No.

Institut Teknologi Bandung
Ministry of National Education
Republic of Indonesia

Republic of Indonesia

Special Assistance for Project Formation (SAPROF) for the Development Project of Institut Teknologi Bandung (III)

Final Report

December 2008

JAPAN INTERNATIONAL COOPERATION AGENCY

PADECO CO., LTD.

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Table of Contents

Appendices

List of Tables

List of Figures

Abbreviations

AMDAL	Environment Impact Assessment System
ANDAL	Environment Impact Assessment Report
B/C	Benefit to Cost
BAPEDAL	Environmental Management Agency, *Badan Pengendalian Dampak Lingkungan*
BAPPENAS	National Development Planning Agency, *Badan Perencanaan dan Pembangunan Nasional*
BOD	Biochemical Oxygen Demand
CADL	Center for Arts, Design & Languages
CAS	Center for Advanced Sciences
CCTV	Closed-Circuit Television
CIBE	Center for Infrastructure & Built Environment Engineering
CITIE	Center for IT in Industrial Engineering
COD	Chemical Oxygen Demand
CRCS	Center for Research & Community Service
DGHE	Directorate General of Higher Education
DIPA	Integrated Budget
EIA	Environment Impact Assessment
EIRR	Economic Internal Rate of Return
ES	Engineering Services
ESC	Engineering Service Consultant
F/C	Foreign Currency
FIRR	Financial Internal Rate of Return
GOI	Government of Indonesia
GOJ	Government of Japan
HEI	Higher Education Institution
HELTS	Higher Education Long Term Strategy
HPLC	High Performance Liquid Chromatography
ICB	International Competitive Bidding
IDR	Indonesian rupiah
IT	Information Technology
ITB	Institute of Technology Bandung, *Institut Teknologi Bandung*
ITS	Institute of Technology Sepuluh Nopember, *Institut Teknologi Sepuluh Nopember*
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
L/C	Local Currency
LAPI	Foundation for Research and Industrial Affiliation, *Lembaga Afiliasi Penelitian dan Industri*
LAPI Yayasan	LAPI Foundation
LCB	Local Competitive Bidding

LPPM	Institute for Research and Community Service, *Lembaga Penelitian dan Pengabdian kepada Masyarakat*
MONE	Ministry of National Education
MOU	Minuets of Understandings
MPN	most probable number of coli-form bacteria
OECF	Overseas Economic Cooperation Fund
O&M	Operation and Maintenance
ODA	Official Development Assistance
PIU	Project Implementation Unit
PLN	National Electricity Company、*Perusahaan Listrik Negara*
PMC	Project Management Consultant
PMS	Project Management Services
PQ	Pre-qualification
PT LAPI	LAPI Inc.
RISTEK	Department for Research and Technology
RPJM	Mid-term Development Plan
S&T	Science and Technology
S1	Undergraduate course
S2	Master course
S3	Doctor course
SAI	Institute Accountant System
SAPROF	Special Assistance for Project Formation
Sqm	Square meter
STP	Sewage Treatment Plant
SUK	Commercial Business Unit, *Satuan Usaha Komersial*
T/A	Technical Assistance
TCP	Technical Cooperation Project
TOR	Terms of Reference
TSS	Total suspended solids
UGM	Gadjah Mada University, *Universitas Gadjah Mada*
UI	University of Indonesia
UKL	Environmental Management Effort
UPL	Environmental Monitoring Effort
UPMA	Academic Assurance Quality Unit
URPM	Community Service Research Unit Centers
USAID	United States Agency for International Development
VAT	Value Added Tax
WB	World Bank

Executive Summary

SAPROF
on
The Development Project of
Institut Teknologi Bandung (III)

Executive Summary

SAPROF TEAM

Contents

- Objectives of the Project
- Necessity and Background of the Project
- Project Component
- Scope of the Project
- University – Industry – Community Linkage
- Project Cost and Finance
- Procurement Method and Packaging
- Project Effectiveness Indicators
- Environmental Consideration
- Implementation Arrangements and Schedule
- Operation and Maintenance Arrangements

2

Abbreviations

- BAPPENAS: National Development Planning Agency, *Badan Perencanaan dan pembangunan*
- DGHE: Directorate General of Higher Education
- EIA: Environment Impact Assessment
- ESC: Engineering Service Consultant
- FC: Foreign Currency
- ITB: Institut Teknologi Bandung
- LC: Local Currency
- PIU: Project Implementation Unit
- PMC: Project Management Consultant

3

Objectives of the Project

To promote qualitative and quantitative expansion of education and research of ITB
by enhancing its research facility and capacity, as well as University-Industry-Community Linkages,
and thereby contribute to the development of:
1)human resources who will be the core of the industry and academic research; and
2)the nation's industry and its competitiveness in the world.

4

Necessity and Backgrounds(1)

- Current situation and challenges of higher education
  - Increase of enrollment is indispensable for sustainable economic growth. (at present below 50%)
  - Another key is quality of engineer – to promote new industries through R&D, taking the merit of globalization.
  - Challenges that top Indonesian universities are facing in autonomy era: dilemma of contracted R&D works (ensuring non-APBN revenue) and educating quality engineers.
- Connection between higher education and industries
  - Majority of the graduates get job in engineering industries.
  - Some of graduates prefer to get a job in financial sector because of the high salary.
  - Private/public corporations compete to employ ITB graduates.
  - Many of ITB graduates become the core/key personnel representing respective industries.
  - Strong tie with state enterprises (ex. PERTAMINA, PLN, PT KAI) through long engineering relationship.
  - High demand for R&D work by the top universities (ITB, UI, etc) as private/public corporate does not have sufficient R&D capacity.

5

Necessity and Backgrounds (2)

- Relevance of the priority field in ITB development plan
  - Renewable Energy responds the energy policy shifting from oil and gas.
  - Biotechnology maximizes utilization to the rich natural resources and leads international competitiveness.
  - Environment and Water Resource prepares the disaster management capacity and quality of life, threatened by the climate change etc.
  - Information and Communication Technology is corresponding to rapid and continuous growing technology globally.
  - Design and Art encourages the Creative Industries and empowers national history and heritage.
- Future impacts to be brought by ITB to Indonesia's industries
  - Strengthen R&D capacity of industry by supplying quality engineers
  - Provide quality, on-demand R&D services to the industries
  - Facilitate synergy between ITB and the industries in R&D works
  - Enhance R&D capacity of other universities nationwide by "producing" academic personnel with R&D skill

6

Project Component (1)

- Construction
  - Building A B- New Construction
    Center for Advanced Sciences (CAS)
    Mathematics and Astronomy
    Center for Research & Community Service (CRCS)
  - Building C – New Construction
    Center for Infrastructure & Built Environment Engineering (CIBE)
  - Building D – Renovation with small extension
    Center for IT in Industrial Engineering (CITIE)
  - Building E – New Construction
    Center for Art and Design & Languages (CADL)
- Renovation work
  Center for Infrastructure & Built Environment Engineering (CIBE)
  Center for Art and Design & Languages (CADL)
- Infrastructure work
  Site development including water, sewage, etc for all above construction works

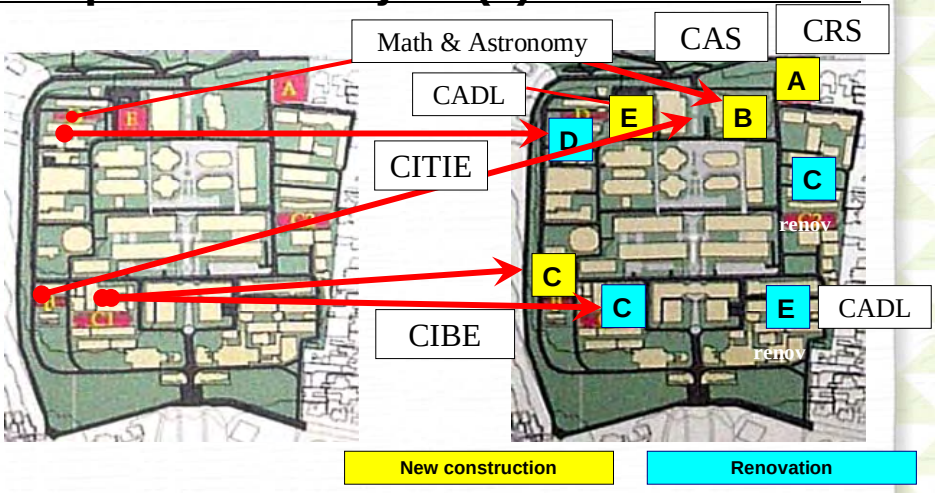
7

Project Component (2)

- Equipment of Research and Education
- Furniture and Books
- Staff Development
  - Degree programs of both master and doctoral students in Japan
  - Program of post-doctoral students in Japan
  - Degree program of doctoral students in Indonesia
  - Short-term oversea study
  - Seminar and workshop oversea and in Indonesia
  - Research Grant
  - Support by appointed professors from Japanese universities for enhancing capacity and quality of nano-tech related research
  - Administrative services of study in Japan
- Consulting Services
  - Support for Project Management
  - Support for Engineering

8

Scope of the Project (1): Construction



new	36,500 m2	new	34,300 m2
renov	7,300 m2	renov	11,100 m2

9

Scope of the Project (2): Construction

	Original			SAPROF		
CAS	new	4F	3,500㎡	new	10F	15,300㎡
CRCS	new	8F	8,000㎡			
				Math. and Astronomy will move to this.		
CIBE	new	10F	10,000㎡	new	10F	11,000㎡
	new	4F	3,500㎡	renov	1F	2,460㎡
CITIE	new	4F	3,500㎡	renov	4F	5,900㎡
	renov		1,500㎡			
CADL	new	8F	8,000㎡	new	8F	8,000㎡
	renov		5,800㎡	renov		5,800㎡

10

Scope of the Project (3): Equipment

- Equipment, Furniture and Books

Equipment is scrutinized by utilization, sustainability and uniqueness.

Unit: Thousand US $

	CAS	CITIE	CIBE	CADL	CRCS	Total
Main Equipment	*High-resolution transmission electron microscopy *Nano-viewer *X-Ray	*Motion Analysis System *Eye Tracking System *Virtual Reality	*Hydraulic actuators *Load Cell *Cahsis Dynamometer Single Axle	*3D Printer *Avid Media Composer Nitris DX system *Physiological Performance Analysis Unit	*Offline Editing-Machine *Distance Learning System	
Equipment	**9,674**	**1,728**	**4,726**	**1,631**	**221**	**18,149**
Furniture /Books	**912**	**396**	**1,509**	**542**	**784**	**4,143**
Total	**10,586**	**2,124**	**6,235**	**2,173**	**1005**	**22,292**

11

Scope of the Project (4): Staff Development

- Staff Development

- Mechanism of fellowship is implemented according to JICA's requirement, even if it is different from GOI regulation.
- Degree program starts from Apr. 2010, instead most program for CAS may start after "Road Map" is developed, i.e. Sep. 2010.

	Master	Doctor		Post Dr	S.Term	Seminar/Workshop		Total # of person
	Oversea	Domestic	Oversea	Oversea	Oversea	Domestic	Oversea	
CAS	4		3	8			20	35
CIBE			6				20	26
CADL		5	5		9	10	10	39
Total	4	5	14	8	9	10	50	100
Cost (1000US$)	324	75	2,561	289	101	11	195	3,556

- Fellowship agency services for studying Japan, for example, supporting on acquiring visa, settlement, and administration services of tuition/allowance payment will be provided by engineering services.

12

Scope of the Project (5): Staff Development

- Support on capacity development for Nano-science

- Appointed professors (*) from Japanese potential collaboration universities will assist making "Road Map" to develop Nano-science, based on the national policy and strategy, ITB strategy and industries' needs.

  (*)Professors who has an experience to coordinate national policy and university policy, and to manage the university.

- "Road Map" shall include the staff development through various fellowship programs, approach for joint/collaboration research with industries as well as community, education programs including graduate program in a future and so on.

- Based on "Road Map", updated idea and approach is applied to the implementation of the project in a flexible manner.

13

Scope of the Project (6): Staff Development

- Research Grant

- Research theme will be selected with competition, but innovativeness and impact to other Indonesia universities are to be encouraged.

- ITB allocates 10.5 bil.Rp for researches on 5 priority sectors annually.

- To support new research centers, additional grant is required.

14

Scope of the Project (7): Consulting Services

- Consulting Services

	Project Management	Engineering Services
Period	60 months	39 months
International Expert	–	10
	–	83 PM
Local Expert	5	28
	133 PM	351 PM

PM: Person Month

15

University – Industry – Community Linkage

- University – Industry – Community Linkage
  - Many linkage projects for Industries and Community are realized based on professors' personal relation.
  - Engineering and consultancy (to tackle the problems/issues) type linkage is more than joint/collaboration research.
  - Although foreign investors (ex. Japanese) have an interest to make linkage with ITB, contact point is not clear for investors.
  - Proactive role for CRCS for linkage is required with administrative staff capacity strengthening. New unit with private entrepreneurship discipline is to be considered as an option.

16

Project Cost and Finance (1)

- Project Cost

	ITB Proposal	SAPROF Proposal	Difference	SAPROF Proposal
	(In thousand USD)			(In million Yen)
Construction	**22,780**	**22,205**	**-575**	**2,376**
Equipment	**28,399**	**18,149**	**-6,107**	**1,942**
Furniture and books		**4,143**		**443**
Research Grant	**360**	**360**	**0**	**39**
Staff development	**4,725**	**3,556**	**-1,169**	**380**
Consulting services	**5,532**	**5,858**	**+326**	**627**
Support on nano-tech	**240**	**241**	**+1**	**26**
Sub-total	**62,036**	**54,512**	**-7,524**	**5,833**
Price Escalation	**1,522**	**8,613**	**+7,091**	**932**
Contingency	**2,711**	**3,156**	**+445**	**338**
VAT	**6,627**	**6,628**	**+1**	**709**
Total	**72,896**	**72,909**	**+13**	**7,795**

17

Project Cost and Finance (2)

- JICA Loan and GOI Portion

		FC (In million Yen)	LC (In million IDR)	Total (In million Yen)
J ICA	Construction (New and renovation of CITIE)	946	93,283	
	Equipment	1,834		
	Staff Development (Overseas and Administration services)	371		
	Staff Development (Support on enhancing capacity and quality of nano-tech related research)	26		
	Consulting services (E/S)	309	18,958	
	Price Escalation & Contingency	572	32,347	
	Total	4,057	144,588	5,719
GOI	Construction (Renovation and Infrastructure)		30,878	
	Equipment		9,335	
	Furniture and books		38,496	
	Staff Development (Domestic)		794	
	Staff Development (Research Grant)		3,345	
	Consulting services (PMS)		8,572	
	Price escalation and Contingency		27,432	
	VAT		61,619	
	Total		180,472	2,075

Project Cost and Finance (3)

- Annual Fund Requirement

In million Yen

	JICA	GOI	Total
2010	358	201	559
2011	977	544	1,521
2012	3,514	842	4,356
2013	702	362	1,064
2014	75	117	192
2015	75	7	82
2016	19	2	21
Total	5,719	2,075	7,795

19

Procurement Method and Packaging

- Procurement method and Packaging

<Construction, Facility & Equipment>
Construction of 4 new Bilds and renovation of CITIE : ICB
Construction of infrastructure and renovation work: LCB
Equipment 1 (for others than CAS) : ICB
Equipment 2: ICB
(for CAS except nano-tech related high-end equipment)
Equipment 3 (Nano-tech related high-end equipment) : IS
Equipment 4 (Ordinary equipment) : LCB
Books and Furniture: LCB

<Consulting Services>
Project Management Consultant: LCB
Engineering Services Consultant: ICB
= Design competition is recommended when ESC is selected.

20

Project Effectiveness Indicators (1)

- Project Effectiveness

  Quantitative (Outcomes) indicators

  - 1) Research capacity expansion

    Laboratory floorage per student of relating faculties: Present → Target

    CITIE 1.6㎡/student → 2.1㎡

    CIBE 2.6㎡/student → 4.0㎡

    CADL-Language 3.5 ㎡/student → 3.1㎡

    CADL-Arts and Design 0.5-0.8㎡/student → 3-4㎡

    Academic Publications in journals and conference: 567 → 770

  - 2) Collaboration research increase

	Present	→	Target
# of international universities involved in research collaboration:	11	→	34
# of collaboration research	38	→	84
# of funding institutions for collaboration research	11	→	28

  - 3) Increase of Students intake

	Present	→	Target
# of intake of relating faculties (master: S2):	300	→	425
# of intake of relating faculties (doctor: S3):	42	→	78

21

Project Effectiveness Indicators (2)

- Project Effectiveness

  Qualitative (Impact) indicators

  - 1) The position and recognition of ITB in the world-level academia will be strengthen.
  - 2) Joint research laboratory proposal from industries will be promoted.
  - 3) ITB's role and contribution to supporting other universities and industries in Indonesia will be increased.
  - 4) Research capacity of other universities in Indonesia will be enhanced.
  - 5) Higher education relevancy to the international market will be improved.
    - * Students' better satisfaction by, for example, high salary, better position, good benefit.
    - * Relevancy between their field of study and their professional position.
    - * Relevancy of competency of graduates and requirement of employment sector in global market.

22

Environmental Consideration

- Environmental Effect

Environment Check List according to JBIC Environment Guideline is as under;

1. EIA, Environment Permit and Public Explanation
2. Mitigation Measures
3. Natural Environment
4. Social Environment
5. Others

Most items other than under-mentioned, are considered as "not applicable" or "negligible".

2.(3) Waste : Waste treatment is properly done by existing facilities.

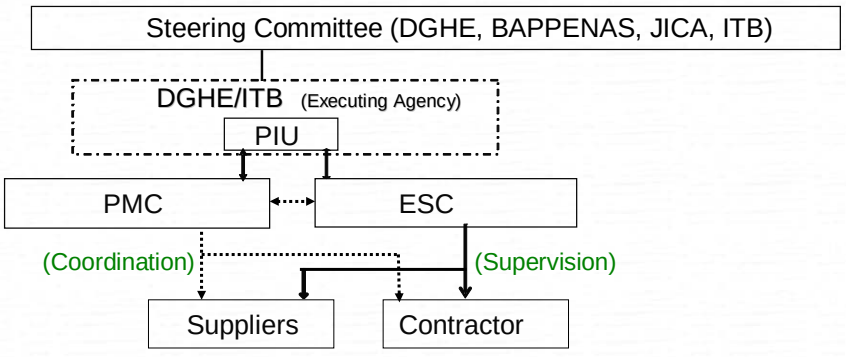
4.(3) Heritage: Historical buildings and landscape are reserved.

5.(1) Impact during construction: Noise and dust should be cared.

23

Implementation Arrangements and Schedule(1)

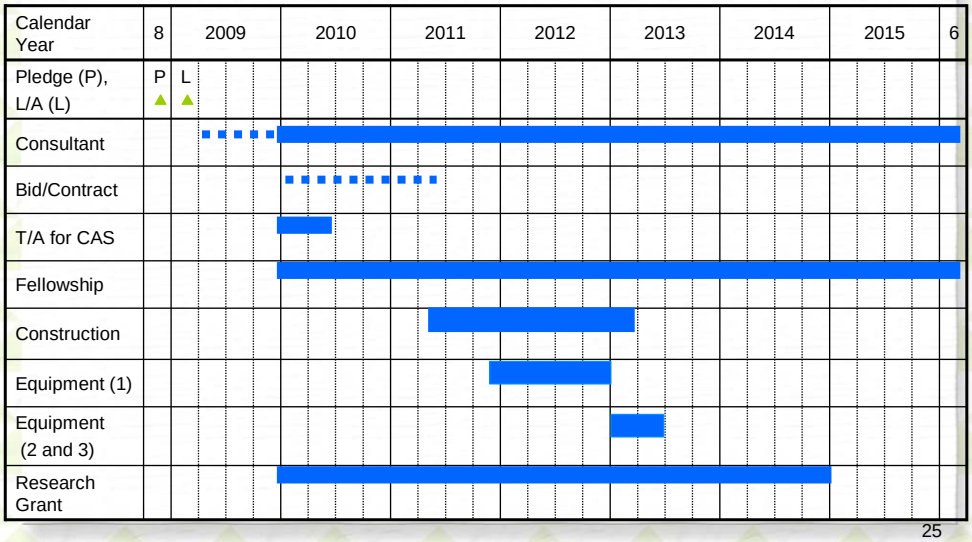
- **Implementation Arrangements**



24

Implementation Arrangements and Schedule(2)

Implementation Schedule



25

Operation and Maintenance Arrangements

Operation and Maintenance (O&M) Arrangements

	O&M Activities	Responsible Unit
Operation	Electricity, water, phone	Directorate of Assets
	Computer Network	Information Resources TIU
	Supplies (Laboratory, office)	Centers
Maintenance	Equipment	Centers
	Building and Infrastructure	Directorate of Assets
	IT facilities	Information Resources TIU

- New regulation about allocation of Institution Development Fund (IDF) was issued in 2007.
-15-17% of income from collaboration activities should be allocated as IDF.
- Among IDF, 20% of it should be allocated for maintenance and capacity development for ITB resources.
- Present O&M expenditure (particularly building maintenance) is not sufficient.

26

0 BACKGROUND AND OBJECTIVES OF THIS STUDY

0.1 Summary of Development Project of ITB (I) and (II)

ITB was established in 1920 as the first university in Indonesia. Since then, it has produced top level scientists, engineers, and researchers who have contributed to industries, academia, and have played a crucial part in advising on the technology policy and economic development of Indonesia. In 1988, ITB compiled a campus development Master Plan. Along with this Master Plan, in the 1990s, the Development Project of ITB phase I and II were carried out with an OECF loan assistance.

The first project aimed to improve internal efficiency of education and to establish new departments, such as a Department of Ocean Engineering and Material Engineering, which were strategically important towards the industrialization and technological development within Indonesia. The first project was soon followed by the second one aiming further improvement of internal efficiency of education, and enhancement of the quality of graduate studies and research in the designated Faculties. The table below shows a summary of the Development Project of ITB (I) and (II).

Table 0.1 Summary of Development Project of ITB (I) and (II)

Project Period	1992 – 1997	1994 – 2002
Project Cost	1,830 million Yen	7,767 million Yen
Loan Portion	1,570 million Yen	7,180 million Yen
Project Component		
Construction	Main buildings: • Faculty of industrial technology	Main buildings: • Faculty of mathematics & natural science • Faculty of earth science & technology • Computer center • Science technology art center
Equipment	• Equipment related to faculties whose buildings were constructed by the project	• Equipment related to faculties whose buildings were constructed by the project
Fellowship	None	46 lecturers
Consulting services	• PMS • E/S	• PMS • E/S • Oversea study support services
TA	• Fellowship services • Japanese language training services	• Curriculum Development • Higher education management, etc

Source: Ex-post evaluation reports

According to the ex-post evaluation reports of these two projects, the undergraduate and graduate education and research of the designated Faculties was greatly enhanced. However, operation and maintenance (O&M) arrangements including measures to cover the cost of buildings, facilities, and equipment were in need of improvement.

Considering those outcomes and observations made from the previous two projects, this study was conducted to assist formulating a new Development Project of ITB.

0.2 Objectives of This Study

ITB has developed the ITB Development Project 2007–2017, 'Strengthening Institutional Quality towards International Standard', and proposed it to JICA (formally called JBIC).

This SAPROF study was conducted to formulate the Project details so as to be suitable for the JICA financing, by:

1) Assessing the necessity and background of the proposed project;
2) Confirming the relevance of the proposed project;
3) Verifying the scope of the proposed project; and
4) Verifying the implementation, operation and maintenance plan and arrangements.

1 NECESSITY AND JUSTIFICATION OF THE PROJECT

1.1 Current Situations and Challenges of Higher Education in the Field of Engineering

The overall GER (Gross Enrolment Rate) of Indonesian higher education was at 17% (2006). This rate is low compared to most nations, and it reflects the slow development of Indonesia as compared to other developing countries (e.g. Malaysia 2005: 29%, Philippines 2006: 25%, Thailand 2006: 46%, China 2006: 22% data from World Bank edstats). In the developed countries, GER is more than 50% (e.g. Japan 2007: 56.4%, USA 2004: 52.1%, UK 2005: 62.6%, France 2005: 41% data from Ministry of Education, Culture, Sports, Science and Technology – Japan).

The situation is grim due to the fact that natural science & engineering student enrolment is below 50% of the total student enrolment. While it is well understood that a nation's competitiveness will rely much on the active contributions of its natural scientists and engineers, the condition seems worse as there is an expected decrease in student's interest to enroll in science & engineering in the future. If the worldwide enrolment rate in science & engineering decreases significantly, then it may influence Indonesia as well in the near future. But the efforts to increase the capacity of engineering education are restrained by inadequate funding in covering the investment and recurrent cost. Engineering education needs substantial funding to achieve the minimum standards, both at the investment stage as well as at the operational stage. The tuition fee for engineering school is much higher than other fields of study with the exception of medical school, further engineering education is considered as a difficult subject for most people. Along with those reasons the uncertain career prospects for engineering, the enrolment in engineering education is on the decline. In the worst case situation programs like Agriculture Engineering might have to be closed due to the lack of students. In Indonesia, to avoid such a situation, it is recognized that affirmative actions must be taken by the government, especially if it plans to increase the enrolment rate in science and engineering.

Table 1.1 Ratio of Science & Engineering Enrollment to the Population in Different Countries

Country	Data	Average	Ratio of Sci&Tech (per Population)
Australia	Enrolment in Sci&Tech	231,621	1.13%
	Population (UNESCO,2006)	20,530,424	
Brunei Darussalam	Enrolment in Sci&Tech	504	0.13%
	Population (UNESCO,2006)	381,951	
Cambodia	Enrolment in Sci&Tech	7,599	0.05%
	Population (UNESCO,2006)	14,196,612	
Indonesia	Enrolment in Sci&Tech	1,084,317	0.47%
	Population (UNESCO,2006)	228,864,479	
Japan	Enrolment in Sci&Tech	798,272	0.62%
	Population (UNESCO,2006)	127,953,098	
Malaysia	Enrolment in Sci&Tech	265,066	1.02%
	Population (UNESCO,2006)	26,113,733	
Philippines	Enrolment in Sci&Tech	632,532	0.73%
	Population (UNESCO,2006)	86,263,714	
Republic of Korea	Enrolment in Sci&Tech	1,321,503	2.75%
	Population (UNESCO,2006)	48,050,440	
United States	Enrolment in Sci&Tech	2,646,954	0.87%
	Population (UNESCO,2006)	302,841,222	
India	Enrolment in Sci&Tech	2,212,595	0.19%
	Population (UNESCO,2006)	115,175,1462	

Source: UNESCO

Increasing the enrolment rate in natural science and engineering will have to be followed by improving the quality and relevancy of education. In Indonesia however, more than 50% of the graduates with higher education are working in fields other than natural science and engineering. This is due to the mismatch between the productive sectors' need and the qualification of the graduates. Or it is due to the fact that natural science & engineering could not offer better incentives and remuneration, and therefore the graduates prefer to work in other promising jobs.

Investment in higher education especially in natural science & engineering is very expensive and therefore the educational fee for students becomes high. Students and their parents invest in higher education, as they expect that the income once they graduate later on will be significantly enough to cover or 'repay' their investment. Industrial development and science technology development in Indonesia have been growing slowly and they have not been able to attract graduates to work those sectors. The financing business for example, is still much more attractive.

It seems that industrial development in Indonesia is in a vicious circle. To boost the industry, they need qualified scientists and engineers which are churned out by the higher education institutions. In order for the scientists and engineers to contribute to the industry then there should be the incentives provided by the government and the industrial sector. The incentives will only be available if industry grows at significant level; however, a well qualified human resource is essential for that growth. The circle has to halt at some point and development policy should be created from so as to change the course of industrial development. It is quite reasonable if the starting is from human resource development, where experience of many advanced countries shows that investing in human resource development will be very beneficial for the economic growth of the country.

In the developed countries, the main thrust of industrial development is a qualified human resource backed up by a strong political will for investment. Relocation of industrial sites and science & technology centers now follow host countries that can provide the competitive human resources. Infrastructures and natural resources are no longer the dominant factors in determining the industrial site location. Especially with the advancements in ICT the world is by far borderless. The fast enhancement of ICT and shorter cycle of technology development, the quality of human resources becomes the determining factor.

To train qualified natural scientists and engineers requires an intensive investment in higher education system, including the establishment of world class universities, institutes, advanced research & development centers, and the recruitment of top quality students, faculty members, researchers. The initial stage should be led by the government where an effective investment program is launched for that purpose. In many countries, the government selected several top universities to become centers of excellence with the provision for a significant multi-year investment budget. Once the centers are established then the government's support shifts to performance based funding. In the meantime the centers already have the capacity to generate more support from the stakeholders.

The investment policy when dealing with a limited budget, for many beneficiaries has to be decided through selection process. Otherwise the investment will be meaningless if it is thinly distributed among all institutions. In the case of Indonesia, the government has to select among the top universities for natural science & engineering to be supported as centers of excellence. ITB is eligible candidate to be financed as center of excellence since ITB has been quite advanced in science & technology development with many international publications, patents, prominent researchers and professors, etc. Data shows, in comparison to other national universities, the programs and teachers for doctorate as well as master programs, particularly engineering, are far well-regulated (shown in Appendix 1.1-1). In addition the quality of the programs is assured from accreditation grade (shown in Appendix 1.1-2). ITB surpasses other universities in Indonesia in the field of science & technology, and ITB has become the benchmark of science & technology development among Indonesian higher education institutions. Most universities in Indonesia put ITB as their model for future development in science & technology, and therefore it is crucial for ITB to determine its future development policy.

The policy to select several centers of excellence as the prime mover for national competitiveness will only work if they can pull forward other universities for further quality & relevance improvement. This in turn will allow other universities to also move forward with a synergy that can meet the current global challenge and competition. As the center of excellence ITB has the task to lead and facilitate other universities, and also other research institutions, so that their competitiveness levels mutually grow. Under such a mechanism, the significant investment for ITB will benefit the nation.

Developing a center of excellence can not commence from scratch, otherwise the investment will not be put to its best. There should be a certain level of achievement so that any further investment will exponentially increase the performance of the center. The necessary factors for successful center of excellence are strong academic & research tradition, competitive mindset, commitment & loyalty to the institution. ITB fulfills these requirements therefore any investment towards ITB will enhance excellence in science & technology.

In the international level, ITB is recognized widely for its scientific achievement indicated by the citation index. It is still small compared to many other top universities in the world, and thus

ITB needs to strengthen its academic and research capacity. The government should start by considering an appropriate budget. One of the main constraints of the ITB enhancement program in becoming a Center of Excellence is its deficient strategic apparatus to address advanced research. In order to meet global competition ITB needs to find its niche specialization, otherwise it is difficult to compete with other top universities with the given resources. A plausible solution will for ITB will be to use its strategic location to obtain national competitiveness.

1.2 Connection between Higher Education in the Field of Engineering and Industries

The SAPROF team conducted a series of interview sessions with two top universities (ITB and UI), and 10 business entities to investigate interrelation between the higher education, particularly ITB, and industries.[1]

It found that there is a steady and continuous demand by both public and private sector, for the universities (i) to produce quality engineers, and (ii) to conduct R&D works. Such expectations, especially towards these top universities, is very high, while universities feel that they have still not been able to meet up to those demands yet.

The recent background of the Indonesian economy having recovered from the financial crisis in 1997, has only added to the continuous demand for university graduates with an engineering background. Quantitatively speaking, Indonesia is not in a serious undersupply of fresh graduate with engineering background. But when it turns to “quality” engineers, however, competition among employers is very tough. Fostering the number of quality engineers is one of the challenges that Indonesian universities (especially top universities including ITB) are facing. By “quality” many in the industry imply “R&D skill with a sound knowledge”.

R&D work by universities is a promising area; top universities in Indonesia are well trusted by the industries and they contract R&D work to the universities. This brings universities another challenge – maximizing the quality and quantity of contracted R&D work, while continuing their commitment in providing quality education in order to raise quality engineers.

For an Indonesian university, this is not a question of “quality or quantity”. Indonesian universities, especially those top ones, need to pursue both the quality and quantity of the graduates. The top universities interviewed recognized that it is their mission to continue producing more number of graduates with better skills, which in turn to be one of the fundamentals of Indonesian industry to further prosper.

[1] SAPROF team visited recruitment firm (1), industrial estate management firm (1), Japan chambers of commerce, and manufactures (7). Refer to Appendix1.2-1 for the list of interviewee and summary of interview outcomes

1.2.1 Demand-Supply Analysis Showing the Relations between the Supply of Human Resources Backgrounds in Engineering Science and Technology, and the Demands from Industries in Indonesia, including Transitional Changes

(1) Overview

Overview of the demand and supply of engineers is as follows.

- Demand: Emerging demand for "quality" engineers with R&D skill and knowledge.
- Supply: Quantitatively the graduates with engineering background are not seriously under-supplied. But fostering more "quality" engineers is a challenge that universities are facing.
- Not all the students with an engineering degree find a job in engineering. Many students prefer to work in non-engineering sectors as they offer high salary.
- Oil & mining, and banking sectors are gaining popularity regardless of the nature and position of work they offer.
- At the same time R&D work undertaken by universities is useful to the industries to supplement their shortage of R&D capacity

Universities consider that Indonesian industries need engineers with R&D skills. According to an interviewee (UI), Indonesian industries are mainly concerned with assembling – in other words they just follow the instructions from manuals. These manuals are researched and developed somewhere else, and not in Indonesia. To progress to the next level of industrial development, localizing research and development (R&D) is a key, and thus supplying sufficient number of "quality" engineer has become indispensable.

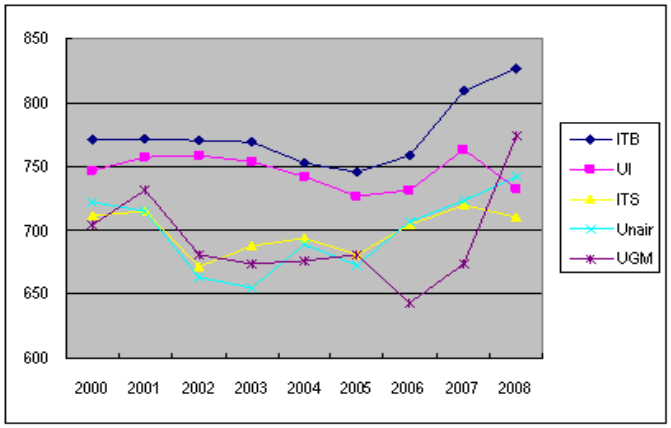
Industry also foresees higher demand for engineers with more specialization, though it also depends on the type of industry. By "better quality", they mean engineers with more focused and precise knowledge on their expertise, and with R&D knowledge and hands-on skill.

Local Indonesian firms have been active in R&D work, either on their own or by contracting to universities. There is a growing potential also with foreign enterprises; some of them have already opened R&D center and many (not all, of course though) are interested to follow suit. For example, according to an interviewee, Japanese firms are keen on minimizing the number of Japanese staff seconded from their headquarters, and to "localize" the whole production operation. It would be an effective cost-saving choice, but also at the same time, it is a contribution to the Indonesian society at large. Such view is shared widely among Japanese enterprises interviewed during the study. When R&D localization is planned, firms naturally need to hire local engineers with R&D skills.

(2) Supply of ITB Graduates and Its Characteristics

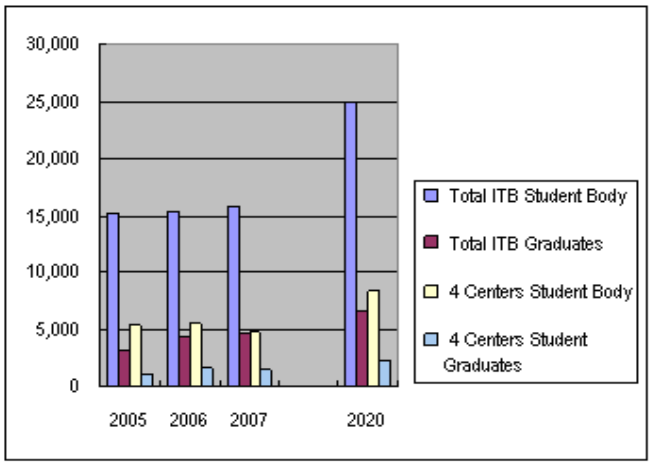
ITB has a very competitive system of student intake. According to ITB teaching staff, ITB takes only the top 1% students nationwide[2]. According to the National University Entrance Exam result, mean scores of ITB entrants have been at the top since 2000.

[2] In fact, it is 0.4%. There were 1,076,184 fresh graduates from high school while student intake (August 2007) was just 4,578 (Source: ITB & MONE (http://www.depdiknas.go.id/statistik/0607/sma_0607/tbl_01.pdf)



Source: DGHE

Figure 1.1 Means of Entrance Examination Score, Top 5 Universities in Indonesia



Source: ITB

Figure 1.2 The Numbers of ITB Students and Graduates

Among 13 faculties and schools[3] under ITB, the followings are especially popular among students:

<Popular ITB faculties among students>
- Faculty of Industrial Technology,
- Faculty of Mining and Petroleum Engineering
- Faculty of Civil and Environmental Engineering, and
- Faculty of Art and Design.

There are approximately 3,100–3,500 graduates produced every year from ITB, and it is expected that the proposed 4 centers would serve for 1,000–1,300 of the total graduates supplied to the labor market every year. ITB master plan aims to increase student body by 1.26 times from current 15,851 (2007) to 20,000 at the main campus in Bandung[4]. Assuming the same growth at the main campus, the proposed 4 centers would serve for a total of 1,200–1,700 graduates every year.

Upon graduation, most of the students prefer getting a job in accordance with what they have majored; however, not all of them find a job in the engineering field. In fact, many of the graduates find a job regardless of their engineering expertise. These days, oil & mining and banking sectors are gaining popularity among the graduates as they offer very attractive salaries and allowances.

According to the office of the vice rector (student affairs), ITB is widely recognized as the best science and technology university in Indonesia and that ITB graduates in general are talented and have great potential. Yet ITB recognizes there is much scope in producing high quality engineers, and no just fostering "general" engineers. Quality refers to producing engineers with more specific and concrete knowledge of their expertise with specific R&D skills.

(3) Demand for ITB Graduates: Very High

"ITB as the number one in Indonesia", whose evidence is shown in the section above, is also the shared view in the industry. Dislike graduates from other "ordinary" universities, ITB graduates are on high demand. For those have not hired one yet, it is considered prestigious to hire an ITB graduate, according to one factory manager interviewed during the study. Perception of employers toward ITB graduates include:

[3] ITB has following faculties and schools
- Faculty of Mathematics and Natural Sciences
- School of Electrical Engineering and Informatics
- Faculty of Mining and Petroleum Engineering
- Faculty of Industrial Technology
- Faculty of Earth Sciences and Technology
- Faculty of Mechanical and Aerospace Engineering
- Faculty of Civil and Environmental Engineering
- Faculty of Art and Design
- Graduate School
- School of Pharmacy
- School of Architecture, Planning, and Policy Development
- School of Business and Management
- School of Life Sciences and Technology

[4] ITB aims to increase total number of students up to 25,000, including satellite campuses.

Positive	Negative
Very competitive	Expensive
Have leadership	Arrogant (sometime)
Rationale	Not very good at setting research question[5]
Critical thinking	
Good communication skill	
Confident	
Well focused to achieve the target	

This makes an average ITB student get placed with employment shortly after graduation. Recently, the lead time to the first employment after graduation has become shorter and shorter; it used to be 4–5 months but now 1–2 months after graduation. Annually, a total of 200–300 firms approach the student recruitment office of ITB to fill up 600–800 positions. For example, an oiling company (originating from the USA) offers tied scholarships for a 4th grade student (chemistry, machinery and physics students in their 7th semester). Under the scheme the firm pays tuition and other costs while the student promises to work at that company upon graduation. It is not understatement to say that an unemployed ITB graduate is unheard of. In fact ITB graduates also have a sense of entrepreneurship, so they would start business before being categorized as unemployment, according to the Office of the Vice Rector.

The list below displays popularity growing fields of study, and ITB is facing the difficulty in meeting the demand of graduates required:

- Earth Science (Faculty of Mining and Petroleum Engineering)
- Information Technology (School of Electrical Engineering and Informatics/Faculty of Industrial Technology)
- Electronic Engineering (School of Electrical Engineering and Informatics),
- Industrial Engineering (Faculty of Industrial Technology), and
- Industrial Machinery (Faculty of Mechanical and Aerospace Engineering).
  (Underline: match with the popular faculties mentioned above)

(4) Demand for R&D personnel

Among seven manufacturers interviewed, five of them have needs for R&D works in some form to be done locally in Indonesia. This is convincing result that there exists a demand for engineers with R&D skills in Indonesia. For example, a heavy construction machine manufacturer (PT Komatsu) and water pump manufacturer (PT Ebara) already have an R&D section in Indonesia to design attachments to their products. Also a printer manufacturer (EPSON) would like to start R&D (product design). At Ebara, for example, a graduate of ITB (graduated around 20 years ago) now serves as Vice Plant Manager and is responsible for entire plant operation employing 330 workers including R&D works. The Plant Manager (interviewee) expects this person to be the future plant manager in the near future.

Point here is that this personnel joined the pump manufacturer 20 years ago (when demand for the quality engineers was not significant as it is now), and is now holding a key position managing the whole operation of the factory including R&D. This implies that although the demand for R&D personnel was not significant before, now it is increasing, and also that it is considerably important to keep supplying engineer with good potential.

[5] This comment was not addressed particularly to ITB graduates. Context is this; Indonesian university graduates in general is not good at setting good research questions, and this applies even to ITB graduates

Business is a continuous and dynamic process of decision making, and in the process, business always attempts to rationally maximize the capabilities of the employees. Given this, it is always worthwhile to keep upgrading the average skill level of engineers to be supplied. The more number of quality engineer supplied to the market, the better chance for the employers (industry) to utilize the potential of the employees, hence the better chance for the industry to proceed to the "next" level from a currently "assembling" industry.

1.2.2 The Higher Education's Correspondence and Performance, in the Field of Engineering Science and Technology, toward the Human Resource and Research Demands of the Industries in Indonesia

Overall, demands for R&D work by the industry are on the increase but industries do not have sufficient capacity to conduct the work. Thus, many of them contract this work to the top universities (such as ITB, UI, UGM, ITS, etc) in Indonesia, while at the same time they also expect that these universities will produce more quality engineers eventually. This section focuses on demand of the industries for R&D work by the university.

(1) How does university respond to needs of the industry?

Setting up an organization is the ordinary response to how Universities respond to the demands from the industries for R&D works, collaboration, etc. LPPM is the case for ITB. After the deregulation, universities are able to set up such centers. Universities have become autonomous, independent entities with freedom to conduct contracted R&D work.

The deregulation has unveiled that: (i) there is a huge R&D demand in industries (private and state) and (ii) there are insufficient numbers of engineers in the industry who are capable of R&D works; therefore, many parties come to the universities to contract / collaborate for R&D works.

In Indonesia, four universities are leading in collaborating with industries: ITB, UI, ITS and UGM. For example, UI has a plan to develop a business incubation center called "Science Park[6]" which is counterpart of LPPM in ITB. Like LPPM, the Science Park is capable of research for development, consulting, survey etc in their business line. It also plans to have business accommodation facilities on top of the incubation facilities.

(2) Is university effectively responding to the needs?

As for the LPPM of ITB, in 2007, it managed a total of 521 projects worth IDR. 146 Bil (equivalent of JPY 1.6 Bil). This includes 168 research projects that were worth IDR 24.9 Bil (Eq. JPY 280 Mil). PT LAPI, a LPPM wing that is a kind of corporate entity, managed in total 284 research projects and community service projects that were worth IDR 124 Bil (Eq. JPY 1.4 Billion) in the same year. It is fair to say that ITB has been quite effective to respond to industry needs. Within a relatively short period of time (only 7 years since the deregulation), ITB managed to form an organization that is capable of handling hundreds of contracts annually.

(3) What Role do Industries expect the Universities to Play?

Apart from producing a more number of quality engineers, it is a common view that ITB is trustworthy in contracting for R&D work. Material testing, surveys, and marketing study, etc would be more promising areas. As an example, a water pump manufacturer (PT Ebara Indonesia) already had a joint R&D work with ITB to develop a Turbine Electricity Generator

[6] http://www.research.ui.ac.id/v1/images/stories/uisp/exec-summary-rev.pdf

(2004–2007). These initial findings are convincing enough that there are R&D requirements to be carried out through contract-out or joint endeavors.

(4) Challenges

Contracted R&D work by University; however, seems to be a double edged sword. A university is both an educational and a research institution serving to the community at large, so its function is not only limited to one domain. Conducting contracted R&D has a both pros and cons

Pros	Cons
• Raise revenue to the university • Teaching staff can conduct real research which is useful for society • University can contribute society at large through practical work	• Teachers would spend too much time for the contracted R&D work, and this could compromise the resources available in producing quality engineer

To maximize the benefit of the proposed project for ITB, it is highly recommended that the proposed project should be ready to minimize the "cons". With this context, SAPROF team proposes a TA for institutional strengthening of CRCS, aiming to develop internal business procedures and roles to prevent sacrificing academic vigor, to maximize the pros and minimize the cons.

1.3 Relevance of the Priority Field Proposed in ITB Development Plan

1.3.1 Relevance of the Priority Areas except Nano-Science Technology Set in the ITB's Proposed Master Plan

(1) Relation between ITB Priority Areas and National Priority Areas

ITB describes on its master development plan in the period of 2006 to 2025 that its vision and mission should be formulated in coordination with the framework of Indonesia National Development Vision. Therefore, one way to evaluate the relevance of the priority fields selected by ITB is to examine the harmony with Indonesia national development plan. ITB set five priority areas shown below:

1. Renewable energy (Alternative energy)
2. Biotechnology
3. Environment and water resource
4. Information and communication technology
5. Design and art

The current Indonesian National Science and Technology (S&T) Development Plan (2005–2009) was launched in August 2005 aiming to develop science and technology for national development and prosperity of the people, through actions in following six focus areas:

1. Food resilience
2. Sustainable energy
3. Effective and efficient multi-modal transportation
4. ICT for economic prosperity and good governance
5. Health and pharmaceuticals development (including herbal medicine)
6. Self-reliance in defense technology

RISTEK suggested that the following may hinder the S&T development speed, they are: a general low level of research capability manifested in a shallow bench of S&T human resources, limited laboratory facilities and inadequate R&D funding. Gross domestic expenditure (0.05% as GDP) on R&D in Indonesia was at a very low level in 2001, compared to levels in neighboring countries Singapore (2.1%), Malaysia (0.69%) and Thailand (0.24%). This indicator did not improve much in the last five years. The drastic improvement cannot be expected in the future, because there are so many prioritized problems to be solved in Indonesia, for instance, poverty problem, sanitation and health problem, primary and secondary education improvement. If the Indonesia Government invests in all the areas of science and technology using the R & D budget, each area of the science and technology can receive only very limited amount of research fund. Under this situation, Indonesian R & D performance will be surely inferior even to the neighboring countries. Therefore, Indonesia should find niche research areas producing world-class research results (e.g. in agricultural biotechnology) and invest those intensively.

The S&T organization and infrastructure in Indonesia is slowly moving away from a previous dependence on public sector funding to more application-oriented commercial enterprise and innovation. We encountered several examples of this trend at ITB when we visited LPPM, and Yayasan LAPI. However, almost all of those linkages were based on engineering works such as design of plants, maintenance of plants, and instructional roles through trainings, seminars and workshops. In addition, those linkages are mostly initiated by senior teaching staffs. Therefore, it seems that the linkage based on research and development activity with the industry is still weak. Therefore, Indonesia should find niche research areas producing world-class research results (e.g. in agricultural biotechnology).

Renewable energy is one of the areas prioritized by ITB which directly corresponds to the GOI prioritized ***sustainable energy***. Development of sustainable energy resources is a global issue, because fossil fuel will be exhausted in the future. Indonesia as a country is the largest producer of crude palm oil and it has abundant of biomass. It is therefore quite relevant that ITB, as a leading research institution in Indonesia, tackles renewable energy development. In ITB, the following research is being carried out: biodiesel fuel using palm oil, jatropha curcas et.al., and its combustion, bio-ethanol production processes, gasification of biomass like empty fruit bunch, tissue culture of jatropha curcas and oil palm. The research is spread across several schools and departments including mechanical engineering, chemical engineering and school of life science and technology. As global consensus, it has now become important that renewable energy be produced from other than food sources. This has been termed as the second-generation renewable energy. ITB has started research on the second-generation renewable energy in accordance with this global consensus. However, ITB researchers face many constraints like unavailability of latest instruments for measurement. For instance, researchers of chemical engineering mention that if enzyme activity in bio ethanol process is identified in situ, they can develop the most effective process for bio ethanol production.

Biotechnology is closely related to the areas of ***sustainable energy***, ***food resilience*** and ***health and pharmaceuticals development*** prioritized by GOI. The Biotechnology Faculty was set up when Inter-University Center was established at ITB by World Bank in 1985. School of Life Science and Technology was found by separating the Biology department from the Faculty of Mathematics and Natural Science in 2006. Now, there are a total 38 teaching staff at the school of life science and technology and all of them hold a PhD. The school sends young staffs to doctoral programs overseas including Japan, to expand its new bioengineering study program.

Research activities in the school of life science and technology are carried out by four research groups of ecology and bio systems; physiology, developmental biology and bio-medics; microbiology, genetics and molecular biology; plant science and biotechnology.

Later two research groups are carrying out researches on bioscience and biotechnology. Research subjects are as listed below.

1. Micro-biology, Genetics and Molecular biology group
   a Silent gene to stop ripe of fruits, like banana.
   b DNA and LMA analysis of leafs to prevent deceases of Indonesian tropical plant.
   c Cancer mechanism from cell analysis

2. Plant Science and biotechnology
   a Investigation of the best plant to produce bio-fuel using tissue culture method
   b Bio remediation to clean polluted air and water.
   c Production of microalgae to clean the fishery water.

The School of Life Science and Technology started a linkage program with industry sector including foreign company with a new model. This linkage program was supported by DGHE, ITB and three companies, PT. Charoen Pokphand Indonesia (HQ Thailand), PT. Kimia Farma, and PT. Kalve Farma.

As mentioned above, biotechnology group at ITB is actively conducting research on subjects to strengthen the food industry, renewable energy industry and to enhance health of Indonesian people. However, ITB does not have a DNA inspection facility and the researchers send the samples to Korea for DNA identification. It takes more than one month to obtain the DNA results after sampling. In addition, the school of life science and technology does not have an electron microscope to observe bio samples in high resolution. Neither do they have access to manipulator for gene modification. Those apparatuses are necessary for advanced life science and technology researches.

Environment and water resources is corresponding to the goals of the ***health and pharmaceuticals development*** prioritized by GOI. At the Faculty of Civil and Environmental Engineering, four laboratories are carrying out research concerning the environment and water resources. They are laboratories of water quality, air and water management, water processing engineering, and solid waste disposal.

Those laboratories are very actively collaborating with local governments and private companies. For instance, they have set up a self-monitoring system of landfills with local governments; an electronic base or board waste problems are being addressed by working with a private company, and water treatment system development is being carried out in association with a Japanese construction company; and the laboratory is working to provide technical advise and consulting to the central government,

As mentioned above, ITB activities in this area has always been in accordance with the central and local governments working in order to preserve local communities' environment.

As a conclusion, ITB's selection of this priority area is quite relevant to conserve Indonesian health living standard. However, installed equipment and facilities such as computers, chemical analysis equipment in this faculty are one- or two-generation older than the latest one. For

effective and efficient research and education performance, those old equipment and facilities needs to updated at the earliest.

Information and communication technology activities correspond to the ***ICT for economic prosperity and good governance*** goals prioritized by the GOI. In Indonesia, research and development on ICT must focus on software, open network systems low cost-access and contents service rather than hardware, because there are few IC-hardware local industry companies Development of information and communication technology is mainly developed by the School of Electric Engineering and Informatics. The school sets forward five innovation outlines concerning ICT. Those are as follows:

1. ICT as a platform for socioeconomic development
2. Development of five packages of rural ICT
    a Technology
    b Products
    c Services
    d Investment
    e Community development
3. Institutional Research using research agenda (research roadmap)
4. Embed within ITB academic setting
5. Administer through virtual research center

Concerning the innovation outlines 1, and 2, which are most closely related to the government priority, the school is carrying out various researches and developments as mentioned below.

1. Development of next generation network handling text, voice and image as well as its network security, application software and infrastructure
2. Development of intelligent deposit system, for instance text, image and voice data storage.
3. Development of digital graphic contents, software and hardware for graphic animation, art, and game
4. Development of autonomous system such as intelligent software and hardware, robotics and automatic e-commerce
5. Development of clean energy power system for preservation of environment
6. Development of huge database system and devices for education and tutorial system

The school also participates in the national research projects: Design and development of chips based on wymax standard for wireless network.

Through these research achievements, the information and communication open systems can be constructed and any person can access the necessary data and information for business, health, medical therapy, leisure and so on. Low cost-access is realized by wireless access using mobile phone and IP phone.

As a conclusion, ITB’s selection of ICT as a priority area is reasonable beyond questions to bring about knowledge-based society in Indonesia. In addition to ICT research activities done by School of Electric Engineering and Informatics, ITB intends to introduce ICT into manufacturing systems in Indonesia to strengthen Indonesia manufacturing industry. This intention is very reasonable, because manufacturing industry companies all over the world are using ICT processes in their production systems, marketing, and material and parts purchase. Department of industrial engineering will develop a new education program and research

agenda. However, their computer facilities are obsolete and should be replaced with new powerful ones. Human resource of professionals to teach students and researchers must be strengthened to educate and research new ICT systems for effective and efficient manufacturing system development.

Design and art is selected as one priority area by ITB, because Art and Design serves as major contributor of the creative industry of Indonesia and has been set as one of the priority sectors in the creative industry of Indonesia (Indonesian roadmap for developing creative industry 2009–2015. *The Development of Indonesian Creative Economy 2025: Results of National Convention on the Development of Creative Economy, June 2008. National Ministry of Commerce*). In Indonesia, 24 other institutions than ITB are teaching design and art program courses, but most of all program courses are related to dance, traditional music and other performance. ITS has only game design program using computer graphics. ITB is the only institution that has comprehensive design program including industrial design and master, and doctoral programs.

Center of design and art has following three functions:

1. Education
2. Researches on Indonesia culture and heritage: for instance, development of new batik design, new material for batik, and technology
3. Information access from outside

It is understandable that research and education of design and art can contribute significantly to creative industry companies to thrive in Indonesia. As creative industry firms are founded increasingly, labor force demand for design and art engineers will in turn steeply increase. ITB having comprehensive programs on design and art in education and research can only take a leadership role to found creative industry firms.

As a conclusion, this priority area has also appropriately been selected. However, the classrooms are very small to accommodate all the students. High-power computers are necessary to install latest version of CAD and CAE, but only obsolete PC are available. To study the design and art, quick modeling machine is inevitably required, but their labs are not equipped with them.

(2) ITB Policy to promote Research Activities on the Priority Area

Management for promotion of the research activities on five priority areas is conducted by LPPM. Every year, the research fund of 10.5 billion IDR is allocated at five priority area researches. In inter-university center founded by World Bank in 1994, five research centers related to the five priority areas were established. However, the research fund was not automatically distributed to those research centers, but research proposals were accepted from any research groups formed by those center, departments, and individuals. Appendix 1.3-1 shows the research topics awarded by this fund.

As seen in the table, ITB has been making appropriate efforts to allow research on the five priority areas.

(3) Summary

In the Strategic Plans 2006–2010, ITB declares to establish its position as a research institution as well as an education institution. The priority areas are selected by ITB senator’s decree to accomplish this objective. Considering that ITB selected priority areas can harmonize the national economic development strategy and the national priority areas on science and

technology, and that ITB human resource is available to carry out and sustain the research activities, the five priority areas were selected. Especially, the area of design and art was established as the pioneer and role model of tertiary education of Art and Design studies in Indonesia in 1974 and actively assisted the establishment of Art and Design study programs in other institutions such as Universitas Trisakti in Jakarta (1980s), Institut Teknologi Nasional in Bandung (1990s), and Universitas Bunda Mulia in Jakarta (2000s). As described in details in the previous section, five priority areas are selected to match with and support the national development plan in science and technology, and to assist creative industry emergence. The ITB strategic plan and its model to establish a research institution can be transferred to the other universities.

From these missions, five priority areas are selected by ITB. It can be concluded that the selection of five priority areas are very relevant.

1.3.2 Relevance of Nano Science and Technology

(1) General

Nano science and technology tries to understand natural phenomena through observation of cells and their molecular behavior to create new and prominent functions and performance by macro- or microscopic approaches. Emergence of this technology is often called the next industrial revolution. Therefore, developed and developing countries are rushing to have started research and development of nano science and nano technology. Developed countries invested more than 100 million US$ of their budgetary resources towards this area. In Asian countries, Japan, Korea, China, Singapore, Malaysia, Thailand, Indonesia, and Viet Nam have all started research and development in this area. Developing countries like Malaysia, Thailand, Indonesia, and Viet Nam can only invest a rather small amount of their budget of less than 50 million US$,. Therefore, developing countries research and develop nano science and technology focusing on narrow fields. This policy and strategy is truly necessary.

(2) Current Status of Indonesia Nano Science and Technology

A program of research and development on nano science and technology was initiated and promoted by Indonesia government (RISTEK) in 2005. The status of Indonesia nano science and technology can be stated as the initiation stage. Therefore, the program aims to assess the direction and the roadmap of nano science and technology researches, and to promote three subjects, prototype of **nano particles**, prototype of **nano devices**, and prototype of **nano coating**. According to this program, primitive or preliminary research and developments on subjects related to nano science and technology are carried out by several research institutes, like University of Indonesia, ITB, Indonesia Institute of Science, National Nuclear Energy Agency for Indonesia and others. RISTEK has conducted several activities to decide a policy for research and development of nano science and technology in Indonesia since 2005. One activity is to establish Indonesia professional Society for Nanotechnology together with LIPI in order to provide periodical opportunities for the members to exchange information and opinion related to nano science and technology in Indonesia. RISTEK also owns Eijkman institute and promotes molecular cell biology recently. Although three years of society activity has been conducted, the Indonesia nanotechnology policy still lacks clarity. In such situation, especially in state research institution such as LIPI and BPPT, researchers carry out research on their own terms and interest. Equipment and instruments installed in UI, ITB, BPPT are of old and outdated. Recently, LIPI developed new ball milling equipment to produce nano particles. In general, those research institutes including universities have little collaboration with industry sectors, because industry sectors are still not ready to introduce nano technology. In such

situation, BPPT collaborates with pharmaceutical industry to develop herbal medicines, synthetic materials and cosmetics.

As a summary, in Indonesia, mining resources are abundantly deposited and vegetation is exotic and lush. Nano science and technology possesses large potentials to create or manufacture products with high value and discover properties from the available ample natural resources. Therefore, it is necessary for Indonesia to promote nano science and technology, because it could play a major role to reinforce Indonesia industry sector in world market competitiveness.

(3) ITB Research Activities on Nano Science and Technology

In ITB, nano science and technology research started at Department of Physics, Faculty of Mathematics and Natural Science, under the support by DGHE in 2003. The research activity has been gradually surged year by year. According to ITB data (Appendix 1.3-2), total 19 research projects have been carried out in ITB since 2003. In addition, 11 teaching staffs have engaged in research related to nano science and technology as project leaders. According to the websites of UI and LIPI, two research groups or laboratories related to nano science and technology have been formed at UI, but not formed explicitly at LIPI. From these facts that ITB has been playing more active role in nano science and technology research than others, it can be said that the ITB research activity on nano science and technology is entirely satisfactory to lead Indonesia nano science and technology society. However, it should be noted that thirteen of the projects are concentrated across the departments of Physics and Chemistry, Faculty of Mathematics and Natural Science. Recently, department of Pharmacy and Department of Engineering Physics joined the nano-related research and development.

In accordance with the national policy of Indonesia nano-related research and development in ITB focuses has focusing on the areas below:

1. Nano particle, nano powder
2. Nano composite: Catalyst
3. Nano devices: Dye-Synthesized Solar Cells

Research achievements in these areas are being used widely by chemical engineering, biotechnology and bioengineering, electrical and electronic engineering, mechanical engineering, pharmacology, and metallurgy. Further the Chemical and Mechanical Engineering Departments of Faculty of Industry Technology, Microbiology and Bioengineering groups of School of Life Science, Chemical Pharmacology and Bio Pharmacology groups of School of Pharmacy will introduce nano science and technology to their researches on renewable energy development, clone vegetation development using gene manipulation, new jamu (Indonesian traditional medicine) and medicine delivery system, respectively.

(4) Summary

Nano science and technology is inevitably an strategic academic field for Indonesia, although Indonesia’s current status in this field lags far behind from developed countries. In this circumstance, the Indonesia government is working hard to identify and assess special areas to be selected as Indonesia strategy of nano science and technology development. ITB can take a major role in these efforts using their recent experiences.

As observed above, nano science and technology has the ability to add value to the research in several academic fields of ITB. As a conclusion, ITB’s selection of nano science and technology as a priority area is indeed relevant.

1.4 Future Impacts to be brought by ITB to Indonesia's Industries

ITB has been appreciated for providing qualified human resources to industries in Indonesia, particularly state owned companies, e.g. PERTAMINA, PLN, P.T. KAI. Based on the strong ties between the graduates and the faculty, various projects for those state industries had been solved with engineering collaboration with ITB. This collaboration will continue and will contribute to improving its efficiency and quality of services of ITB.

As for national private companies, the fact that a majority of Board Members are occupied by ITB graduates, is not rare. It is reported that ITB graduates become the core engineers after 2 years on-the-job training. The superior engineers may develop their carriers even by transferring the job to foreign companies. For example, 300 engineers graduating from ITB are currently working at Boeing and Airbus. Many of the leading engineers in the oil & gas company both abroad and in Indonesia are ITB graduates. Also some of the successful ITB graduate engineers are now the owner of high-tech multi-national companies. On the other hand, Research and Design (R&D) work, at present, still depends on the foreign engineers at home country and/or in Indonesia. Particularly Nano-science technology is widely considered as the tool to bring innovative solutions. However, in order to save cost as well as time, most companies are willing to shift R&D to Indonesian engineers, if it is possible. The idea that ITB shall become a "research oriented university" is responding to this requirement. Not only existing faculties, schools and centers, but also the proposed new centers are developed to achieve that vision. Practically and internationally standardized ITB graduates will take those roles as well.

Creative industries, which are rather new to Indonesia, may rapidly grow, if the Art and Design faculty provide the talents to be developed through the studies in ITB, which has the longest history in Indonesia with international knowledge and technology.

With the enhancement of ITB capability and capacity, the benefit will not only for ITB itself and other universities in Indonesia, but also for the industry. Development of industry needs a strong assistance from the university in terms of qualified human resources and knowledge (through research & development activities).

The challenge is how to attract the ITB graduates to work in Indonesia's industry, since there are more ITB graduates (especially in natural science & engineering) currently working in non science & engineering fields. The reasons are, among others:

1. Most of the industries are low-tech or medium-tech industry which only requires skilled and highly skilled technicians (diploma graduates from polytechnic universities);
2. The employee salaries in industry is not competitive with the banking and finance business;
3. Most of the high-tech industries are foreign licensed or foreign owned and they usually limit the involvement of local graduates;
4. Unclear prospect for the future career of scientists and engineers since there is no clear path for a professional career, only managerial careers are available in the company;
5. There is a 'mismatch' between the expertise needed by industry and the outcome of the university product.

Based on the observation, ITB graduates have no difficulty to find a job, and usually they are looking for a more challenging job. ITB students are recruited among the top 1% of Indonesian high school graduates. Their potential is very high and therefore after graduation, they will always obtain jobs when competing with other graduates in Indonesia. Most of the employer

tend to recruit ITB graduates regardless of their study fields, they only concern with the intellectual capability and achiever spirit.

The role of ITB graduate scientists has been very significant both in national and international forums. Many inventions and breakthroughs have been achieved by these graduates and that is due to their intellectual capability and hard working attitude towards high achievement. Even with limited facilities, they can still perform well since they have strong linkages with international institutions. Some of the scientists who are working abroad at international research centers perform well and receive many international awards or recognitions. It has become clear that a proper investment at ITB for centers of excellence will create a great impact to the country for its scientific achievement.

With the center of excellence at ITB, the industry will benefit at most through the quality of human resources from ITB graduates and science & technology support provided by ITB. For increasing the involvement of ITB graduates in industry, some actions should be taken by the government, for example incentives for foreign investment; political will for acceleration of industrial development; 'protection' or subsidy for local nature based industry (e.g. agro-based industry).

ITB can obtain a niche or competitive edge if they develop the center of excellence based on local unique resources to come up with internationally competitive outcomes.

2 SCOPE OF THE PROPOSED PROJECT

2.1 Overall Objectives of the Proposed Project and Relevance of the Project Implementation

2.1.1 Overall Objective of the Proposed Project

Overall objective of the proposed project is to promote qualitative and quantitative expansion of education and research at ITB by enhancing its research facilities and capacity, as well as University-Industry-Community Linkages, and thereby contribute to the development of:

1) human resources who will be the core of the industry and academic research; and
2) the nation's industry and its competitiveness in the world.

2.1.2 Relevance of the Project Implementation

The proposed five centers: Center for Advanced Sciences (CAS), Center for IT for Industrial Engineering (CITIE), Center for Infrastructure Built and Environment Engineering (CIBE), Center for Art, Design and Language (CADL), and Center for Research and Community Services (CRCS), are meant to enhance ITB's competitiveness in the international forum as well as maintain its role as a bench-marking reference for universities in Indonesia. CAS aims to strengthen international competitiveness, which utilizes the rich natural resources available in Indonesia. CITIE is aiming to strengthen application research based on the ITB experience of IT research for other fields. CIBE is aiming to respond to national demands for rapid expansion of infrastructure development as well as environmental protection. CADL is aiming to support human resources for the creative industries, which are given a strategic priority by the government. Capacity of language is recognized as an important base for internationally competitive research. CRCS will conduct an intensive university – industry collaboration so that ITB expertise and capability will be fully utilized by industry, and eventually Indonesian industry will grow and provide prosperity for the people.

On the other hand, through intensive discussion ITB will make its research program applicable for the industries' needs. The collaboration or linkage is also meant to generate revenue for ITB so that ITB can operate and maintain all the invested facilities properly. With an intensive collaboration, it is expected that the project will become sustainable.

2.2 Scope of the Proposed Project

2.2.1 Outline of the Proposed Project

(1) Major Component of the Project

The proposed project from ITB consists of four major components as summarized below.

Table 2.1 Major Components of the Project

1) Construction (Civil Work)	• **Building A B-** New Construction Center for Advanced Sciences (Nano science & Technology and Biotechnology) Mathematics and Astronomy Center for Research & Community Service (University-Industry-Community Linkages) • **Building C** – New Construction Center for Infrastructure & Built Environment Engineering

	• **Building D** – Renovation with small extension Center for IT in Industrial Engineering • **Building E** – New Construction Center for Design & Languages • **Renovation work** Center for Infrastructure & Built Environment Engineering Center for Design & Languages • **Infrastructure work** site development including water, sewage, etc for all above construction works
2) Procurement	• Necessary research and education equipment/books/furniture for above centers
3) Staff Development	• Overseas and domestic degree fellowship program • Overseas and domestic non-degree fellowship program • Research Grant • Support by appointed professors from Japanese universities for enhancing capacity and quality of nano-tech related research • Fellowship agency services of programs in Japan
4) Consulting Services	• Engineering services • Project management service (Bidding assistance, project supervision, environment monitoring assistance etc.)

(2) Summary of Each Center's Objectives

The followings are the summary of each Center's objectives.

1) Center for Infrastructure and Built Environment (CIBE)

CIBE represents the core activities of the FCEE (Faculty of Civil and Environmental Engineering) with objectives:

- To improve the quality of higher education in the subjects of planning, design, construction, and management of infrastructures in the built environment to produce graduates to meet national demand at a global competitiveness level.
- To improve the quantity and quality of research and national problem solutions by conducting leading research in each specific research area, in accordance with the ITB vision as a research university.
- To perform an active role in the community empowerment, by providing continuing education and community services.
- To improve facility management to achieve a sustainable and integrated system.

2) Center for Arts, Design and Language (CADL)

2-1) Arts and Design

- Education: To provide undergraduate and postgraduate education to support and cater to the national agenda (number of intakes, number of qualified graduates, inter-university initiatives, etc) and international perspective (establishing mutual cooperation in education, providing opportunity for continuing studies, etc)
- Research: To provide research opportunities in developing Art and Design artifacts of Indonesia (providing industrial partnership, inter-universities assistances, collaborative programs, etc), enhance the preservation and conservation program of traditional/cultural artifacts of Indonesia, and provide Art and Design consultancies, initiatives, and trainings for the Small and Medium Scale Enterprises of Indonesia.

- Information Services: To provide services for collecting, disseminating, exhibiting, and presenting Art and Design artifacts and activities.

2-2) Languages

- To improve its current language teaching and learning-activities, so that ITB can produce graduates with more language skills
- To expand services with future potential and relevant market segments, such as engineers, researchers, technicians, and other practitioners rather than ITB students.

3) Center for Information Technology in Industrial Engineering (CITIE)

- To improve education and research in the Department of Industrial Engineering.
- To accelerate research, particularly in the field of Strategic Production Network: cooperation between several small and medium-sized enterprises to reduce uncertainty and secure and foster competitiveness
- To further extend the international cooperation program of the Industrial Engineering Department
- To offer support for establishing a strong SMEs in manufacturing sector, which is in line with the national industrial development plan.

4) Center for Advanced Science (CAS)

- To establish a center for research and development on advanced science.
- To provide the national manpower and workforce with the knowledge and know-how of advanced science in order to increase the global competitiveness of the national workforce.
- To promote advanced science education through improvement of manpower, teaching methods, and teaching materials. The center will offer training and apprenticeship programs for faculty members from universities around the country.
- To provide technical services and consultancies on the application of advanced science in increasing product quality to national industries.
- To become a national window for international cooperation and linkages in the research and development of advanced sciences.
- This Center will develop Nano Technology focusing in Nano Material, Nano Bio, Nano Medicine and Advance Acoustics.

5) Center for Research and Community Services (CRCS)

Distance Learning Center to be included in CRCS has the following objectives:

- To deliver ITB's high level education program and resources to non-residents and non-traditional students no matter where they are.
- To enhance education and research collaboration with other universities not only in Indonesia, but also in other countries.

2.2.2 Construction

(1) Campus Master Plan

ITB currently has a student body of around 18,000. Indonesia has a very high demand to increase the number of university students for the continuing development of the country. ITB cannot increase the capacity of the existing student body in the Bandung campus due to the physical constraint of the land area. Upon discussion with ITB architects, it is apparent that the physical capacity of the Bandung campus is maximum 20,000-student body. ITB has had a long-range projection to buy the zoo area on the west side of campus, but due to the autonomy

policy of universities, it has become difficult to get approval from the municipality to get this zoo site. However, the SAPROF team strongly recommends acquiring this zoo site for future expansion of ITB. If this land can be acquired, then the student body may be able to increase up to 25,000. ITB strategy to meet the national demand for quantity increase is an indirect approach. ITB will train and educate students from other universities. By this way, ITB can achieve quality and quantity demand of the country.

Based on above assumption, the physical master plan of ITB Bandung campus does not envisage a large future increase in total floor area. The future expansion will be mainly for research purposes; i.e. laboratories. This assumption is very important to keep the campus environment in a good and attractive condition. ITB Bandung campus does not plan to have large high rise buildings to accommodate the huge increase in the student body. High-rise buildings with elevators are not efficient, and will destroy the pleasant and attractive existing environment.

(2) Facility Development Concept

For this new 21st century, facility development of ITB Bandung campus is to have the following development criteria.

Maximum usage of existing buildings – Renovation, Conversion, Re-use –
Environment and sustainability is the key issue of this century. ITB is not to implement the "scrap and build" system of the 20th century. All existing facility should be firstly considered to be renovated, or converted into new function or re-use its building materials.

Integration and cooperation – the synergy effect –
ITB physical development is not to be confined in the traditional sectionalism of each faculty. Facility layout is to be developed to encourage physical interaction among the staff. Researchers should be "forced to walk around the campus." This will enhance physical communication among different researchers. Modern technology requires a profound mixture of various fields of expertise. It means that facilities for one faculty are not to be in one place, but can be in several areas of the whole campus.

Projective efficiency – flexibility for future development
Small-scale development is not efficient in the long run. This is a rapidly growing world. The demand and needs are changing very fast, and the competitiveness of an organization depends on how fast you can adapt to a changing world. This is why the existing buildings that are only 20 years old are now obsolete. ITB must abandon the "scrap and build" system, and move into new sustainable and environmentally friendly development system. New development must have sufficient space and flexible space to easily and efficiently accommodate future demands.

Heritage – respect for history and traditional culture
ITB campus has kept its old buildings in its heritage zone, and respected its design in the transition zone. The heritage buildings are masterpieces of timber structure. It shows that ITB was technology-oriented from the start. The campus is now almost built to its limit, and it will be a challenge to keep this heritage in the future. There will always be pressure to demolish the old timber structure and build anew. However, it should always be kept in mind that old values will never be re-built if you demolish it. Continuity of culture is important value to be what we are.

(3) Review of Project Sites

ITB had proposed 6 sites for the Project, as shown in this diagram.

Figure 2.1 Proposed Project Sites

The following issues were discussed regarding these sites.

- **Project site C1 for civil engineering**

This site includes demolishing an old building. Although this old building is not registered as a historic building, it is still a masterpiece of the era.

This zone is in the center of historic environment zone. In the south there is the famous hall that is registered as a historic building. In the north, there is the chemistry lecturer hall, in which Sukarno is said to have also taken lecture. Building right in the center of this historic zone will ruin forever the attractive environment in this part of campus.

Furthermore, the space is narrow and not large enough to accommodate the large experiment facility (the strong wall) of the civil engineering department.

SAPROF team proposed to build the civil engineering at site B. Here are some old buildings of no value, and can be cleared to create a good site of roughly 45 m. x 45 m. If 6 story building, the floor area can have more than 10,000 m^2.

Civil engineering building
An example of wood joint masterpiece

Chemistry lecture hall

- **Project site D for industrial engineering.**

There is a small three-story building which they propose to demolish and build a new high rise. The site is only 9m wide.

The existing building is a three-storey building. The structure is reinforced concrete, and it is possible to renovate.

It is not efficient to demolish this narrow building, and again build a narrow 9m wide high rise. A narrow building will have a long corridor, and effective area is relatively small compared to a normally dimensioned building.

This plan to re-build this site should be revised.

Proposed narrow building to be demolished and re-build

- **Project site C2 for hydraulic engineering.**

The proposal was to keep the experiment facility, and just to rebuild the wooden structure to make an office space of about 1000 m^2. The wooden structure is a masterpiece of the construction era. It shows the innovative ideas of wood joints and is a good textbook for all engineers. This should not be demolished.

This can be kept, and a small office space of about 1000 m^2 can be built together with the civil engineering faculty new building.

The woodwork of Hydraulic Building

Summary of Project Site Review

Figure 2.2 Summary of the Project Site Review

(4) The Final Project Sites

Following above discussions between ITB and the SAPROF team, the Project sites were decided as follows.

Table 2.2 Final Project Sites

	BEFORE				**REVISED**			
				New site				
A	**CAS** Center for Advanced Sciences	4F	3,500 m^2	Adjacent site to B parking site will be developed together with CRCS B site. Maths and Astronomy will be moved to this site also.	**BUILDING AB** **CAS** Center for Advanced Sciences		
					Mathematics & Astronomy		
B	**CRCS** Center for Research & Community Service	8F	8,000 m^2		**CRCS** Center for Research & Community Service	8F	15,300 m^2
C1	**CIBE** Center for Infrastructure & Built Environment Engineering	10F	10,000 m^2	Will be integrated into A site.	**BUILDING C** **CIBE** Center for Infrastructure & Built Environment Engineering	10F	11,000 m^2
				Both wooden structures to be preserved			
C2	Hydraulic and Ocean engineering laboratories	4F	3,500 m^2		Infrastructure Engineering, Hydraulic and Ocean engineering laboratories	reno	2,460 m^2
D	**CITIE** Center for IT in Industrial Engineering	4F	3,500 m^2	Will renovate the same building which maths and astronomy now occupy	**BUILDING D** **CITIE** Center for IT in Industrial Engineering	reno	5,900 m^2
		reno	1,500 m^2				
E	**CADL** Center for Arts, Design & Languages	8F	8,000 m^2	E	**BUILDING E** **CADL** Center for Arts, Design & Languages	8F	8,000 m^2
		reno	5,800 m^2			reno	5,200 m^2
	new		**36,500 m^2**		new		**34,300 m^2**
	renovation		**7,300 m^2**		renovation		**11,100 m^2**

＊BUILDING AB

for CAS & M & A & CRCS

These functions are to be built in the same site. For optimal efficiency, the building is to be integrated into one unit. The common facilities can be shared between these functions.

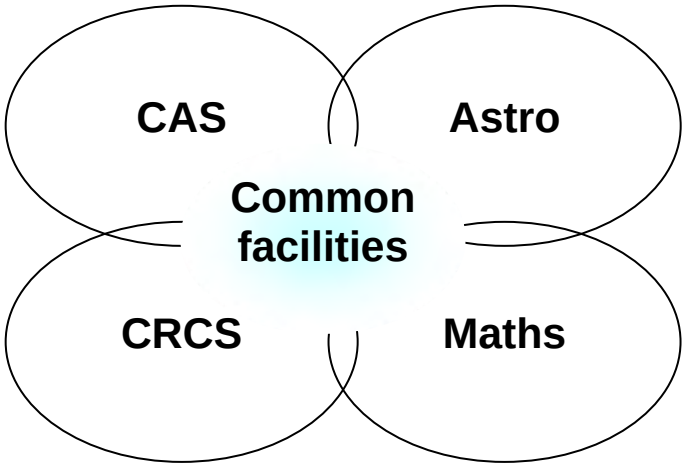


Figure 2.3 CAS & Maths & Astro & CRCS

The Revised Construction Sites

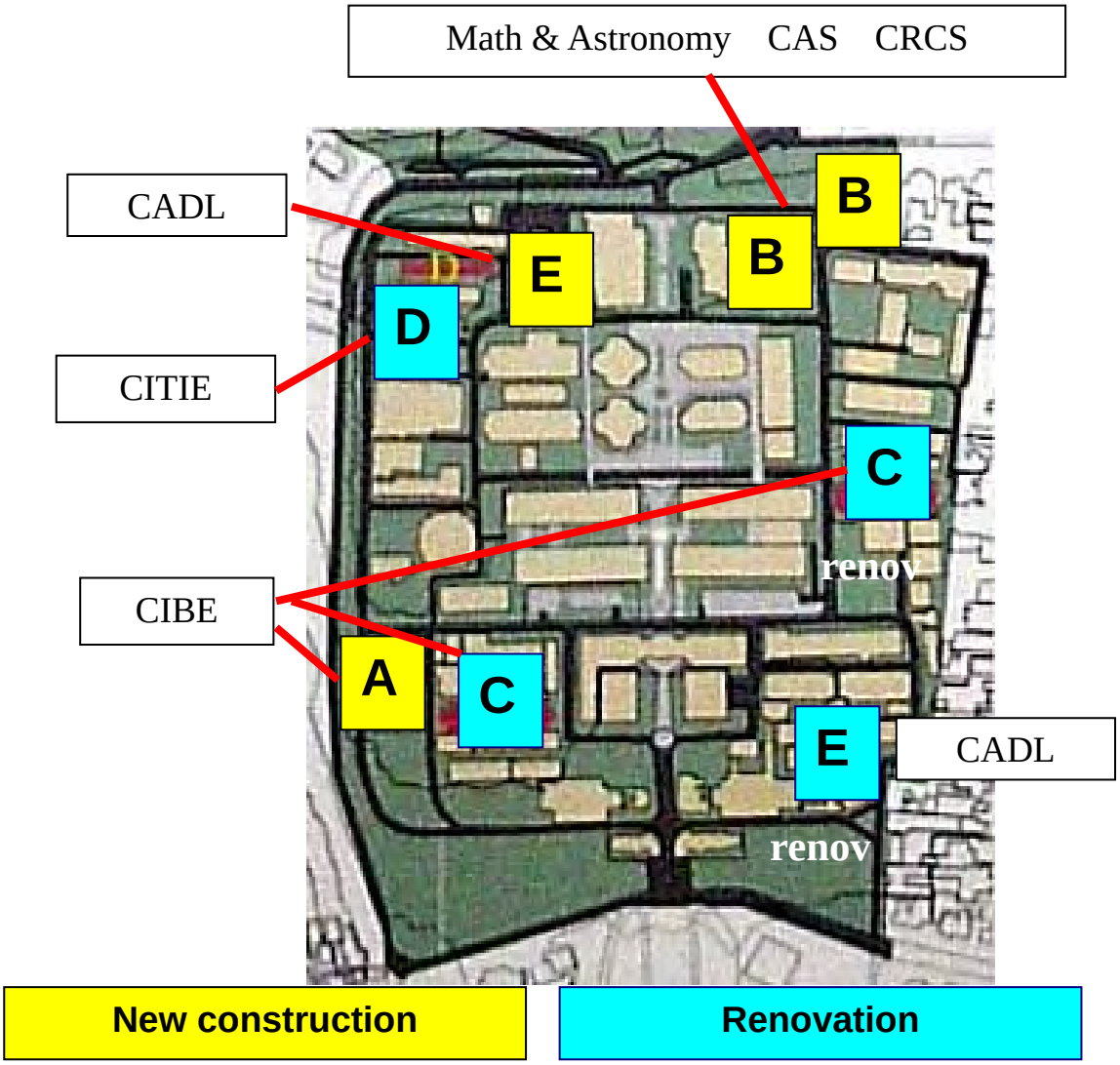


Figure 2.4 Revised Construction Sites

***Project Site A**

CIBE is planning to have a large experiment lab for a strong wall. It requires a large space, preferably more than 40m by 40m. The size of project site A is to be maximized to accommodate these functions. The existing three buildings, including the acoustic building are to be cleared for the new building. The two buildings are old, single storey buildings. The acoustic building is not so old, but needs to be cleared since it cannot be near to a large experiment zone such as a strong wall. The acoustic building is a small building, so it can be re-built anywhere that is appropriately quiet.

(5) Review of Facility Designs for Centers

1) Required Facilities for Centers

As stated in the review of scope of the Project, the capacity of the facilities for Centers was discussed between ITB and SAPROF Team.

Detail room requirements are summarized in Appendix C-14.

2) Policy for Determination of Contents and Scale of Facilities for Centers

The SAPROF Study policy for determination of contents and scale of facilities is as follows:

- Floor area per person is shown in Table 2.2, which is set based on not only DGHE's standard and other international standards but also examples from other universities. The size of major rooms is to be decided through discussion with each center and PIU considering the layout plan of the equipment.
- The number of rooms is proposed based on the target number of students, the practical number of persons that can use them, and the curriculum.
- The size of each room is planned based on not only curriculum and the target number of students, but also the practical number of persons that can use them, activities in rooms, availability and safety.
- The flow line plan, zoning plan and facilities plan are planned in consideration of the internal circulation of students, lecturers and staff, etc. and external flow lines of guests and equipment, etc.
- The facilities' scale, in terms of operation and maintenance, is planned based on the target number of staff and organizations.

3) Standard of Unit Floor Area

According to the discussion with ITB, the SAPROF Team reviewed requirements with the standard of unit floor area as shown below.

The total floor area for the construction budget estimate is to include all common facilities area such as toilets, mushola, storages, machine rooms, etc. as well as all circulation areas such as corridors, stairs and lifts. Therefore, the gross total floor area is calculated from net total floor area by following formula.

Gross Total Floor area = Net total floor area

+ 10% common facility area + 25% circulation area

Table 2.3 Unit Floor Area

	Room Name	Unit Floor Area (m^2/persons)
1	**CRASSROOM**	
	Classroom	2.0
	Discussion Room	2.0
2	**LABORATORY**	
	Laboratory (with special grand size equipment)	9.0
	Computer Laboratory	3.0
3	**ADMINISTRATION**	
	Dean's Room	20.0
	Professor's Room	15.0
	Lecturer's Room	7.5
	Lecture Assistant's Room	5.0
	Student Assistant's Room	2.7
	Meeting Room	2.0
	Office	4.5
4	**SUPPORTING FACILITIES**	
	Library	1.6
		Assumed 25% of students
	Cafeteria	2.5
		Assumed 30% of students
5	**COMMON FACILITY AREA**	
	Praying Room	0.8
	Storage	0.45
	Toilet	2/25 persons
	Total	**10%**
6	**CIRCULATION**	
	Total	**25%**

Note: * SAPROF Team calculated based on the discussion with faculties and referable examples, standard layout of the room is shown in Appendix.C-16

Source: SAPROF Team

4) CRCS building

The design for CRCS building was completed in December 1996. The function of CRCS has changed very much in these 12 years, as shown in following chart.

Table 2.4 Function of CRCS

1996 CRCS	2008 CRCS	Comment
P-ITB	Logistics and procurement office	
MBA	-	
LP	LPPM	LP and LPM is now joined as LPPM
LPM		
LAPI	LAPI	PT LAPI is now a private entity separated from former LAPI
	SUK	
	Distance learning	

The room requirements for the new 2008 CRCS was re-calculated again considering the above new functions as shown in Appendix C-14. Also, as explained before, the functions of CAS, Mathematics and Astronomy will be joined to the same project site as CRCS. Therefore, the

building is to be designed so that these four functions can share and coordinate common facility rooms such as meeting rooms, seminar rooms, exhibition spaces, visiting lecturer areas, mushola, etc.

The result is that, 1996 CRCS building was designed as 11,181sqm, but 2008 CRCS, M&A, and CAS building will be modified to 15,300sqm. If each centre is built separately, the total area will become more than 20,000sqm.

The design for this new complex will utilize the design of 1996 as much as possible. The designs for architectural details can be basically used for the new complex. The structure design will be re-calculated for the increased capacity. The electrical and mechanical design will be modified to accommodate the new functions, and also updated to current technology which is more energy efficient than 12 years ago.

2.2.3 Equipment

(1) Equipment List Review Policy

Each Center prepared the lists of equipment to be procured by the project based on the center's development strategy. ITB and the SAPROF team discussed and set review point of views as follows for the proposed equipment.

1. Contribution to the enhancement of research and education quality
2. Contribution to the increase of research and education quantity
3. Frequency of use
4. Uniqueness (Internal/External duplication)
5. Sustainability

From a point of view of sustainability, especially the skills to maintain and operate new equipment, how to cover maintenance and operation cost, and ease of obtaining spare parts are reviewed. Basically each center selected equipment that had been used by at least some academic staff members before, which may prevent a case that there is nobody who knows how to operate the equipment. Each center also estimated major equipments' maintenance and operation costs and considered measures to cover its cost. The ease of obtaining spare parts was also considered.

The allocation of priority on each point of views above is considered based on the nature of the Center and its objectives mentioned in 2.2 above. Moreover, five points of view are intermittently reviewed. For example, if the equipment exists in ITB, the necessity of additional equipment is considered. In the case that researchers have to wait for a long time because of the limited number of the equipment for many users, which makes research speed slower, the equipment is decided to be included in the list, regardless of duplication. On the other hand, in case that equipment whose frequency of use is very low, that it exists in another HEI, and that its maintenance cost is fairly high, the SAPROF team recommended not to purchase the equipment but rather rent it when needed.

(2) Sequencing Proposed Equipment

Among equipment listed, ITB and the SAPROF team discussed sequencing of the equipment. Because price escalation rate and equipment price may change from now to the time of the project implementation, it might be possible that the budget would remain and additional equipment be procured. Concerning such a situation, the SAPROF team suggested that ITB divide proposed equipment into the first and second sequences. Equipment listed in the first

sequence has higher priority than those in the second sequence. Currently only the equipment listed in the first sequence is planned to be tendered. However, if the budget remains because less price escalation rate than estimated is actually applied, equipment listed in the second sequence might be tendered. It is better to have the second sequence equipment as well as the first one to achieve the target and enlarge the effect of the Project.

The equipment list will be reviewed again and categorization of equipment into 1st or 2nd sequence could be adjusted when the tendering documents are prepared at the beginning of the project implementation according to the needs at that time.

Appendix 2.2-1 is an equipment list with the indication of 1st and 2nd sequence.

(3) Special Considerations

1) Requirements for construction to accommodate equipment

There are pieces of equipment that have special requirements for space and environment, such as dimension, weight, power supply and base isolation. Those equipment requirements for building and facilities were submitted to architects to reflect them into designed buildings and facilities.

2) Chemical waste treatment

Some equipment of CAS and CADL deals with chemicals that will require chemical waste treatment. ITB has implemented the procedure of hazardous waste management shown in Appendix 2.2-2. New centers will also follow this procedure.

2.2.4 Staff Development

In order to develop the staff capacity, three centers (CAS, CIBE and CADL) request the following programs. Each program is planned as the most pragmatic and effective way.

1) Degree programs for masters and doctoral students at oversea universities are planned in order to send teaching staffs to Japanese universities. ITB has been implementing various collaborations with Japanese universities. Continued relations are greatly appreciated by ITB. As ITB has a policy for cultural diversity, ITB considers the participants had better learn not only academic fields but also Japanese culture and ethics, thus, the program includes Japanese language study at ITB for three months and three months in Japan. After that language study, the Master program is designed for 2 years and the Doctoral program for 5 years. It is also appreciated that Japanese junior professors made a joint research at ITB for the same field as ITB staff studied at Japanese university. Research grants may assist to make this collaboration more effective.

   For the Master program, the candidates are to be selected from both Bachelors and Masters. They will have a status of an ITB employee upon their assignment to overseas programs.

2) Program for post-doctoral students for 1 year is planned for CAS. It intends to strengthen the capacity of core members of Nano-science, so that “the Road Map” is executed in a professional and pragmatic way. Most of the program is implemented at Japanese universities, which already made a mutual understanding for collaboration with ITB.

3) Regarding CAS, particularly nano-science technology, Japanese professors from potential collaboration universities for above mentioned 1) and 2) will be appointed through direct appointment procedure. Because of the fact that; as described in 1.3.2, Nano science

technology has a great opportunity to grow; however, many countries also recognize its potential and importance. A strategic approach with a clear vision is indispensable to make this science field effective. ITB has made a "Road Map" plan for every priority area. Following to the experience in other priority area, "Road Map" for Nano-science technology is to be developed urgently. To harmonize the Indonesian national policy and strategy as well as the industries' needs, the professors appointed will support ITB in making "Road Map".

The main scope of works is;

a) To assist ITB to review the national policy and strategy regarding Nano-science technology development,
b) To assist ITB to review the industries' needs on Nano-science development as well as to establish a channel to exchange the views with the industries,
c) To assist ITB to develop the "Road Map" for Nano-science,
d) To advise ITB to review the component of the project (facilities, equipment, fellowship and so on) from the consistency and effectiveness of the "Road Map" point of view
e) To advise ITB to make a future development of graduate courses as well as degree courses

4) A domestic program for doctoral students is planned for CADL in order to increase the doctor degree professors. As the Art and Design Faculty was first established at ITB in Indonesia, the domestic program is executed at ITB. This course is designed for 3 years.

5) Short term oversea study for CADL is planned. Most programs are implemented at a Japanese university for 2 months.

6) Seminars and workshops held abroad and in Indonesia are also considered as a good opportunity for capacity development as well as for dissemination of knowledge. Average period to attend is considered as 1 week.

   Number of planned staff is noted below. In comparison to previous loan experience, the plan is considered pragmatic.

Table 2.5 Number of Fellowship

Number of person, US$

	Master	Doctor		Post-Dr.	S.Term	Seminar/Workshop		Total
	Overseas	Domestic	Overseas	Overseas	Overseas	Domestic	Overseas	
CAS	4		3	8			20	35
CIBE			6				20	26
CADL		5	5		9	10	10	39
Total	4	5	14	8	9	10	50	100
Base Cost /person	81,100	15,000	182,900	36,100	11,200	1,050	3,900	

7) Fellowship agency for degree programs for masters and doctoral students, and post-doctor program in Japan

   To implement fellowship programs in Japan smoothly and effectively and to reduce burden to both the target universities and ITB, administrative and logistic services are better to be provided.

The main scope of works is:

a) To support the participants for the necessary arrangements for entry and settlement in Japan
b) To advise the participants in starting up and completing a fellowship program
c) To provide centralized administration services of the payment to universities as well as allowances to participants.

This fellowship agency services will be included in Engineering Services.

The cost breakdown of each program from 1) to 7) above is shown in Appendix 2.2-3.

8) Research grants are also considered as a tool to encourage qualified research activities. At present, CRCS allocates 10.5 billion Rupiah for 5 priority field researches annually on a competitive basis; however, some sector is relatively new, thus, it is not easy to select those challenging research themes. As new centers reflect ITB policy forward to "Research Oriented University", additional grants for new centers, which provide 5 themes for 5 years on a competitive basis, should be arranged.

2.2.5 Consulting Services

(1) Project Management Services (PMS)

Although ITB has enough capacity to manage the project efficiently, ITB can appoint only two or three staffs as PIU (Project Implementation Unit), which is insufficient to coordinate every action. In addition, good governance for implementation of the project requires a transparent and accountable system to have oversight of the overall project. PMC supports PIU as well as develops a coordination role with full understanding of GOI, ITB and JICA rules and regulation.

The main scope of works is:

a) To assist PIU to check the design and tender documents from a consistency and effectiveness point of view,
b) To assist PIU to check the tender evaluation is done according to rules and regulations
c) To assist PIU to monitor the financial as well as physical progress of the project according to JICA requirements and make periodical project status reports
d) To assist PIU to monitor the outcomes of the project that could be evaluated by both quantitative and qualitative indicators
e) To advise PIU to coordinate and expedite solving the problems, which may cause adverse effects on the progress as well as the outcomes of the project
f) To advise PIU to resolve disputes between stakeholders

(2) Engineering Services (ES)

According to Indonesian regulations, a project of this size must have a separate contract for Construction Management (CM). However, for JICA projects, CM service is included in E/S. ITB assessed that this system was effective for the two former JICA projects at ITB. A full time assignment of international experts during the construction phase is necessary to keep the quality of the building. Therefore, for this project also, a full time international expert is to be retained from design phase until completion of the building and equipment procurement.

The main scope of works is:

a) To design and make a tender specification for construction and building, procurement of equipment and procurement of furniture and books.

b) To assist ITB to make tender documents and organize the tender conference as well as prepare answers to questions by the tender participants.
c) To assist ITB to make tender evaluation
d) To assist ITB to make negotiation with the contractor(s) and suppliers
e) To supervise the contractor(s) and suppliers in accordance with the contract

Engineering services will also provide fellowship agency services mentioned in 2.2.4 (7).

The cost breakdown of consulting services is shown in Appendix 2.2-4.

2.3 Promoting University-Industry-Community Linkages in ITB

The mission of Indonesian higher education consists of education, research, and community service, and there is a notable objective of the mission, i.e. the university should not become an ivory tower but should be close to the community and become an agent of development for the community. ITB develops linkages with the stakeholders, among others with the industry, regional and district government, NGOs, community leaders, community organizations, alumni & alumni association, and many others.

At present, with various exceptions, the academic research linkage is responsible to CRCS (LPPM) and commercial linkage (engineering and consultancy) is responsible to LAPI Yayasan, which is the foundation for commercial activities owned by ITB since its establishment. In the case that a tendering process is required, P.T. LAPI, which was established by LAPI Yayasan (its share was sold to ITB), will take the role, because Yayasan can not be allowed to join the tender. In 2007, CRCS made 590 contracts amounting to 150 billion Rupiah, LAPI Yayasan and P.T. LAPI made 288 contracts amounting to 460 billion Rupiah and 160 contracts amounting to 231 billion Rupiah respectively.

Some of these linkages will be formal and some other will be informal, also some linkages are institutional and some other will be personal/individual. This situation is inevitable and it happens to all universities in Indonesia. The university needs to keep its flexibility in developing linkages due to its academic nature. Although ITB was given autonomy, the existing government regulation, especially concerning tax and fiscal matters makes the linkage complicated. While for private universities (there are around 2,700 in Indonesia), there is no difficulty to develop any kind of linkage.

Higher educational institutions are expected to act as the agent of development, and therefore they have to interact closely with the stakeholders. The strength and competence of the institutions rely solely on the faculty members (including the researchers) and also on the students, therefore it is necessary for the institutions to disseminate widely the information concerning the available expertise and knowledge. There are many ways of interaction between the institution and the stakeholders, and those should be encouraged to build the image that the university is part of the community.

Person to person contact is the initial stage for a long lasting linkage, once the scope of work and term of reference have been determined then the linkage could be formalized by the institution and it becomes binding to the involved parties. There should be a mechanism set up by the institution to allow effective linkage establishment and providing the faculty members with proactive approach to interact with the stakeholders.

In ITB the role of linkage establishment has been conducted by LPPM (Center for Research and Community Services). Looking at the number of ITB personnel involved through LPPM, only about 50% of the total ITB faculty members, that means the remaining 50% is either developing personal linkages or not active at all. In ideal case, LPPM should be able to cover all ITB personals so that LPPM becomes the gateway for linkage development.

The basis of university-industry-community linkages or collaborations should be mutually beneficial, including the intangible benefits. ITB provides experts in science & technology for research & development, and the industry/community provides budget and facilities accordingly, and the agreement should be professionally installed to respect each of the involved parties. The industry/community needs the support from ITB for their research & development programs, since they have a very limited capacity and capability for R&D. They do not have proper laboratory facilities and adequate researchers, since it takes time and a huge budget to establish R&D facilities and personnel. From the point of view of efficiency and effectiveness, it is better for the industry/community to outsource the R&D services appropriate for their needs. On the other hand, the industry will not survive without appropriate R&D since they will lose their competitiveness in the market due to obsolete and outdated products. The most appropriate target for R&D outsourcing is with the university, in this case with ITB since ITB is the leading institution for science and technology knowledge development.

As for the international investors in Indonesia, particularly from Japan, the companies had been relying on headquarter for R&D human resources and activities itself. In addition, foreign investors do not have a proper access to the information regarding ITB research activities, even though they have a contact with ITB for recruiting graduates. However, in order to respond to demand quickly, R&D will be shifted from Japan, thus, same as above-mentioned, university, particularly ITB, will become the most proper partner for outsourcing and/or collaboration. ITB decided to open an office in BEKASI, which is the largest industrial development zone in Java. The proactive actions of CRCS through that office will expedite effective linkages with Japanese investors as well.

In order to make a proactive action efficient and effective, CRCS should develop the capacity of administrative staffs intensively. Then teaching staff assigned to CRCS can concentrate on supporting academic research quality. The university-industry-community linkage will generate revenue for ITB, and according to ITB regulation, a certain percentage of revenue should be retained for operation and maintenance of all the research facilities at ITB. Although CRCS made every effort to handle accounting timely, many complaints about the delay of handling are observed by the professors. This is also the requirement of CRCS capacity development. JICA training course for university-industry linkage arrangement is considered as one of the appropriate opportunities for CRCS administrative staff development.

3 IMPLEMENTATION, MONITORING AND MANAGEMENT

3.1 Proposed Implementation, Monitoring and Management Arrangements

3.1.1 Project Management Structure and Its Functions

The chart below shows the project management structure.

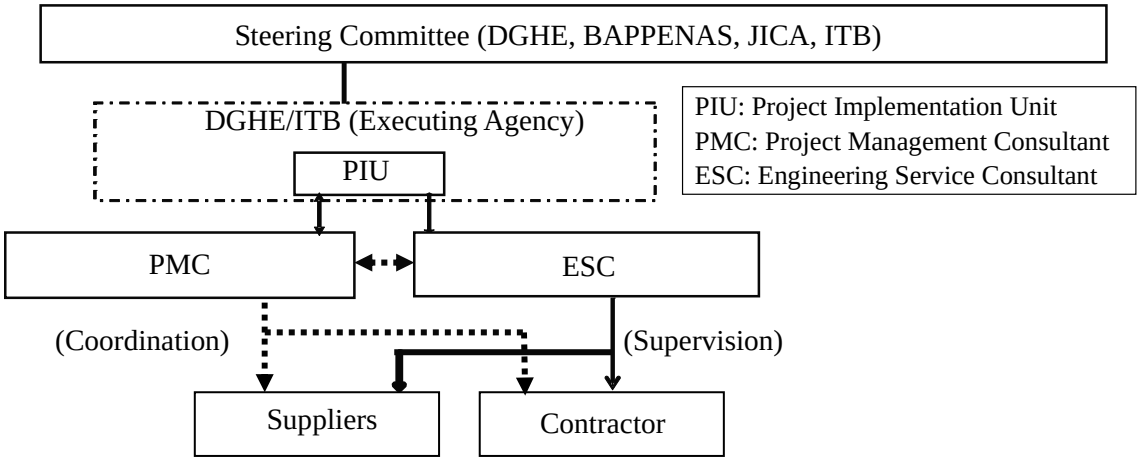


Figure 3.1 Project Management Structure

Steering Committee: Steering Committee will consist of a representative from JICA, BAPPENAS, DGHE, and ITB. It will receive project reports from Executing Agency and review them periodically. It has the authority for decisions on major issues, for example, a matter beyond the scope of the project planned.

Executing Agency: Executing Agency will consist of DGHE and ITB. Regarding administration of JICA Loan, ITB will handle necessary tasks, like requesting JICA's concurrence, and DGHE will supervise these tasks.

PIU: PIU will be established in ITB with a few representatives from ITB. PIU will communicate with the management of ITB, such as Rector, vice Rectors, and Senate, to know updates regarding ITB's development strategy and direction, and reflect them in the Project implementation, if necessary. It will have the responsibility to report about the Project to the steering committee consisting of DGHE, BAPPENAS, JICA and ITB. For daily administrative and technical project management, The PIU will be assisted by PMC and ESC accordingly to ensure well conceived management plan and implementation, and act as a decision makers and supervisor for daily activities of the Project.

PMC: PMC will be attached to PIU. Their main responsibility will be to manage project implementation including the records of project progress and accounts and to assist PIU during audit processes. They are to assist PIU in making necessary reports to the authorities such as JICA, MONE, BAPPENAS, and in coordinating with them for submissions, approvals and concurrences including maintenance of network and communication linkage with all internal and external parties concerned (municipality, authorities, etc). PMC will consist of a Project Management Expert, Construction Management Expert, Financial Management Expert, Monitoring and Evaluation Expert, Procurement Expert and Supporting staff.

ESC: ESC is responsible to prepare and produce detail engineering design for all construction programs including related work (site development, etc) stipulated in terms of reference for Engineering Services Consultant. During construction, ESC will supervise contractors, work with PMC and report to PIU to make the project work smoothly. ESC will consist of international and local consultants. Both international and local consultants will be appointed as team leader, architect, structure engineer, electrical engineer, mechanical engineer, utility engineer, tender document specialist, equipment engineer, procurement specialist. Only local consultants are to be allocated for resident architect, landscape architect, civil engineer, cost estimation/quantity surveyor.

3.1.2 Operation and Maintenance Arrangements (Structure, Capacity Assessments including Financial Aspects, Rules and Regulations)

(1) Operation and Maintenance Related Organization Structure

O&M related organization structure is shown below.

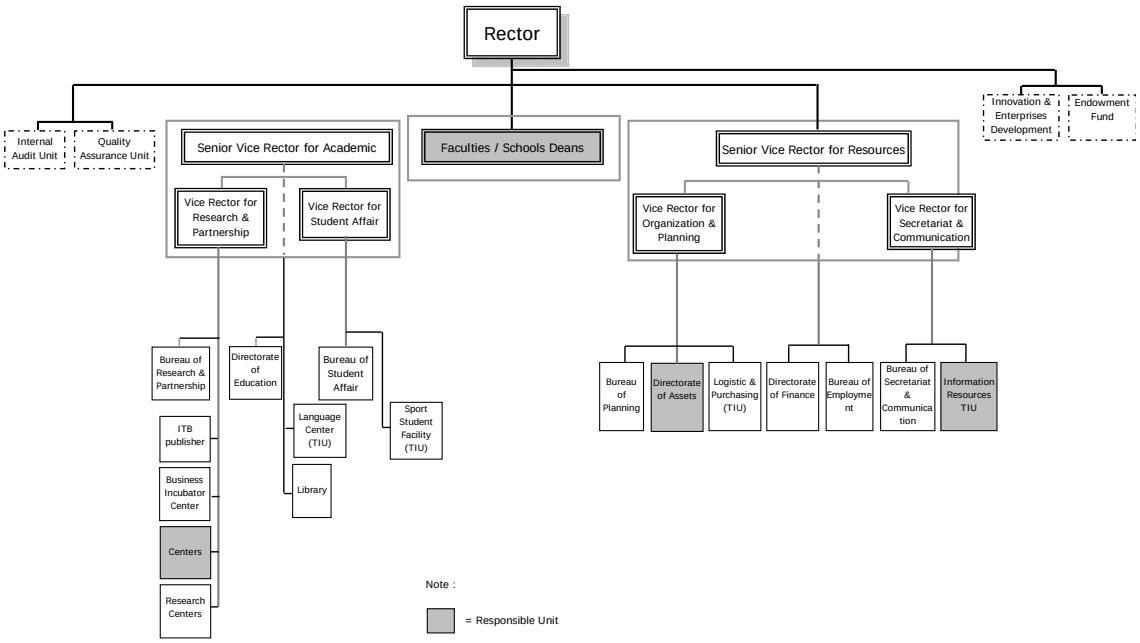


Figure 3.2 Operation and Maintenance Related Organization Structure

Each organization's functions are summarized below.

Bureau of Planning (BP): bureau will arrange ITB's activities plan and budget plan base on the proposal of each units in ITB. BP will manage all activities and budget and coordinate each unit in ITB.

Directorate of Assets (DA): DA will be responsible for collecting data assets of ITB and utilization of the assets. DA also will manage utilization of ITB's common facilities, such as parking areas, electricity, water, telephone, and vehicles. DA will be responsible for major repair of buildings and the maintenance of assets.

Logistics & Purchasing (LP): LP will be responsible for procurement of material and services in ITB based on the work program Bureau of Planning. Procurement mechanism should follow the rules of ITB's procurement system.

Directorate of finance (DF): DF will manage ITB's financial matters such as developing financial management system, book keeping, reviewing financial reports of each units, controlling petty cash, payment and prepare overall financial report.

Bureau of Employment (BE): This bureau will monitor all employee activities, recruitment, promotion, pension program and manage employee expenditure (salary etc).

Information Resources (IR): IR is a division that is responsible for planning, installation and maintenance of all information system facilities in each unit of ITB. In addition, IR also has the responsibility to develop the database system, website design and maintenance, and to assure internet connection.

Vice Rector for Research and Partnership (VRRP): As a management division that has the main task to decide ITB's policy and direction for research and partnership.

Bureau of Research and Partnership (BRR): The function of BRR is to conduct management of research activities and partnership. BRR have responsibility to provide guidelines of research proposal, research selection, research administration, partnership administration and to manage research proposal include proposal selection and research activities.

Centers(C): The centers are scientific development units established by the faculty and have responsibility to the faculty. The purpose of the centers is to develop certain scientific programs for research or study which are funded and managed by the faculty.

Research Centers (RC): RC established by ITB. ITB dedicated RC as the center of research development, facilitating and allocated fund for its research program.

Business Incubator Center (BIC): This center has an important role to facilitate ITB, researchers and surrounding industries. The center will secure and assure every research product that will be used by industry. The center will facilitate the partnership between ITB, researchers and industries by providing legal administration documents.

Table below shows O&M activities and their responsible unit.

Table 3.1 Operation and Maintenance Activities and Their Responsible Unit

	O&M Activities	**Responsible Unit**
Operation	Electricity, water, phone	Directorate of Assets
	Computer Network	Information Resources TIU
	Supplies(Laboratory, office)	Centers
Maintenance	Equipment	Centers
	Building and Infrastructure	Directorate of Assets
	IT facilities	Information Resources TIU

(2) New O&M Regulations

As ITB has been aware of fund raising to cover O&M cost, new regulations about allocation of Institution Development Fund (IDF) was issued in 2007. 15–17% of income from collaboration activities should be allocated as IDF. Among IDF, 20% of it should be allocated for maintenance

and capacity development for ITB resources. These regulations translated into English are shown in Appendix 3.1-1. These new regulations will contribute to increasing not only awareness of ITB's lectures and staff members in generating and saving O&M cost, but also income to be spent for O&M.

(3) Maintenance of Building Facilities

The responsibility of building maintenance is in the Bureau of Assets under the Senior Vice Rector for Resources.

The organizational structure of the Bureau of Assets is shown below, with about 20 technicians for repair works, and about 150 cleaners for daily cleaning.

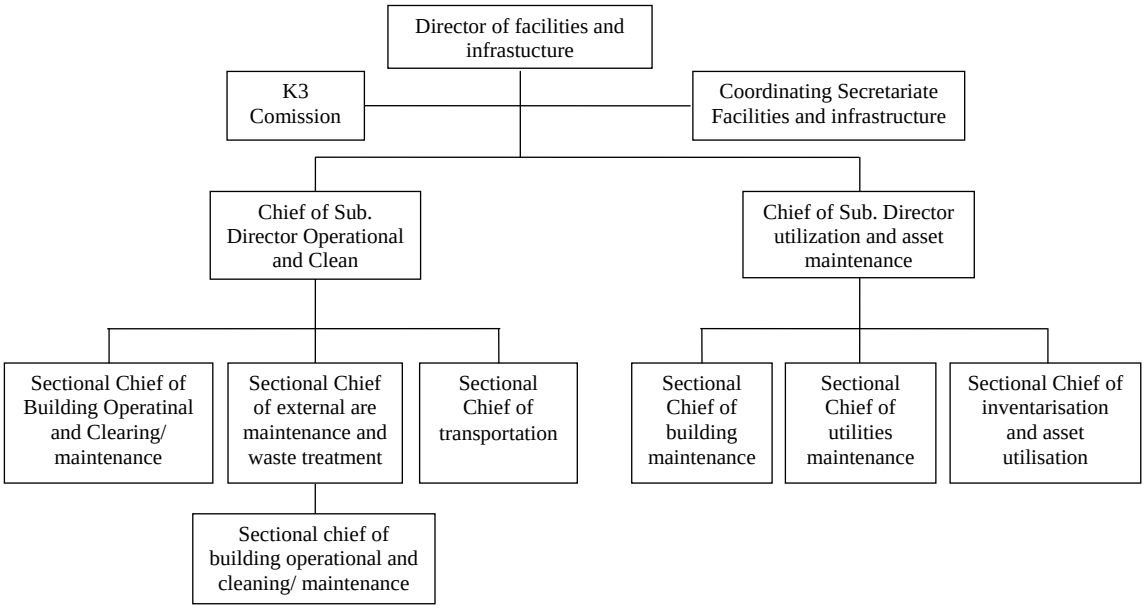


Figure 3.3 Organizational Structure of the Bureau of Assets

The annual budget of building maintenance is shown below.

Table 3.2 Annual Budget of Building Maintenance

Year	Total building operation & maintenance cost	
2006	2,348,988,500	IDR
2007	5,015,595,795	IDR
2008	5,715,287,750	IDR

The budget increased substantially in year 2006, and in year 2007 it was about 5.7 billion rupiah (aprox. US$ 610 thousand). The total building floor area of the ITB campus is approx. 268,000 sqm. Therefore, the maintenance cost is roughly 21 thousand rupiah (US$ 2.3) per sqm.

This is equivalent to 0.8% of standard new building construction cost.

For proper maintenance of buildings, it is said as a rule, that at least 1 % of initial construction cost should be spent yearly, and ideally it should be more than 2%. Therefore, it can be said that

current ITB maintenance budget for buildings is a little less than the minimum requirement. The unit cost of maintenance should be increased 20–30% for better maintenance of the buildings.

The project will construct an additional 34,500 sqm, 12.9% increase. If unit cost is increased 20–30% and total floor increases 12.9%, then the total maintenance cost should increase 35–45% of current amount.

Rough calculation of maintenance cost after building completion

billion IDR x 20–30%(unit cost) x 12.9% (total floor increase) = **7.7 - 8.4 billion IDR** (35–45% increase)

(4) Operation and Maintenance of Equipment

To ensure that equipment procured by the Project works sustainably, the SAPROF team recommends ITB the followings.

1) Requiring equipment suppliers to provide contact agent information for aftercare services.
2) Requiring equipment suppliers to provide operation manuals written either in Indonesian or English.
3) Carrying out user registration of the equipment for manufacturers, so that manufacturers will have a responsibility to inform the updated agent info, even if the registered agent is withdrawn from Indonesia.
4) Adding or extending the warranty period of the equipment
5) Preparing troubleshooting and maintenance manuals for the equipment
6) Keeping efforts on raising more budget for O&M

As described in 3.1.2 (2) above, ITB set new regulations to save a certain amount of O&M cost systematically from revenues generated from contracted projects. In addition, each center is planning to save O&M cost for equipment by renting equipment or providing services of measuring specimen to other Faculties or Schools in ITB, other HEIs, research institutes and industries. Appendix 3.1-2 shows a plan to cover O&M cost for nano-science technology related equipment that requires high O&M cost. It is important to establish a mechanism to advertise to other institutions in which ITB has the equipment and can provide such services. However, at the same time, a balance between research and income generation services should be carefully designed.

3.2 Proposed Packaging and Construction Method

3.2.1 Procurement Method and Packaging

Upon discussion with ITB and considering previous projects' lessons learned, the SAPROF team proposes the following packaging method.

(1) Construction and Procurement

Construction of new buildings and renovation of CITIE (*1)	:	ICB
Equipment 1 (for others than CAS) (*2)	:	ICB
Equipment 2 (for CAS excluding electron microscopes) (*2)	:	ICB
Equipment 3 (for electron microscopes) (*3)	:	International shopping
Equipment 4 (for ordinary equipments)	:	LCB
Construction of infrastructure and renovation work (*1)	:	LCB
Books & Furniture	:	LCB

Support by appointed professors from Japanese universities
on enhancing capacity and quality of nano-tech related research : Direct Appointment

(2) Consulting Services

Project Management	(*4)	:	LCB
Engineering Services	(*4)	:	ICB

(*1)
The tender package will be in one package for these construction works. Following is the reason to have only one package for construction.

- SCHEDULE: The phasing of these works is related to each other. Most new construction and renovation cannot start until related facilities are moved to the other site. If the contracts are separated, each contractor will blame the other contractor for not keeping the schedule. With one package only, the contractor will be responsible for coordinating the works and keeping the original schedule.

- COMPETITIVE PRICE AND QUALTIY: For international competitive bid, the package must have sufficient size to attract good companies. Total building cost for all these new buildings and renovation is about 20million US dollars. This is a good figure to attract good quality companies. If the packages are divided and one package is less than 10million US dollars, it will not be attractive, and a good competitive price cannot be expected. Also, by making a single package, the indirect cost of construction can be optimized. All the buildings will have the same quality.

- MAINTENANCE: After completion of the buildings, it is important to have good maintenance. The single contractor can devise comprehensive maintenance plan. This plan can be optimized by making an efficient maintenance rotation program among the buildings. When there is maintenance or repair work, it will be much easier for the client to contact the single contractor, rather than to search for which contractor made that part.

For infrastructure (site preparation works including sewage, water, electricity modifications for the new construction sites) and renovation work for CADL and CIBE is to be LCB due to budgetary constraints of loan amount. It is crucial that the infrastructure work to be started and completed according to the planned project schedule. Otherwise the construction work for the new buildings cannot be started, and if the new buildings are not completed, the equipment cannot be procured. Renovation work for CADL and CIBE is not related to other works, so it has a more flexible time schedule.

(*2)
The reasons why tender package of equipment for CAS and others are to be separated:

1) Equipment for CAS should be finalized based on the “Road Map” for nano-science technology development in ITB. “Road Map” development with assistance from invited professors from Japan and research capacity development of researchers of ITB are planned to be carried out at the beginning of this project. It is better to reflect results brought by those developments on finalizing equipment list of CAS. Meanwhile, the equipment of others other than CAS does not need to wait for finalization on the CAS equipment list as long as an installation space for equipment is ensured.

2) Additional adjustment of the space, for example, acoustic noise control and vibration control, may be required to accommodate the highly sensitive equipment of CAS, which can only be properly analyzed after construction of CAS is fairly finished.

Because of the above reasons, separating package into two, and preceding tendering for equipment other than CAS by package of CAS equipment will contribute to implementing the project efficiently and effectively.

(*3)
Out of this CAS equipment package, procurement for electron microscopes is also separated into one package. There are only 3 companies that can provide these Microscopes. Each company has different types of specifications, and it is not possible to have competition among them with the same specifications. The selection and procurement must be done considering both the price and the specifications. Therefore, international shopping methods are recommended since ITB will be able to directly negotiate with these manufacturing companies so that they can get the optimum equipment considering its price and performance.

Electron microscopes require special setting environment in terms of, for example, magnetic shield, anti-floor vibration, sound proof system, electrical isolation system and so on. These special fittings are not covered under standard or non-standard building work of Cipta Karya. Therefore, these special fittings shall be made and installed by the Equipment supplier of electron microscopes.

(*4)
Design competition
ITB has kept its heritage environment with important heritage buildings in the centre. The new building design must enhance this heritage environment. Therefore, design ideas for this project should be both innovative and have respect to heritage. For this purpose, open design competition is recommended. The winning designer will have the contract for preliminary design of the project.

The Project building also requires high technology engineering skills. Also, smooth coordination with the authorities, including JICA, is required of consulting services. These skills should be evaluated based on experience and qualifications, and is not suitable for open design competition. Therefore, in order to get the optimum combination of experts, the two services should be separately chosen.

The difficulty of design competition is how to make the evaluation procedure efficient, impartial and transparent. Another difficulty is budgetary constraints. The construction budget for this project is not abundant and has to be used efficiently. An aesthetically attractive design is often expensive (but not always). Therefore, the Terms of Reference (TOR) and evaluation procedures should be carefully made to make this design competition a successful one.

The main procedure concept of these two selections is shown below.

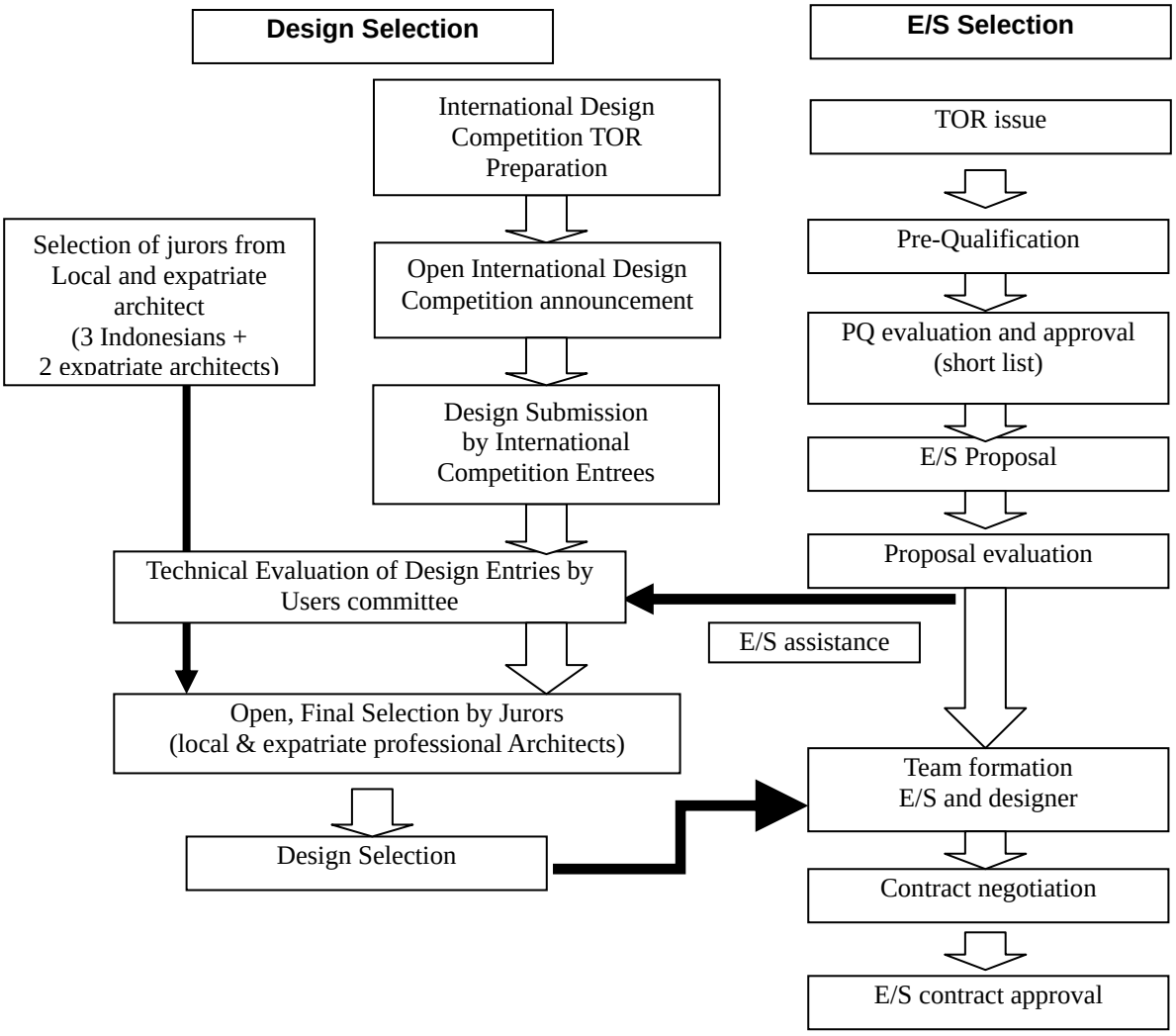


Figure 3.4 Main Procedure Concept of Design Competition

Construction Supervision service

According to Indonesian regulations, a project of this size must have a separate contract for Construction Management (CM). However, for JICA loan projects, CM service is included in E/S. ITB assessed that this system was effective for the two former Japanese loan projects at ITB. A full time assignment for international expert during the construction phase is necessary to keep the quality of the buildings and to manage the schedule of the Project. Therefore, for this project also, CM service will be included in E/S contract, and an international expert is to be on full time assignment during construction period of the building and equipment procurement period.

3.2.2 Construction Method

Most of the facility in this Project requires only standard construction methodology. However for CAS building, some special care must be taken to ensure the required nano technology. Nano technology is often very sensitive to vibration, noise, magnetic field, temperature, etc. Sound proof and magnetic shield rooms are required.

For these special rooms, special sub-contractors must be chosen. They are sub-contractors that have special skills for fabricating these rooms, and have qualified abilities to guarantee the final specification for sound proof quality, magnetic shield quality in the completed rooms. Standard construction contract procedures will not cover these issues. A special clause must be added to standard construction contract to make sure that these specifications are met. Especially for electron microscope rooms, some special measures need to be taken. After practical completion of the building, testing must be done to analyze the specific quality of the room. Upon this analysis, some additional measures must be taken to minimize the effects. These cannot be designed and built before. It is purely a trial and error procedure to get that most ideal viewing environment for the microscopes.

This means that some budgetary contingency must be incorporated into the construction contracts. Also, some of the special equipment, such as clean bench, etc, needs special coordination with the mechanical systems of the buildings. This equipment must also be sub-contracted to a special company that has skill and qualifications for installing this equipment.

3.3 Environmental Consideration

JICA encourages the project proponents to implement appropriate environmental and social considerations in accordance with the JICA Guideline for Confirmation of Environmental and Social Considerations (hereinafter referred to as “JICA Environmental Guideline”). Analysis according to a check list regarding environment issues to be defined in JICA Environmental Guideline is attached in Appendix 3.3-1.

According to Indonesian government regulations of Environmental Impact Analysis (PP No.27, 1999) a development project should pass a screening process involving the development of EIA document. The proposed project includes construction of facilities, and educational and research activities at operation stage. The project is in the existing ITB campus and has neither land acquisition nor resettlement. The scale of construction is not so large, and there is no significant ecosystem because the site was used already for buildings or parking. Therefore the impact caused by the project is considered as minimal.

The EIA document shall be made by E/S, and will be submitted together with building permit documents. The precautions for construction, such as noise, dust and others, shall be clearly stated in this document and will be submitted to the Contractors as conditions of contract as the environmental impact management and monitoring (UKL-UPL).

Following issues should be mentioned in this EIA.

- Information disclosure to all stakeholders, especially to related households if any, should be implemented sufficiently and properly by ITB in the procedure of EIA.
- The access road to the project site and traffic plan at construction and operation stages should be discussed with the City, ITB and E/S consultants at design stage.
- Contractors should prepare the detailed construction plan. ITB should request the plan to be included in the bid document to the contractor.
- Special attention should to be paid for noise/ vibration based on the detail construction plan at construction and operation stages.
- Safety management plan should be made considering the students and surrounding traffic.

The major environmental issues for this project other than above general procedures are:

- Cultural heritage of ITB
- Waste management including sewage and hazardous materials.

SAPROF team advised, and ITB agreed to preserve as much as possible the wooden structure system as cultural heritage of ITB (refer to physical master plan chapter).

As for the hazardous waste management system, *it is explained in detail in answer to question no I* shown in Appendix 2.2-3. In this year 2008, ITB has formulated a plan to improve the current system, and is now in process for implementation.

4 PROJECT COSTS, FINANCE, AND SCHEDULE

4.1 Project Costs

Project costs consist of the following components:

- Construction (new buildings, renovation of existing buildings, and infrastructure development)
- Equipment
- Books & Furniture (books include journals)
- Research Grant
- Staff development (Degree and non-degree programs, programs for post-doctor, short-term training, seminar and workshop)
- Support by appointed professors from Japanese universities on enhancing capacity and quality of nano-tech related research
- Consulting services (Project Management and Engineering Services)

Table 4.1 Total Project Cost

	Original in thousand USD	**SAPROF in thousand USD**	**Difference in thousand USD**	**SAPROF in million Yen**
Construction	22,780	22,205	-575	2,376
Equipment	28,399	18,149	-6,107	1,942
Books and Furniture		4,143		443
Research Grant	360	360	0	39
Staff Development (Oversea and Domestic)	4,725	3,556	-1,169	380
Support on nano-tech development	240	241	+1	26
Consulting services	5,532	5,858	+326	627
Sub-total	62,036	54,512	-7,524	5,833
Price Escalation	1,522	8,613	+7,091	932
Contingency	2,711	3,156	+445	338
Administration cost	0	0	0	0
VAT	6,627	6,628	+1	709
Import Tax	0	0	0	0
Total	72,896	72,909	+13	7,795

Price Escalation: F/C: 2.6% / year L/C: 5.8% / year
Physical Contingency: 5.0% / year
Administration cost[7]: 0
Value-added Tax (VAT): 10% of the total project cost
Import Tax[8]: 0

Interest during construction and commitment charge will be added to the total project cost above and be covered by GOI.

[7] ITB will utilize the existing facilities and personnel to implement the Project. Additional administration cost is not required.
[8] Import Tax will be exempted by GOI

Interest during construction for construction: 1.40% / year
Interest during construction for consultant: 0.01% / year
Commitment charge: 0.1% / year

(1) Construction Costs

The basic calculation of the unit prices for construction, excluding price escalation and contingency, are based on the Cipta Karya (Directorate General of Human Settlement, Ministry of Public Works) Standard price type A building.

For Bandung 1st February 2008 : IDR 2,514,000 per sqm

For a building of more than 2 stories, the following construction factor will be used.

Table 4.2 Storey Construction Factor

Storey	Factor
2	1.090
4	1.135
6	1.197
8	1.265
10	1.330

Some of the laboratories require double or triple height. For these laboratories, 30% of void area of upper floor is added to the floor area for calculation of building construction cost. For laboratory buildings in higher education, an additional 25% of the total cost will be applied in accordance with *Pedomen Teknis Pembangunan BGN* (Standard for National Building).

Non-standard costs relevant to this project are given as following:

Table 4.3 Non Standard Factor

	factor	Factor
AC	Air conditioning	10-20%
EV	Elevator/escalator	8-12%
TL	Telephone PBX	3-6%
IT	Information system	6-11%
GE	Generators	7-12%
FR	Fire protection system	7-12%
LT	Special lighting	2-5%
GS	Medical gas system	2-4%
FD	Foundation	7-12%
UD	Disabled persons facilities	3-8%
BF	Basement	120% of base

Some of the required labs needs high ceilings. For example the strong wall lab needs more than 20m clearance height. For these buildings, additional floor area considering the void space for this high ceiling is to be added for cost calculation.

Above total is 58–110%. Since not all above facilities are included in all of the new buildings, factor of 40% to 80% is applied depending on the nature of each building.

The unit costs for cost estimation are summarized as below.

Table 4.4 Unit Price for Building Construction

				Standard 2008/2/1	multi storey factor	lab factor	standard	Non standard		total
AB	Center for Advanced Sciences	8F	3,900 m^2	IDR 2,514	1.265	1.25	IDR 3,975	40%	IDR 1,590	IDR 5,565 **64,000JPY**
	Mathematics Astronomy Center for Research & Community Service		11,400 m^2	IDR 2,514	1.265	1.00	IDR 3,180	30%	IDR 954	IDR 4,134 **48,000JPY**
C	Center for Infrastructure & Built Environment Engineering	10F	11,000 m^2	IDR 2,514	1.330	1.25	IDR 4,180	30%	IDR 1,254	IDR 5,433
	Hydraulic and Ocean engineering laboratories		addition 480m^2 for void space							**62,000JPY**
	Infrastructure & Engineering and Hydraulic	reno	2,4600 m^2	IDR 2,514	0.750					IDR 1,886 **22,000JPY**
D	Center for IT in Industrial Engineering	reno	5,900 m^2	IDR 2,514	0.750					IDR 1,886 **22,000JPY**
E	Center for Arts, Design & Languages	8F	8,000 m^2	IDR 2,514	1.265	1.00	IDR 3,180	30%	IDR 954	IDR 4,134 **48,000JPY**
		reno	5,200 m^2	IDR 2,514	0.750					IDR 1,886

(thousand Rupiah, 1IDR=0.0115JPY)

Following is summary of unit price by former JICA projects in ITB.

Table 4.5 Unit Price of Former Projects

Completion date	Building	Unit price
March-95	Lab TeK V Lab TeK VI	31,000JPY/m^2
December-95	Lab TeK X	39,000JPY/m^2
December-96	Lab TeK VII Lab TeK VIII	43,000JPY/m^2
May-96	Lab TeK IX-A	43,000JPY/m^2
November-98	Lab TeK IX-B Lab TeK IX-C	39,000JPY/m^2
November-96	Lab TeK XI	66,000JPY/m^2
January-97	Science Technology and Art Center	53,000JPY/m^2
January-01	Computer Center and Academic Resources	40,000JPY/m^2
July-02	Basic science center A & B	40,000JPY/m^2

The unit price for this project is 48,000 JPY to 64,000 JPY. The construction cost has risen sharply these two years. For example the price of reinforced steel bars has almost doubled. Therefore, compared to former projects, the new unit price is barely possible to keep the quality of the building.

4.2 Project Funding Arrangement

The Project Costs have been categorized into those to be financed by Japanese ODA Loan (JICA) and by the Government of Indonesia (GOI).

Table 4.6 Project Financing

Construction of new building and renovation of CITIE	JICA	100%	GOI	0%
Renovation of CIBE and CADL	JICA	0%	GOI	100%
Infrastructure development	JICA	0%	GOI	100%
Equipment 1, 2 and 3	JICA	100%	GOI	0%
Equipment 4	JICA	0%	GOI	100%
Furniture & Books	JICA	0%	GOI	100%
Staff Development (Degree program, Post-doctor program, short term training, seminar/workshop taken place overseas)	JICA	100%	GOI	0%
Staff Development (Support by appointed professors from Japanese universities on enhancing capacity and quality of nano-tech related research)	JICA	100%	GOI	0%
Staff Development (Degree program and seminar/workshop taken place in Indonesia)	JICA	0%	GOI	100%
Staff Development (Research Grant)	JICA	0%	GOI	100%
Consulting services (PMS)	JICA	0%	GOI	100%
Consulting services (E/S)	JICA	100%	GOI	0%
Contingency	JICA	81%	GOI	19%
Price Escalation	JICA	73%	GOI	27%
VAT	JICA	0%	GOI	100%

Table 4.7 JICA Portion and GOI Portion

In thousand USD

	FC	LC	Total
JICA			
Construction (New and renovation of CITIE)	8,842	10,040	
Equipment	17,144		
Staff Development (Degree program, Post-doctor program, short term training, seminar/workshop taken place overseas)	3,470		
Staff Development (Support by appointed professors from Japanese universities on enhancing capacity and quality of nano-tech related research)	241		
Consulting services (E/S)	2,894	2,041	
Price Escalation	3,529	2,741	
Contingency	1,806	741	
Total	37,926	15,562	53,489
GOI			
Construction (Renovation and Infrastructure)		3,323	
Equipment		1,005	
Furniture and books		4,143	
Staff Development		86	

	FC	LC	Total
(Degree program and seminar/workshop taken place in Indonesia)			
Staff Development (Research Grant)		360	
Consulting services (PMS)		923	
Price escalation		2,343	
Contingency		609	
VAT		6,628	
Total		19,420	19,420

FC in million Yen / LC in million IDR / Total in million Yen

	FC	LC	Total
JICA			
Construction (New and renovation of CITIE)	946	93,283	
Equipment	1,834		
Staff Development (Degree program, Post-doctor program, short term training, seminar/workshop taken place overseas)	371		
Staff Development (Support by appointed professors from Japanese universities on enhancing capacity and quality of nano-tech related research)	26		
Consulting services (E/S)	309	18,958	
Price Escalation	378	25,462	
Contingency	194	6,885	
Total	4,057	144,588	5,719
GOI			
Construction (Renovation and Infrastructure)		30,878	
Equipment		9,335	
Furniture and books		38,496	
Staff Development (Degree program and seminar/workshop taken place in Indonesia)		794	
Staff Development (Research Grant)		3,345	
Consulting services (PMS)		8,572	
Price escalation		21,773	
Contingency		5,659	
VAT		61,619	
Total		180,472	2,075

4.3 Project Schedule

The standard former JBIC loan pre-condition for project schedule is as follows;

1. Loan agreement pre-notice: December 2008
   Exchange of note (E/N) for loan agreement February 2009

2. Standard periods for scheduling
   a. Selection of consultant 9 months
      (if by direct appointment 6 months)
   b. PQ 3 months
   c. Tender document JICA concurrence 4 months
   d. Tender period 3 months

e.	Evaluation of tender	5 months
f.	Tender concurrence from JICA	1 month
g.	Contract negotiation	1.5 month
h.	Contract concurrence from JICA	0.5 month
i.	Opening of L/C, issuing of L/Com	1 month
	Total	16 months
	(if with PQ	19 months)

The above standard period is recommended from JICA for Project Scheduling based on their experience. This standard 16 months (19months with PQ) shows the very poor efficiency of both the GOI administration and the former JBIC.

Another constraint of the loan procedure is that the GOI budget cannot be disbursed in the initial year since the loan is not officially approved the year before. So the project has to wait until next fiscal year before any official procedure can start.

Considering above constraints "Standard" project implementation schedule is shown on Appendix 4.3-1. The target of this schedule is to have most of the facilities and equipment completed by first quarter (March) of year 2013.

To realize this target, this "standard" schedule assumes that administration efficiency can be somewhat improved. For example, the tender period is shortened from former JBIC standard of 16 months to 14 months (12.5% increases in efficiency). Every administration effort from both GOI and new JICA is required to keep this "standard" schedule.

The optimum "Quick" schedule is also shown on Appendix 4.3-2. This "Quick" schedule is based on the assumption that the budget can be used in the first year of the loan agreement. That, although DIPA arrangement is not officially fixed, some of the component may start in the year 2009.
The target of this "Quick" is to have most of the facilities and equipment completed by the second quarter (August) of year 2012.

The new university year from September 2012 can start with the new facilities.

This is a rather optimistic schedule. For example the main tender for new building construction is scheduled to be completed in 9 months, nearly 50% more efficient than the former JBIC standard.

Key schedule for both schedules are as follows:

a.	Infrastructure site preparation work	4 months
b.	Construction period for 8 floor building:	16 months
c.	Construction period for 10 floor building	18 months
d.	Procurement period for standard equipment	12 months
e.	Procurement period for Electron microscopes including installation periods	15 months

For a reference, implementation schedule indicating activities to be financed by loan portion and those by GOI portion separately is also shown in Appendix 4.3-3.

4.4 Annual Fund Requirement

Annual fund requirement is shown in Appendix 4.4-1. A commitment charge and interest during construction is also shown in the same table.

Table 4.8 Estimated Annual Fund Requirement

In thousand USD

	JICA Portion	GOI Portion	Total
2010	3,343	1,882	5,225
2011	9,140	5,092	14,232
2012	32,854	7,877	40,731
2013	6,560	3,386	9,946
2014	702	1,094	1,796
2015	709	71	780
2016	182	18	200
Total	53,489	19,420	72,909

In million Yen

	JICA Portion	GOI Portion	Total
2010	358	201	559
2011	977	544	1,521
2012	3,514	842	4,356
2013	702	362	1,064
2014	75	117	192
2015	75	7	82
2016	19	2	21
Total	5,719	2,075	7,795

5 MONITORING AND EVALUATION INDICATORS

5.1 Quantitative (Outcomes) Indicators

The following outcomes of the Project are expected: 1) expansion of world class research capacity, 2) expansion of capacity to promote collaboration research with industries and communities, 3) activities attracting new students, particularly master and doctoral programs.

ITB has various quantitative indicators for its own monitoring and evaluation. Among those indicators, the following indicators are considered as appropriate and workable. PMC will compile monitoring and evaluation indicator report yearly based on data mainly collected through CRCS and other concerning sections of ITB. Upon project completion, analysis of the results will be written on Project Completion Report (PCR).

1) Research capacity expansion

	Center	**Present (2008)**	**Target (2016)**
Laboratory floor space per student of relating faculties:	CITIE	1.6m^2/student	2.1 m^2/student
	CIBE	2.58 m^2/student	4.00 m^2/student
	CADL - Language	3.48m^2 (62 students/class)	3.11m^2 (102 students/class)
	CADL - Arts and Design	0.5–0.8m^2/student	3 – 4 m^2/student
Academic publications in international and domestic journals and conferences relating new centers:		567	770

2) Increase of collaborative research

	Present (2008)	**Target (2016)**
Number of collaborative research projects with new centers:	38	84
Number of international universities involved in research collaboration with new centers:	11	34
Number of funding institutions for collaborative research:	11	28

3) Increase of Students intake

	Present (2008)	**Target (2016)**
Number of intake of relating faculties (Master: S2)	300	425
Number of intake of relating faculties (Doctor: S3)	42	78

5.2 Qualitative (Impacts) Indicators

In addition to the quantitative indicators, the following effects are expected. Data collection and analysis will be carried out at the end of the project and be written on PCR . It is recommended to continue monitoring these indicators even after the project is completed to measure further impacts.

1) The position and recognition of ITB in the world-level academia will be strengthened.
2) Joint research laboratory proposal from industries will be promoted.
3) ITB's role and contribution to supporting other universities and industries in Indonesia will be increased.

4) Research capacity of other universities in Indonesia will be enhanced.
5) Higher education relevancy to the international market will be improved.
   * Students' better satisfaction by, for example, high salary, better position, and good benefit.
   * Relevancy between their field of study and their professional position.
   * Relevancy of competency of graduates and requirement of employment sector in global market.

Data collection methods for qualitative indicators will include, but not be limited to:
1) World university ranking published by several different organizations
2) Interviewing sampled stakeholders, such as ITB graduates, other HEI teaching staff and industries, both international and domestic.

5.3 FIRR・EIRR

The SAPROF team attempted an initial estimation of the IRRs related to the proposed project. This preclinical estimation suggests that the project proposal would have positive IRR as follows.

- Private IRR (PIRR): 14.75% (S1), 26.02% (S2), and 12.23% (S3)
- Financial IRR at 14.13%
- Economic IRR at 7.41%

IRRs are very sensitive to (i) number of the graduates per year that benefit from the proposed centers, and (ii) starting salary of the graduates (by S1, S2, and S3). Unfortunately, time and other resources allowed were not sufficient for the SAPROF team to synthesize sound assumptions in regards to the above (i) and (ii). The estimation is based on general data and statistics only, and it includes many assumptions[9].

Beneficiaries

Number of the graduates that benefit from the project is 27,850 (S1), 12,406 (S2), and 944 (S3). Total number of the beneficiaries (graduates during the 30 years after the project completion) is estimated at 41,200. Yearly number of the graduates are 1,039 (S1), 427 (S2) and 35 (S3).

Beneficiary HEIs are institutions that send teaching staffs to ITB's S2 or S3 programs, that have collaboration research with ITB, and that receive technical assistance from ITB. Names can be found in Appendix 1.1-1.

ITB is going to establish the ITB's Engineering Research Center in Bekasi industrial estate aiming to accommodate research activities which are directly contributing to the industry's needs. Thus, beneficiary industries will not only be ones around Bandung but also in Bekasi as well as Jakarta. Beneficiary industry's types will be electronics and parts, pharmacy & chemicals and automotive and motorcycle, that operate in the area.

[9] Refer to Appendix5.3-1 for further information regarding IRR estimation

6 ALTERNATIVES, CONTINGENCY PLAN, RISKS, AND REMAINING ISSUES

(1) Project Implementation starts in 2010, taking the procedure of DIPA arrangement into consideration. Unless a legal document is authorized, disbursement from ODA loan as well as GOI budget for the next year is not secured by DIPA. This means that DIPA for 2009 must be prepared in 2008. However, it is expected that the GOJ commitment is made in March 2009 at earliest. If a particular arrangement is made between GOI and GOJ to overcome the above constraint, implementation schedule would be expedited as per Appendix 4.3-2.

(2) As described in 2.3, capacity of CRCS, particularly administrative staff, should be strengthened for proactive action. To improve the capacity, in addition to the group training course of JICA, T/A for capacity building is to be considered. This T/A may expand effective collaboration with foreign investors.

(3) Although research grant to support new centers is planned by ITB, a limited and competitive grant scheme has no affirmative consideration to young professors. A certain mechanism to encourage the young professors will grow the sustainable culture and incentivize a research oriented university. Collaboration research with young professors, particularly ones who studied in Japan, also encourages a firm relationship with Japan.

(4) As the tuition fee of ITB has been increasing, poor but capable students lost the opportunity to study at ITB. Support for the poor is to be considered as a component.

(5) As the cost and performance capacity of advanced equipment is developed and changed drastically in a very short time, flexible approaches shall be considered.

(6) ESC and PMC should coordinate with each other and consult with ITB and JICA in a timely manner.

APPENDICES

Appendix 1.1-1 Comparative Statistics between ITB and Other Public and Private Universities/Institutes

PUBLIC UNIVERSITIES / INSTITUTE

UNIVERSITAS SUMATERA UTARA	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	7	167	47	3.55
All Master Programs	27	1448	243	5.96
All Undergraduate Programs	44	19105	1377	13.87
All Diploma, Specialist, Profesional Programs	37	4794	154	31.13
Total all programs	115	25514	1821	14.01
All Eng. Doctoral Programs	0	0	1	0.00
All Eng. Master Programs	6	148	66	2.24
All Eng. Undergraduate Programs	11	4481	321	13.96
All Engineering Programs	17	4629	388	11.93

UNIVERSITAS ANDALAS	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	3	23	4	5.75
All Master Programs	21	413	40	10.33
All Undergraduate Programs	35	14379	1333	10.79
All Diploma, Specialist, Profesional Programs	9	1285	63	20.40
Total all programs	68	16100	1440	11.18
All Eng. Doctoral Programs	0	0	1	0.00
All Eng. Master Programs	2	15	3	5.00
All Eng. Undergraduate Programs	8	3578	282	12.69
All Engineering Programs	10	3593	286	12.56

UNIVERSITAS SRIWIJAYA	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	3	31	13	2.38
All Master Programs	15	1042	92	11.33
All Undergraduate Programs	45	14064	973	14.45
All Diploma, Specialist, Profesional Programs	18	1941	112	17.33
Total all programs	81	17078	1190	14.35
All Eng. Doctoral Programs	0	0	1	0.00
All Eng. Master Programs	2	102	12	8.50
All Eng. Undergraduate Programs	12	4066	274	14.84
All Engineering Programs	14	4168	287	14.52

UNIVERSITAS INDONESIA	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	31	805	169	4.76
All Master Programs	60	7814	543	14.39
All Undergraduate Programs	55	23486	1241	18.93
All Diploma, Specialist, Profesional Programs	57	8308	476	17.45
Total all programs	203	40413	2429	16.64
All Eng. Doctoral Programs	8	146	52	2.81
All Eng. Master Programs	12	980	80	12.25
All Eng. Undergraduate Programs	13	4013	208	19.29
All Engineering Programs	33	5139	340	15.11

UNIVERSITAS DIPONEGORO	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	8	350	34	10.29
All Master Programs	26	2015	138	14.60
All Undergraduate Programs	42	17695	1283	13.79
All Diploma, Specialist, Profesional Programs	37	6217	179	34.73
Total all programs	113	26277	1634	16.08
All Eng. Doctoral Programs	2	98	7	14.00
All Eng. Master Programs	6	338	34	9.94
All Eng. Undergraduate Programs	12	4231	324	13.06
All Engineering Programs	20	4667	365	12.79

UNIVERSITAS GADJAH MADA	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	32	840	126	6.67
All Master Programs	63	6382	418	15.27
All Undergraduate Programs	68	28827	1529	18.85
All Diploma, Specialist, Profesional Programs	53	8380	339	24.72
Total all programs	216	44429	2412	18.42
All Eng. Doctoral Programs	10	102	28	3.64
All Eng. Master Programs	13	1284	88	14.59
All Eng. Undergraduate Programs	24	10063	442	22.77
All Engineering Programs	47	11449	558	20.52

UNIVERSITAS BRAWIJAYA	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	10	309	32	9.66
All Master Programs	22	577	106	5.44
All Undergraduate Programs	42	23196	1251	18.54
All Diploma, Specialist, Profesional Programs	17	2760	74	37.30
Total all programs	91	26842	1463	18.35
All Eng. Doctoral Programs	2	0	1	0.00
All Eng. Master Programs	5	124	19	6.53
All Eng. Undergraduate Programs	14	7588	406	18.69
All Engineering Programs	21	7712	426	18.10

UNIVERSITAS HASANUDDIN	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	6	175	33	5.30
All Master Programs	32	816	148	5.51
All Undergraduate Programs	54	19890	1553	12.81
All Diploma, Specialist, Profesional Programs	13	0	0	0.00
Total all programs	105	20881	1734	12.04
All Eng. Doctoral Programs	0	0	1	0.00
All Eng. Master Programs	10	271	52	5.21
All Eng. Undergraduate Programs	14	5002	285	17.55
All Engineering Programs	24	5273	338	15.60

ITS (Surabaya)	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	7	134	22	6.09
All Master Programs	15	1564	103	15.18
All Undergraduate Programs	22	11419	707	16.15
All Diploma, Specialist, Profesional Programs	3	1623	83	19.55
Total all programs	47	14740	915	16.11
All Eng. Doctoral Programs	5	129	20	6.45
All Eng. Master Programs	11	1134	71	15.97
All Eng. Undergraduate Programs	16	9096	506	17.98
All Engineering Programs	32	10359	597	17.35

INSTITUT TEKNOLOGI BANDUNG	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	26	444	161	2.76
All Master Programs	41	3336	322	10.36
All Undergraduate Programs	35	13702	758	18.08
All Diploma, Specialist, Profesional Programs	1	132	1	132.00
Total all programs	103	17614	1242	14.18
All Eng. Doctoral Programs	19	262	116	2.26
All Eng. Master Programs	27	1796	204	8.80
All Eng. Undergraduate Programs	20	9452	469	20.15
All Engineering Programs	66	11510	789	14.59

PRIVATE UNIVERSITIES / INSTITUTE

UNIVERSITAS TRISAKTI

	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	3	39	1	39.00
All Master Programs	11	895	60	14.92
All Undergraduate Programs	23	17754	691	25.69
All Diploma, Specialist, Profesional Programs	7	563	2	281.50
Total all programs	44	19251	754	25.53
All Eng. Doctoral Programs	1	0	1	0.00
All Eng. Master Programs	5	138	24	5.75
All Eng. Undergraduate Programs	12	4198	257	16.33
All Engineering Programs	18	4336	282	15.38

UNIVERSITAS TARUMANEGARA

	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	1	20	6	3.33
All Master Programs	6	522	39	13.38
All Undergraduate Programs	17	13092	498	26.29
All Diploma, Specialist, Profesional Programs	5	237	44	5.39
Total all programs	29	13871	587	23.63
All Eng. Doctoral Programs	1	20	6	3.33
All Eng. Master Programs	2	83	13	6.38
All Eng. Undergraduate Programs	9	2665	140	19.04
All Engineering Programs	12	2768	159	17.41

INSTITUT TEKNOLOGI INDONESIA

	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	0	0	0	0.00
All Master Programs	0	0	0	0.00
All Undergraduate Programs	10	1386	102	13.59
All Diploma, Specialist, Profesional Programs	2	145	11	132.00
Total all programs	12	1531	113	13.55
All Eng. Doctoral Programs	0	0	0	0.00
All Eng. Master Programs	0	0	0	0.00
All Eng. Undergraduate Programs	10	1386	102	13.59
All Engineering Programs	10	1386	102	13.59

ITENAS (Bandung)

	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	0	0	0	0.00
All Master Programs	0	0	0	0.00
All Undergraduate Programs	13	4348	229	18.99
All Diploma, Specialist, Profesional Programs	0	0	0	0.00
Total all programs	13	4348	229	18.99
All Eng. Doctoral Programs	0	0	0	0.00
All Eng. Master Programs	0	0	0	0.00
All Eng. Undergraduate Programs	10	3477	193	18.02
All Engineering Programs	10	3477	193	18.02

UNIVERSITAS KRISTEN PETRA

	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	0	0	1	0.00
All Master Programs	1	61	8	7.63
All Undergraduate Programs	13	8046	318	25.30
All Diploma, Specialist, Profesional Programs	0	0	0	0.00
Total all programs	14	8107	327	24.79
All Eng. Doctoral Programs	0	0	0	0.00
All Eng. Master Programs	1	61	8	0.00
All Eng. Undergraduate Programs	6	2575	149	13.59
All Engineering Programs	7	2636	157	16.79

UNIVERSITAS PELITA HARAPAN

	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	1	8	9	0.89
All Master Programs	8	525	48	10.94
All Undergraduate Programs	24	5831	286	20.39
All Diploma, Specialist, Profesional Programs	1	0	0	0.00
Total all programs	34	6364	343	18.55
All Eng. Doctoral Programs	0	0	1	0.00
All Eng. Master Programs	4	67	14	4.79
All Eng. Undergraduate Programs	8	1329	118	11.26
All Engineering Programs	12	1396	133	10.50

UNIVERSITAS PARAHYANGAN

	# of Study Programs	# of Students	# of permanent teaching staff	ratio
All Doctoral Programs	4	74	23	3.22
All Master Programs	6	279	42	6.64
All Undergraduate Programs	15	9094	302	30.11
All Diploma, Specialist, Profesional Programs	2	120	11	10.91
Total all programs	27	9567	378	25.31
All Eng. Doctoral Programs	2	20	12	0.00
All Eng. Master Programs	2	122	15	8.13
All Eng. Undergraduate Programs	5	3278	96	34.15
All Engineering Programs	9	3420	123	27.80

Appendix 1.1-2 Accreditation Grade of Engineering Study Programs

No.	Region	Level	Higher Education Institution	Study Programs	Grade	Score
INSTITUT TEKNOLOGI BANDUNG						
S1-1	4	S1	Inst. Teknologi Bandung (ITB)	Arsitektur	B	599.48
S1-2	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Sipil	A	396
S1-3	4	S1	Inst. Teknologi Bandung (ITB)	Planologi/Perencanaan Wilayah dan Kota	A	395
S1-4	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Elektro	A	389.46
S1-5	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Penerbangan	A	385
S1-6	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Lingkungan	A	383
S1-7	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Informatika	A	382.68
S1-8	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Geofisika	A	380.25
S1-9	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Fisika	A	379.79
S1-10	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Industri	A	366.26
S1-11	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Pertambangan	A	362
S1-12	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Geologi	A	361
S1-13	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Kelautan	A	369.69
S1-14	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Material	A	361.99
S1-15	4	S1	Inst. Teknologi Bandung (ITB)	Meteorologi	B	319.34
S1-16	4	S1	Inst. Teknologi Bandung (ITB)	Geofisika	B	314.24
S1-17	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Arsitektur	A	390.62
S1-18	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Mesin	A	390.17
S1-19	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Geodesi	A	384.22
S1-20	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Kimia	A	381.15
S1-21	4	S1	Inst. Teknologi Bandung (ITB)	Teknik Perminyakan	A	363.38
Average Grade - Undergraduate Programs					**A**	**383.56**
S2-1	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Informatika	U	4.0811
S2-2	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Kimia	A	4.9
S2-3	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Mesin	A	4.8
S2-4	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Sipil	A	4.8
S2-5	4	S2	Inst. Teknologi Bandung (ITB)	Sistem dan Teknik Jalan Raya	A	4.7
S2-6	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Geologi	A	4.6
S2-7	4	S2	Inst. Teknologi Bandung (ITB)	Transportasi	B	4.4
S2-8	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Elektro	A	4.8
S2-9	4	S2	Inst. Teknologi Bandung (ITB)	Arsitektur	A	4.7
S2-10	4	S2	Inst. Teknologi Bandung (ITB)	Informatika	A	4.7
S2-11	4	S2	Inst. Teknologi Bandung (ITB)	Planologi/Perencanaan Wilayah dan Kota	A	4.7
S2-12	4	S2	Inst. Teknologi Bandung (ITB)	Geofisika Terapan	A	4.6
S2-13	4	S2	Inst. Teknologi Bandung (ITB)	Teknik dan Manajemen Industri	A	4.6
S2-14	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Lingkungan	A	4.6
S2-15	4	S2	Inst. Teknologi Bandung (ITB)	Ilmu dan Teknik Material	B	4.5
S2-16	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Geodesi	B	4.5
S2-17	4	S2	Inst. Teknologi Bandung (ITB)	Rekayasa Pertambangan	B	4.4
S2-18	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Penerbangan	B	4.4
S2-19	4	S2	Inst. Teknologi Bandung (ITB)	Teknik Perminyakan	B	4.4
S2-20	4	S2	Inst. Teknologi Bandung (ITB)	Instrumentasi dan Kontrol	B	4.3
Average Grade - Master Programs					**A**	**4.57**
INSTITUT TEKNOLOGI NASIONAL (Bandung)						
S1-1	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Arsitektur	B	348.23
S1-2	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik dan Manajemen Industri	B	335.55

No.	Region	Level	Higher Education Institution	Study Programs	Grade	Score
S1-3	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Mesin	B	315.68
S1-4	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Planologi	B	309.14
S1-5	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Industri	A	365.03
S1-6	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Sipil	B	335.17
S1-7	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Arsitektur	B	341
S1-8	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Lingkungan	B	323
S1-9	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Kimia	B	315
S1-10	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Geodesi	B	305
S1-11	4	S1	Inst. Teknologi Nasional (ITENAS) Bandung	Teknik Elektro	C	290
Average Grade - Undergraduate Programs					**B**	**325.71**
INSTITUT TEKNOLOGI SEPULUH NOPEMBER (Surabaya)						
S1-1	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Sipil	A	388
S1-2	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Mesin	A	390.34
S1-3	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Desain Produk Industri	A	389.85
S1-4	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Kimia	A	374.86
S1-5	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Lingkungan	A	368.23
S1-6	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Material	B	322.69
S1-7	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Elektro	A	386.94
S1-8	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Arsitektur	A	382.2
S1-9	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Fisika	A	373.61
S1-10	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Sistem Informasi	A	369.1
S1-11	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Kelautan	A	367.65
S1-12	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Informatika	A	363.89
S1-13	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Industri	A	363.52
S1-14	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Geodesi	B	359.42
S1-15	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Perkapalan	A	388.6
S1-16	7	S1	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Sistem Perkapalan	A	375.18
Average Grade - Undergraduate Programs					**A**	**372.76**
S2-1	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Arsitektur	U	3.8555
S2-2	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Elektro	B	4.5
S2-3	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Sipil	B	4.3

No.	Region	Level	Higher Education Institution	Study Programs	Grade	Score
S2-4	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Lingkungan	B	4.1
S2-5	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Mesin	A	4.7
S2-6	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknologi Kelautan	A	4.9
S2-7	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Arsitektur	A	4.8
S2-8	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Manajemen Teknologi	A	4.6
S2-9	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Kimia	A	4.6
S2-10	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Industri	B	4.5
S2-11	7	S2	Inst. Teknologi Sepuluh Nopember (ITS), Surabaya	Teknik Informatika	B	4.2
Average Grade - Master Programs					**B**	**4.46**
UNIVERSITAS ANDALAS (Padang)						
S1-1	10	S1	Univ. Andalas (UNAND), Padang	Teknik Industri	B	310.63
S1-2	10	S1	Univ. Andalas (UNAND), Padang	Teknik Mesin	A	380.4
S1-3	10	S1	Univ. Andalas (UNAND), Padang	Teknologi Hasil Ternak	A	361.54
S1-4	10	S1	Univ. Andalas (UNAND), Padang	Teknik Elektro	B	353.79
S1-5	10	S1	Univ. Andalas (UNAND), Padang	Teknik Lingkungan	B	314.41
S1-6	10	S1	Univ. Andalas (UNAND), Padang	Teknik Sipil	B	354.99
S1-7	10	S1	Univ. Andalas (UNAND), Padang	Teknik Pertanian	B	343
S1-8	10	S1	Univ. Andalas (UNAND), Padang	Teknologi Hasil Pertanian	B	306.97
Average Grade - Undergraduate Programs					**B**	**340.72**
S2-1	10	S2	Univ. Andalas (UNAND), Padang	Teknologi Industri Pertanian	**B**	**4.2**
UNIVERSITAS BRAWIJAYA (Malang)						
S1-1	7	S1	Univ. Brawijaya, Malang	Teknik Pengairan	A	365
S1-2	7	S1	Univ. Brawijaya, Malang	Teknologi Hasil Ternak	B	350.32
S1-3	7	S1	Univ. Brawijaya, Malang	Teknik Sipil	B	341
S1-4	7	S1	Univ. Brawijaya, Malang	Teknik Elektro	B	338
S1-5	7	S1	Univ. Brawijaya, Malang	Planologi/Perencanaan Wilayah dan Kota	B	310
S1-6	7	S1	Univ. Brawijaya, Malang	Arsitektur	B	305
S1-7	7	S1	Univ. Brawijaya, Malang	Teknik Mesin	B	324.35
S1-8	7	S1	Univ. Brawijaya, Malang	Teknologi Hasil Pertanian	A	388.25
S1-9	7	S1	Univ. Brawijaya, Malang	Produksi Ternak	A	377.31
S1-10	7	S1	Univ. Brawijaya, Malang	Teknologi Hasil Perikanan	A	362.33
S1-11	7	S1	Univ. Brawijaya, Malang	Teknik Pertanian	A	362.05
S1-12	7	S1	Univ. Brawijaya, Malang	Teknologi Industri Pertanian	A	361.76
S1-13	7	S1	Univ. Brawijaya, Malang	Ilmu Komputer	C	262
Average Grade - Undergraduate Programs					**B**	**342.11**
S2-1	7	S2	Univ. Brawijaya, Malang	Teknologi Hasil Pertanian	C	3.496
S2-2	7	S2	Univ. Brawijaya, Malang	Pengelolaan Tanah dan Air	A	4.618
S2-3	7	S2	Univ. Brawijaya, Malang	Teknik Sipil	B	4.114
S2-4	7	S2	Univ. Brawijaya, Malang	Teknik Mesin	C	4
Average Grade - Master Programs					**B**	**4.06**
UNIVERSITAS DIPONEGORO (Semarang)						
S1-1	6	S1	Univ. Diponegoro (UNDIP), Semarang	Arsitektur	A	619.35

No.	Region	Level	Higher Education Institution	Study Programs	Grade	Score
S1-2	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknik Kimia	A	384.54
S1-3	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknik Elektro	A	371.68
S1-4	6	S1	Univ. Diponegoro (UNDIP), Semarang	Planologi/Perencanaan Wilayah dan Kota	B	346.94
S1-5	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknik Mesin	B	335
S1-6	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknik Sipil	A	383
S1-7	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknologi Hasil Ternak	B	345
S1-8	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknik Arsitektur	A	373
S1-9	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknik Lingkungan	B	319.06
S1-10	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknik Industri	B	311.65
S1-11	6	S1	Univ. Diponegoro (UNDIP), Semarang	Teknologi Hasil Perikanan	B	307
S1-12	6	S1	Univ. Diponegoro (UNDIP), Semarang	Perencanaan Wilayah dan Kota	A	381
S1-13	6	S1	Univ. Diponegoro (UNDIP), Semarang	Ilmu Komputer	B	302
Average Grade - Undergraduate Programs					**A**	**367.63**
S2-1	6	S2	Univ. Diponegoro (UNDIP), Semarang	Teknik Sipil	B	4.1
S2-2	6	S2	Univ. Diponegoro (UNDIP), Semarang	Teknik Pembangunan Wilayah dan Kota	A	4.6
S2-3	6	S2	Univ. Diponegoro (UNDIP), Semarang	Teknik Arsitektur	B	4.1
Average Grade - Master Programs					**B**	**4.27**
UNIVERSITAS GADJAH MADA (Yogyakarta)						
S1-1	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknologi Hasil Pertanian	A	641.8
S1-2	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Arsitektur	A	603.8
S1-3	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Fisika	C	287.1
S1-4	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Sipil	A	392.68
S1-5	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Kimia	A	389.2
S1-6	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknologi Pangan dan Hasil Pertanian	A	382.75
S1-7	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknologi Hasil Hutan	A	379.93
S1-8	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Arsitektur	A	379.77
S1-9	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Elektro	A	379.29
S1-10	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknologi Industri Pertanian	A	375.79
S1-11	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Geodesi	A	373.36
S1-12	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Mesin	A	370.57
S1-13	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Geologi	A	368.06

No.	Region	Level	Higher Education Institution	Study Programs	Grade	Score
S1-14	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Pertanian	A	364.46
S1-15	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Industri	B	339.72
S1-16	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Nuklir	B	317.77
S1-17	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknologi Hasil Ternak	A	388
S1-18	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Teknologi Hasil Perikanan	A	374.8
S1-19	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Ilmu Komputer	A	370
S1-20	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Geofisika	A	369.56
S1-21	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Fisika Teknik	B	322
S1-22	5	S1	Univ. Gadjah Mada (UGM), Yogyakarta	Elektronika dan Instrumentasi	A	377
Average Grade - Undergraduate Programs					**A**	**388.52**
S2-1	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Elektro	U	3.7
S2-2	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Geomatika	B	4.373
S2-3	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Geologi	B	4.188
S2-4	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknologi Hasil Perkebunan	A	4.7
S2-5	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Pertanian	B	4.2
S2-6	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Penginderaan Jarak Jauh	C	3.9
S2-7	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Kimia	A	4.8
S2-8	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Sipil	A	4.7
S2-9	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Perencanaan Kota dan Daerah	A	4.7
S2-10	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Ilmu Lingkungan	A	4.6
S2-11	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Arsitektur	A	4.6
S2-12	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Teknik Mesin	A	4.6
S2-13	5	S2	Univ. Gadjah Mada (UGM), Yogyakarta	Ilmu Komputer	B	4.1
Average Grade - Master Programs					**B**	**4.40**
UNIVERSITAS HASANUDDIN (Makassar)						
S1-1	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Arsitektur	A	376.09
S1-2	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknik Sipil	A	367.95
S1-3	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknik Perkapalan	B	355.47
S1-4	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknik Mesin	B	332.84
S1-5	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknik Elektro	B	310.56
S1-6	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknik Geologi	B	302.48

No.	Region	Level	Higher Education Institution	Study Programs	Grade	Score
S1-7	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknologi Hasil Hutan	B	301.69
S1-8	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknologi Hasil Pertanian	B	358.15
S1-9	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknologi Hasil Ternak	B	350.99
S1-10	9	S1	Univ. Hasanuddin (UNHAS), Makassar	Teknik Pertanian	B	325.79
Average Grade - Undergraduate Programs					**B**	**338.20**
S2-1	9	S2	Univ. Hasanuddin (UNHAS), Makassar	Perencanaan dan Pengembangan Wilayah	B	4.2
S2-2	9	S2	Univ. Hasanuddin (UNHAS), Makassar	Teknik Sipil	C	3.7
Average Grade - Master Programs					**B**	**3.95**
UNIVERSITAS INDONESIA (Jakarta)						
S1-1	3	S1	Univ. Indonesia (UI), Jakarta	Teknik Mesin	A	387
S1-2	3	S1	Univ. Indonesia (UI), Jakarta	Teknik Sipil	A	380
S1-3	3	S1	Univ. Indonesia (UI), Jakarta	Teknik Industri	A	378
S1-4	3	S1	Univ. Indonesia (UI), Jakarta	Teknik Elektro	A	372
S1-5	3	S1	Univ. Indonesia (UI), Jakarta	Teknik Metalurgi	B	348
S1-6	3	S1	Univ. Indonesia (UI), Jakarta	Teknik Kimia	A	379.87
S1-7	3	S1	Univ. Indonesia (UI), Jakarta	Arsitektur	A	378.2
S1-8	3	S1	Univ. Indonesia (UI), Jakarta	Ilmu Komputer	A	379.65
S1-9	3	S1	Univ. Indonesia (UI), Jakarta	Teknik Metalurgi dan Material	A	373
Average Grade - Undergraduate Programs					**A**	**375.08**
S2-1	3	S2	Univ. Indonesia (UI), Jakarta	Opto Elektronika dan Aplikasi Laser	U	3.9176
S2-2	3	S2	Univ. Indonesia (UI), Jakarta	Teknik Metalurgi	U	3.8422
S2-3	3	S2	Univ. Indonesia (UI), Jakarta	Teknik Kimia	A	4.8
S2-4	3	S2	Univ. Indonesia (UI), Jakarta	Ilmu Komputer	A	4.7
S2-5	3	S2	Univ. Indonesia (UI), Jakarta	Teknik Mesin	A	4.7
S2-6	3	S2	Univ. Indonesia (UI), Jakarta	Teknik Arsitektur	A	4.6
S2-7	3	S2	Univ. Indonesia (UI), Jakarta	Teknik Sipil	A	4.6
S2-8	3	S2	Univ. Indonesia (UI), Jakarta	Teknik Industri	B	4.3
S2-9	3	S2	Univ. Indonesia (UI), Jakarta	Teknologi Informasi	B	4.3
S2-10	3	S2	Univ. Indonesia (UI), Jakarta	Teknik Elektro	A	4.6
S2-11	3	S2	Univ. Indonesia (UI), Jakarta	Teknik Metalurgi dan Material	B	4.3
Average Grade - Master Programs					**B**	**4.42**
S3-1	3	S3	Univ. Indonesia (UI), Jakarta	Ilmu Material	C	3.1
S3-2	3	S3	Univ. Indonesia (UI), Jakarta	Opto Elektronika dan Aplikasi Laser	B	4.1
S3-3	3	S3	Univ. Indonesia (UI), Jakarta	Teknik Sipil	B	4.3
Average Grade - Doctoral Programs					**B**	**3.83**
UNIVERSITAS KATHOLIK PARAHYANGAN (Bandung)						
S1-1	4	S1	Univ. Katholik Parahyangan (UNPAR), Bandung	Teknik Sipil	A	381.59
S1-2	4	S1	Univ. Katholik Parahyangan (UNPAR), Bandung	Teknik Arsitektur	A	386.89
S1-3	4	S1	Univ. Katholik Parahyangan (UNPAR), Bandung	Teknik Industri	A	367.64
S1-4	4	S1	Univ. Katholik Parahyangan (UNPAR), Bandung	Teknik Kimia	B	328.06
S1-5	4	S1	Univ. Katholik Parahyangan (UNPAR), Bandung	Ilmu Komputer	B	323.9
Average Grade - Undergraduate Programs					**A**	**357.62**
S2-1	4	S2	Univ. Katholik Parahyangan (UNPAR), Bandung	Teknik Sipil	B	4.1

No.	Region	Level	Higher Education Institution	Study Programs	Grade	Score
S2-2	4	S2	Univ. Katholik Parahyangan (UNPAR), Bandung	Arsitektur	B	4.3
Average Grade - Master Programs					**B**	**4.20**
UNIVERSITAS KRISTEN PETRA (Surabaya)						
S1-2	7	S1	Univ. Kristen Petra, Surabaya	Teknik Sipil	A	364.07
S1-2	7	S1	Univ. Kristen Petra, Surabaya	Teknik Mesin	B	349
S1-2	7	S1	Univ. Kristen Petra, Surabaya	Teknik Elektro	B	342
S1-2	7	S1	Univ. Kristen Petra, Surabaya	Teknik Arsitektur	A	380.18
S1-2	7	S1	Univ. Kristen Petra, Surabaya	Teknik Industri	B	346.41
S1-2	7	S1	Univ. Kristen Petra, Surabaya	Teknik Informatika	B	338.43
Average Grade - Undergraduate Programs					**B**	**353.35**
S2-1	7	S2	Univ. Kristen Petra, Surabaya	Teknik Sipil	**B**	**4.4**
UNIVERSITAS PELITA HARAPAN (Jakarta)						
S1-1	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Arsitektur	C	486.46
S1-2	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Manajemen Informatika	C	442.7
S1-3	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Teknik dan Manajemen Industri	B	540.34
S1-4	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Teknik Arsitektur	A	364.55
S1-5	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Teknik Elektro	A	364
S1-6	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Teknologi Pangan	B	353
S1-7	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Teknik Informatika	B	342
S1-8	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Sistem Informasi	B	339
S1-9	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Teknik Industri	B	335
S1-10	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Teknik Komputer	B	302
S1-11	3	S1	Univ. Pelita Harapan (UPH), Jakarta	Teknik Sipil	B	352.2
Average Grade - Undergraduate Programs					**B**	**383.75**
S2-1	3	S2	Univ. Pelita Harapan (UPH), Jakarta	Teknik Industri	B	3.2
S2-2	3	S2	Univ. Pelita Harapan (UPH), Jakarta	Teknik Sipil	C	3.2
Average Grade - Master Programs					**B**	**3.20**
UNIVERSITAS SRIWIJAYA (Palembang)						
S1-1	2	S1	Univ. Sriwijaya (UNSRI), Palembang	Teknik Pertambangan	C	292.78
S1-2	2	S1	Univ. Sriwijaya (UNSRI), Palembang	Teknik Mesin	C	270.04
S1-3	2	S1	Univ. Sriwijaya (UNSRI), Palembang	Sosiologi	C	257
S1-4	2	S1	Univ. Sriwijaya (UNSRI), Palembang	Teknik Sipil	A	362.36
S1-5	2	S1	Univ. Sriwijaya (UNSRI), Palembang	Teknologi Hasil Pertanian	B	329.04
S1-6	2	S1	Univ. Sriwijaya (UNSRI), Palembang	Teknik Elektro	B	311.8
S1-7	2	S1	Univ. Sriwijaya (UNSRI), Palembang	Teknik Kimia	B	303.39
S1-8	2	S1	Univ. Sriwijaya (UNSRI), Palembang	Teknik Pertanian	B	338.99
Average Grade - Undergraduate Programs					**B**	**308.18**
S2-1	2	S2	Univ. Sriwijaya (UNSRI), Palembang	Teknik Sipil	C	3.1
S2-2	2	S2	Univ. Sriwijaya (UNSRI), Palembang	Teknik Kimia	C	3.2
Average Grade - Master Programs					**C**	**3.15**
UNIVERSITAS SUMATERA UTARA (Medan)						
S1-1	1	S1	Univ. Sumatera Utara (USU), Medan	Arsitektur	A	639.25
S1-2	1	S1	Univ. Sumatera Utara (USU), Medan	Teknik Sipil	B	591.59
S1-3	1	S1	Univ. Sumatera Utara (USU), Medan	Teknik Kimia	C	280
S1-4	1	S1	Univ. Sumatera Utara (USU), Medan	Teknik Pertanian	B	341.33
S1-5	1	S1	Univ. Sumatera Utara (USU), Medan	Teknik Industri	A	362.73
S1-6	1	S1	Univ. Sumatera Utara (USU), Medan	Teknik Elektro	B	346
S1-7	1	S1	Univ. Sumatera Utara (USU), Medan	Teknik Mesin	B	322.98

No.	Region	Level	Higher Education Institution	Study Programs	Grade	Score
S1-8	1	S1	Univ. Sumatera Utara (USU), Medan	Teknologi Hasil Pertanian	B	309.13
S1-9	1	S1	Univ. Sumatera Utara (USU), Medan	Matematika	B	233.682
Average Grade - Undergraduate Programs					**B**	**342.98**
S2-1	1	S2	Univ. Sumatera Utara (USU), Medan	Pengelolaan Sumberdaya Lingkungan (PSL)	**B**	**3.2111**
UNIVERSITAS TARUMANEGARA (Jakarta)						
S1-1	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Teknik Arsitektur	A	632.25
S1-2	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Teknik Sipil	A	380.77
S1-3	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Arsitektur	A	377.85
S1-4	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Teknik Mesin	A	360.89
S1-5	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Teknik Elektro	A	362.05
S1-6	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Teknik Informatika	B	354.89
S1-7	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Planologi/Perencanaan Wilayah dan Kota	B	343.34
S1-8	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Sistem Informasi	B	317
S1-9	3	S1	Univ. Tarumanegara (UNTAR), Jakarta	Sistem Komputer	C	265
Average Grade - Undergraduate Programs					**A**	**377.12**
S2-1	3	S2	Univ. Tarumanegara (UNTAR), Jakarta	Teknik Sipil	**B**	**4.228**
UNIVERSITAS TRISAKTI (Jakarta)						
S1-1	3	S1	Univ. Trisakti, Jakarta	Teknik Arsitektur	A	621.2
S1-2	3	S1	Univ. Trisakti, Jakarta	Teknik Planologi	C	292.5
S1-3	3	S1	Univ. Trisakti, Jakarta	Arsitektur	A	377.7
S1-4	3	S1	Univ. Trisakti, Jakarta	Teknik Industri	A	370.64
S1-5	3	S1	Univ. Trisakti, Jakarta	Teknik Sipil	A	365.21
S1-6	3	S1	Univ. Trisakti, Jakarta	Teknik Mesin	A	362.55
S1-7	3	S1	Univ. Trisakti, Jakarta	Teknik Arsitektur Lansekap	B	314.22
S1-8	3	S1	Univ. Trisakti, Jakarta	Teknik Elektro	A	364.52
S1-9	3	S1	Univ. Trisakti, Jakarta	Teknik Geologi	B	337.24
S1-10	3	S1	Univ. Trisakti, Jakarta	Teknik Lingkungan	B	315.54
S1-11	3	S1	Univ. Trisakti, Jakarta	Teknik Informatika	B	315.47
S1-12	3	S1	Univ. Trisakti, Jakarta	Teknik Perminyakan	B	310.73
S1-13	3	S1	Univ. Trisakti, Jakarta	Teknik Pertambangan	B	303.9
S1-14	3	S1	Univ. Trisakti, Jakarta	Sistem Informasi	C	292
S1-15	3	S1	Univ. Trisakti, Jakarta	Perencanaan Wilayah dan Kota	B	321
Average Grade - Undergraduate Programs					**B**	**350.96**
S2-1	3	S2	Univ. Trisakti, Jakarta	Teknik Sipil	C	3.926
S2-2	3	S2	Univ. Trisakti, Jakarta	Teknik Elektro	B	4.1
Average Grade - Master Programs					**B**	**4.01**

Appendix 1.2-1 Interview Records

Date and interviewee	Notes	Findings
1300 September 8 2008 Dr. Aryo Prawoto Wibowo Deputy of Professional and Community Development Office of Vice Rector for Student Affairs, **ITB** Dr. Ciptati Deputi Bidang Pengembangan Karakter dan Kesejahteraan Mahasiswa, **ITB**	• ITB attract the best SMA graduates nationwide. • Students prefer these faculties: Faculty of Industrial Engineering, Faculty of Mining / Oil Engineering, Faculty of Civil Engineering, Faculty of Art and Design, and Faculty of Art and Design. • There are 3300-3500 graduates every year. Approximately 50-60% of them obtain job opportunity through the student affairs office. Other student obtain job opportunity through direct contact to the company. Some of them start their own business too. • We heard that ITB graduates hopping job frequently, but hardly heard about unemployed ITB graduate. • Students with following backgrounds are very popular among the industry: Earth Science (mining and oiling), Information Technology, Electronic Engineering, Industrial Engineering, Industrial Machinery). In this field, supply is not enough and companies are competing to get good graduates. • Average employers have no complain regarding knowledge level of the graduate. • Employers sometime say, ITB graduates are sometime arrogant and not good at team work. They are more stand alone player. English skill getting worse these days, however, ITB try to revitalize the courses. • Graduation ceremony in October is the biggest one in on year. There many companies approaches to ITB to place their recruitment advertisement.	• Very competitive student in take at ITB. • Seems even though labor market of graduated engineer is tough, still there are strong and continuing demand for ITB graduates. • Teachers are pretty confident with ITB graduates.
1400 September 8 2008 Dr. Ichsan S Putra Director Directorate of Education **ITB**	• Has no clear idea how many student increment ITB should expect / anticipate due to this investment • Has no clear idea how much each center would contribute to ITB by gaining income though consultancy, research, and other services that raise fund.	
1600 September 8 2008 **PT McDermott Indonesia** ITB auditorium Mr. Maryono Singosentono Senior Human Resource Manager	• PT McDermott Indonesia is Indonesian branch of American marine / ocean construction company. • Mr Maryono came to recruit student for a scholarship program. The scholarship covers the cost for last 1-2 semesters and the students are promised (or forced) to work at the company. Since 2001, in total of 47 to-be engineers have been recruited. • In total of 19 students came to the briefing session: 8 (FTI-Chemistry), 5 (FMA-Machinery), and 6 (FTI Physics). • He was looking for young personnel in construction engineer, mechanical engineer,	• Very high reputation toward ITB graduates • ITB is the top school to produce talented engineers. • Even better than UI, ITS, and UGM.

Date and interviewee	Notes	Findings
	and chemical engineering. • This year he plans to recruit in total of 14 young to-be engineers, including 9 from ITB and 1 from ITS. • ITB graduate is superior to those from other universities. They have spirits to work in field. UI, UGM – they prefer to work inside the office doing managerial work. • PT McDermant employs approx 130 engineers with under-graduate degree. Approx 30-40% of them comes from ITB. Many of them also go abroad to do more responsible work in engineering work at the field. He remember one in middle east and another in Thailand • ITB graduates have basics of technology, so that s/he easily can be a good engineer with small training after joining the company. • Number of graduate is not enough. If ITB can produce more number of graduates, he would like to hire more from ITB.	
1830 September 8 2008 Dr. Mame Selamet Dutoko Vice Chairman **ITB** Master Plan Team Dr. Megawati Santoso Member **ITB** Master Plan Team	• ITB does not count the center as an individual organization in ITB. They are attached to faculty and other centers. • There fore no concrete data have been prepared regarding student and income increment due to the investment. • Alternative proxy is to use ITB plan to expand number of student, and past trend in fund gathering. • It is not possible to estimate the number of student increment by accumulating each centers as the courses, because courses at each centers do not directly link to student increment of each faculty. • It is more appropriate to estimate it by assuming parameter applying to the total number of planned increment of student body (current 16,000 to 25,000) • Similarly, it is not possible to assume revenue gained by individual centers through contracted activities. Current contract numbers and amount volume is good point to start. • Mame and Mega will collect info and e-mail it to Shin	• CRCS is not in charge of O&M of the equipment and facilities. Asset Bureau is. • It is not possible to aggregate student increment and revenue gain by individual centers. Setting assumption and parameters from the Macro Plan is more appropriate to assume contribution of the proposed centers. • Yet increment of the student that are benefited from the centers (that learn at the centers) and revenues gained by contracted activities utilizing centers are indispensable to monitor the benefit of the project. These can be indicators to be monitored – and worth being discussed through TA.

Date and interviewee	Notes	Findings
1400 September 9 2008 Dr. Emmy Suparka, Vice Rector for Research, Innovation and Partnership, **ITB** Dr. Ir. Edwan Kardena Deputy Vice Rector for Partnership Deputy Vice Rector for Research Collaboration, **ITB**	• LPPM already has in total of 24 Research Centers and Centers. There are 19 Centers and 5 Research Centers. • LPPM recognizes "Research Center" is more research oriented and has more advanced equipment that are good for contracted R&D works. "Center" is more education oriented equipped with more basic facility and equipment. • Distinction between the Research Centers and Centers is not that strict though. • Among 4 targeted center of the proposed JBIC project, CIIE, CDL, and CIBEE already exist and have been working for outside client under coordination of LPPM. • CAS is to be newly developed. It is also going to be a research center among others when it is ready to operate. • PT LAPI and Yayasan LAPI are legal entity of ITB. First ITB established Yayasan LAPI, for ITB to conduct contracted activities. Later in 200X ITB established PT LAPI as law on Yayasan was modified and Yayasan became not able to conduct contracted "commercial" activities. • Bureau of Asset under Senior Vice Rector for Resources, Senior Vice Rector for Academic Affairs, is in charge of financing operation and maintenance of the Research Centers and Centers. • It is possible for ITB to save certain amount of money for planned renewal of the equipment and facilities procured by JBIC loan. • List of the partner entities is obtained.	• Findings through the meeting with Dr. Mame and Dr. Mega are re-confirmed.
0900 September 10, 2008 Drh Wiku Adisasmito Director, Directorate of Partnership and Business Incubator, **UI** Dr. Misri Gozan Head Business Incubator and Science Park, **UI**	• Demands for engineers are very high. Lead time for getting first job of the UI (Faculty of engineering) is getting shorter. • Responding to the engineer demands, UI plans to increase student intake of engineering faculties from current 2,500 to 4,000. • Not only quantity but quality of engineer is important to consider. By quality UI means engineers that have specific expertise with R&D skills. • Given current level of facilities, even top universities are able to produce only general engineer with basic engineering skills, while teaching staff have degrees from world-class universities abroad. It is wasting human resources. • UI plans to develop the Science Park which is incubation facility for UI and private sectors to foster "techno interlunar". • Strong research demand for R&D by industry: energy, facility maintenance, computer science, etc. • Energy, information science, and baking are the popular job for student graduating UI	• Private sector does not have sufficient engineers that are capable of R&D works. In one aspect, that is the background of increasing numbers of contracted research at top universities in Indonesia (e.g. UI, ITS, ITB, and UGM). • In turn, teaching staff at university have spare considerable time to cope the contracted R&D research. This makes it difficult for the teaching staff to concentrate to educate students to be quality engineers. • Top universities are sharing same

Date and interviewee	Notes	Findings
	engineering faculties. • Some of the industries are protected by government regulation to keep governmental monopoly. That hinders competitions hence R&D. • UI adjusts financial shortages to replace depreciated equipment by seeking grant opportunities. Not only self financing, but also collaborating with private sector has potential to keep the university equipment new. Private sector should also invest to University equipment – that would reduce their R&D cost if arranged well.	issues said here. JBIC support for ITB is very well targeting the current urgent needs of university and private industry. • UI tries to find out a new equilibrium to share R&D research work. Currently, contracted R&D work to UI is burden, as it reduces possible resource to be allocated to education to produce quality engineers.
1000 September 11, 2008 Mr. Mnabu TSUKADA Senior Director **JETRO** Jakarta Center	• Graduate of UI is prestige. They have high reputation for its competitive skills. Major company from Japan may be able to hire them, but it would be too expensive for SME. • Strong demand for engineer graduating prestige university such as UI, ITB, and UGM. • Investment to ITB is seems to be reasonable considering prestigious position of ITB and their graduate quality in Indonesia, even taking that this is the third investment to ITB, it seems reasonable into consideration. • ITB is not producing quality engineer but also produce teaching staff in Indonesia. ITB graduate teach at engineering and science faculties nationwide. Hence quality education at ITB means contribute indirectly to other universities. From this term the investment can make sense. . • Engineer (S1) supply is not comparable to neighboring countries, such as Thailand. In Thai for instance they produce approx 40,000 engineer (S1) while Indonesia does only 20,000 while size of the population is double here. • One note: unemployment rate is very high in Indonesia. 完全失業率 is around 10%, and it would be around 20% if include 自発的失業 which is virtually unemployment . • No obvious move to localize R&D among Japanese firm in Indonesia. They still prefer keep R&D internalized. • Maybe daily commodities there should be some space for R&D as they need local knowledge. Marketing may be the one area • Also Japanese company may be interested to contract to CRRS as a part of their CSR.	

Date and interviewee	Notes	Findings
	• Further develop local 裾野産業 is equally important before they move to Nano tech things. • If a company has ITB graduates, then they would feel more closer to CRCS	
1130 September 11, 2008 Sumitomo Mitsui Construction Co., Ltd. (PT SMCC Utama Indonesia) Mr. Akira Hizume Assistant General Manager Mr. Indra Purwanto Director Mr. Linda Djuned Adm. & HRD Manager Mr. Eddy Ismoro Estimate Manager	• ITB is the best university in Indonesia in technology and science field. • Sumitomo always looking forward to good civil engineer and architect. They have one ITB graduate. • ITB graduate is more expensive than others. Once they got experience and so the salary, it is not possible to afford it for a company like us.. • We do very simple construction work, so there seems to be no urgent needs for R&D work to be localized. Whenever advice is needed, they ask Tokyo headquarters, and things solve. • Yet LPPM is interested to know more. May be contact then sometime soon (photocopied LPPM business card) to explorer possible joint R&D activity. • University architect education only does 3 month of practice. This does not involve real work of construction. They just observe and report. With this it is not possible to produce a good architect. They know how to calculate structure and design, but don't have material knowledge. Thus they can not design practical structure which is financial and technical feasible to maintain. • They hire fresh graduate when time allow them to do training. Otherwise look for experience ones by putting advertisement or asking around people.	
1400 September 11, 2008 **PT Tanabe Indonesia** **（田辺製薬）** Mr. Hitoshi Mihara President Director Mr. Erwein Nasir Deputy Director Administration HQ.	• Pretty satisfied with the quality and quantity of the pharmacy graduate. Pharmacy engineer are mainly in charge of production process supervision. • Pharmacy education in Indonesia is more "general" compared to the Japanese counterpart. It also has managerial subject e.g., laboratory management, drug store management, etc. • They take (fresh) graduates from ITB, ITS, UI, and Pajajaran University. • Main products in Indonesian pharmacy industry is "me too" products. It is very hard to do R&D work in Indonesia. Indonesian market is only JPY 300 Bil, while R&D cost of a new would amount to JPY 40bil. R&D cost is too big to cover. • LPPM would not be a potential R&D partner for Tanabe.	• RD cost of a new medicine is not something ITB could afford. Also sales are not ensured. Too high risk for university. • Indonesian market is still not explored yet. • No need yet to explore R&D to develop market. There are still a lot space for them to produce and cell "me too" medicines

Date and interviewee	Notes	Findings
1600 September 12, 2008 **JAC Recruitment** Mr. Andre Firmansyah R Assistant Manager General Engineering Specialist Ms. Chie Kobayashi	• JAC Recruitment Indonesia does not see serious shortage of engineers. Normally job seeking engineer can get work within 2-3 months after the first contact. It is not over supply or under supply of the engineers. • Yet, demand for "quality" engineer is very high. Recently Construction Company inquired JAC for English-speaking engineer, which was very difficult to find ones. • First salary of fresh graduate may range 1.5-3,5 Mil/Month (S1) and 3-4 Mil/Month (S2). D3 would range between Mil. 1-2/Month. • A German pharmacy firm called Mark is now seeking for RD pharmacy personnel. They are going to set up an laboratory for R&D work. • Other industry area that have started looking for R&D personnel: Food, Automobile Parts, IT, etc. Not in steep increase though. Demand is always there to be filled • There are not obvious gap in salary between ITB and non-ITB students.. • IT, Telecommunication, Energy, Mechanical Engineering, Construction are the popular area for ITB students. • Tuition of ITB has been increased after the autonomy. Almost double or even triple. ITB now is a university for richer group. • In getting job, fresh graduates may have high expectation in salary as they don't know realties. Sometimes that would makes then difficult to 0btain job • Ranking of Indonesian Universities including ITB (in Asia week magazine) has become lower these days. It seems ITB thinks R&D capacity is the one of the reason. Enhancing R&D capacity of university and graduating student much with the needs. • Not only local firm but also International firms have started to look for engineer for R&D work. There are continuous and steady demands... He frequently receives recruitment inquiry from corporate in the field of pharmacy, food, automotive parts, IT, etc. • Salary for fresh graduate may start (engineer) at: Rp. 1.0-2.0Mil./Month (D3), Rp.1.5-3.5 Mil/Month (S1), Rp. 3.0-4.0Mil/Month (S2/3). There are not big salary increment between S1 and S2, and also between S2 and S3.	• Japan would not lose by Investment to ITB. ITB is recognized as the best engineering universities and demands for them is already established • Scholarship would be effective to limit adverse effect to poors of tuition fee hike.

Date and interviewee	Notes	Findings
0830 September 12, 2008 **PT Indonesia EPSON Industry** Mr. Eiich Abe Vice President Mr. Krisno Dewanto Supervisor HRM & GA Department Management Support Div. Mr. Edi Santosa Trilastono Senior Manager HRM & GA Dept. Managment Support Div.	• Employs 1,000 staff and 400 of them have engineering background. Engineers group consists of two sub groups: workers and engineers with S1/2 background. For S1/S2 graduates. • EPSON recruits mechanical, electronics, industrial engineers and designers. Last 4 years, art and design personnel. It is not easy for EPSON to find out good mechanical engineers. Many graduates think EPSON is an electronics company while their product, printers, in fact is a machine. • Competitive engineers tend to hop job. Since 2004, approximately 35% of engineer resigned among 300 employed engineers. • In other area, EPSON receives many applicants when they post job offer advertisement for experienced engineers. • When EPSON needs fresh graduates, they directly contact universities to post advertisement. Also contract to recruit company such as JAC. • Top universities are ITS, UNIBraw (Brawijaya University), UGM, ITB, and UI. ITB is outstanding – they have tar anted and well-stuffed brain, positive thinking, logical, and basic knowledge on their expertise. They are good at presentation skills. • Weakness of fresh graduate (not limited to ITB) is their skill to set a question. They can solve problem pretty easily, but not many of then can set a good scientific/engineering questions. • Good engineer is determined by (a) basic knowledge, (b) working quality, and (c) leadership • R&D function is still in Japan, but EPSON has a policy to develop a localized production as much as possible. • EPSON's weakness is still it has only weak link with university. They would like to expand the collaboration with local universities. Joint research with the university on, for example, how to prevent paper stack in the printer, would be interesting and feasible topic. • Automotive industries (e.g., Toyota, Honda, and Daihatsu through Astra) have already started university-industry collaboration in research and development. • EPSON Indonesia has been producing SDIN printers (94), Inkjet Printer (assembly, 97), and multi-function inkjet printers (2004). In parallel, EPSON continues to internalize and localize the entire production process thus more parts are produced in Indonesia through contracting out. • Eventually, half of home-use EPSON printer is produced in Indonesia	• Type of R&D work a corporate demands for university would shift/change as the production line changes reflecting consumer changes • If no initiative is taken, Japanese company would be continuing depending R&D function to its headquarters. Local initiative is the key to localize RD.

Date and interviewee	Notes	Findings
	• Now design work has been started in EPSON Indonesia too. They wish to launch an Indonesian EPSON production. • Targeted centers seem to be very right. Also focus on R&D skill is also right. Better R&D capacity of both graduating student and faculty will benefit both university and industry • Facilities/equipment at ITB is not very good. For example, they uses oscilloscope of three generation ago, so when they start work at EPSON, they don't know how to use oscilloscope of these days.	
0930 September 12, 2008 **PT Narumi Indonesia** **（鳴海製陶）** Mr. Hisashi Sato President Director	• There is one engineer graduating UI. He was trained in Japan and he expects this UI-graduate would be the top of the production process in near future. • Another UI graduate in administrative position is very active and good at marketing and socializing. She is now head of Narumi shop at the Pacific Place. • ITB is really a big name. If possible they also would like to hire one or two. • Mechanical engineer, electricity, design: they are the field Narumi looks forward • Materials (soil and decoration seal) are imported from Japan. R&D work with university does not make sense now for Narumi • It is impossible to produce a bone china using Indonesian soil so far. Narumi would not take that endeavor to extend its production to other type of ceramic produced locally in Indonesia. • There are local customers: Ritz Carlton Jakarta, Marriott Jakarta are using Narumi produced in Indonesia	• Narumi produces bone china for high-end market and protecting their brand name is crucial. • In doing so they stick to using Japanese material and importing them. This is a strategy to continue producing good products and supplying them to the market.
1130 September 12, 2008 **PT East Jakarta Industrial Park (EJIP)** Mr. Takeichi Omata President Director Ms. Naoko Nagai Chief Section Customer Service	• There is increasing demand for personnel who has leadership at the real production process in the factory. • It seems that personnel demand for design, R/D, planning are on increase. Personnel with skills and knowledge on more upstream part of production process are on increase. • R/D demand at local Indonesian corporate should be stronger than that of Japanese companies. • University-industrial cooperation: IT, Design is more promising area. • Contract out research for university: environmental study/assessment, soil survey, and any other type of "survey" should be promising. • There is mission from Hiroshima University visited EJIP. They also tries to help ITB to enhance U-I relationship.	• R/D needs of local company would be stronger than that of Japanese company. • Need to clarify support for U-I by university overseas upon exchange agreement. LPPM is appropriate as the contact point even if an ITB faculty sign the exchange.

Date and interviewee	Notes	Findings
1400 September 12, 2008 **PT Komatsu Indonesia** **（小松製作所）** Mr. Risdhianto B Irawan General Manager Administration Department Komatsu	• Komatsu employs engineers/experts in these fields: manufacturing, production process, design, IT, casting, ironing, metallurgy, quality assurance, structure design etc. • Komatsu Indonesia employs 1,500 workers. Among them 283 are “indirect” engineers who are not directly working on the production line. • They employ freshman with D3 and S1 engineer. This year they employed 39 engineers from poly technique (Bandung, Gajamatda, Jakarta,etc) and universities.(ITB, ITS, UI, UGM) • Demand for fresh graduate (engineers) are on increase and this year is the highest demand, as oil and mining sector has a very strong demand for engineer (especially in mechanical, mining, manufacturing) with very good salary/incentive offer. This year they have faced a difficulty in finding out good engineer candidates in above field. They are “fighting” against oil and Gus sector to get good candidate from the market. • It is not so easy to find ITB graduates. They have only 4 ITB gradates • Komatsu Indonesia provides scholarship for ITB student majoring mechanical engineering. • ITB is the top of the university. Top high school students apply to ITB. ITB graduates are the best possible “raw material” to b e a good engineer. • Komatsu Indonesia product attachment to their main equipment which a unique in Indonesia. These attachments have been developed for the purpose of forestry in Indonesia. Also design team in Jakarta covers design work of the attachment in south east Asia. So all the order for attachment development are taken cared by Komatsu Indonesia. Anther regional headquarter is in Bangkok, but it does not have R&D function like this. • Komatsu Indonesia has MOU (Minutes of Understanding) with 15 local universities (including ITB). Students from ITB come to Komatsu Indonesia for internship in the field of mechanical engineering and business management. • They think University should take part in Science while private cooperate takes care of technology. • Survey and research by university would be promising. Many companies would be interested.	

Date and interviewee	**Notes**	**Findings**
1600 September 12, 2008 **PT Ebara Indonesia** （荏原製作所） Mr. Masaaki Ushijima Plant Manager	• Vice plant manager is ITB graduates (mechanical engineering). He (interviewee) expects this ITB graduate to be the first Indonesian plant manager. • ITB employs engineers with following background: Electricity, Electronic Board, manufacturing process, casting, etc Ebara already employs sufficient number of mechanical engineers • ITB graduates are very competitive. Comparative to average graduates of famous Sci and T university in Japan. • Ebara employs 330 factory worker and 70 administrative staff. Only president and the plant manager (interviewee) is Japanese. It is consistent with Ebara's policy to localize entire production • Ebara already collaborated with ITB during 2002-2007. With AOTS, Ebara and ITB developed Turbine Electricity Generator which is capable of producing electricity for 30-40 housings. Also hold an seminar on industry machinery targeting universities and machine producers • Maybe possible next step for working with ITB should be marketing of this developed pump. If LPPM can do that Ebara would be interested. Ebara also would be interested to contract-out marketing survey, soil survey, material testing, etc to university if the budget and specification of service met • Environmental survey and consultancy is another business field of Ebara, which is taken care buy office in center of Jakarta.	• Needs for R&D and collaboration with universities (ITB) is more promising in the fields where • a products necessitate more craftsmanship (rather than high-tech skill and knowledge) • a company has a longer history of operation in Indonesia • a company has a personnel connection to respective universities (such as ITB)

Appendix 1.3-1 Researches Funded by Research and Community Services Institution (LPPM) (CR), Year 2006–2008

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
1	2008	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Research Center for Biotechnology	Adi Pancoro, Dr.	Isolation and genetic engineering on synthesis genes Polyhidroxyalkanoates (PHAs) - biodegradable materials: gene b-ketothiolase (PhaA), acetoacetyl-CoA-reductase (PhaB) and polyhydroxyalkanoate synthase (PHaC) from Ralstonia eutropa bacteria
2	2008	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Research Center for Biotechnology	Sony Suhandono, Dr.	Characterization promoter of the gene elongation factor-1a for autonomy in biotechnology field
3	2008	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Research Center for Biotechnology	I Gede Wenten, Dr. Ir.	Development of clarification process and simultaneous purification in the production process of enzyme using ultra-filtration
4	2008	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Research Center for Biotechnology	Muh. Bachri Amran, Dr.	Production of composite membrane of Poly (Ether-Sulfon-Poly (Vinyl Pyrolidine) for enzyme separation and condensation
5	2008	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Research Center for Biotechnology	Dessy Natalia, Ph.D.	Cloning and expression of coding gene on gluco amylase for Pichia pastoris
6	2008	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Research Center for Biotechnology	Akhmaloka, Ph.D.	Production and characterization of thermostable lipase enzyme local isolate
7	2008	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Research Center for Biotechnology	Zeily Nurachman, Dr.	Censoring, isolation, and characterization of cellulose from sea microbe
8	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Fine Arts and Design	RR. Dhian Damajani, Ir. MT.	Vernacularism, informality, and urbanism: cafe as contemporary lifestyle expression
9	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Fine Arts and Design	Surjamanto, Ir. MT.	Development of prototype of wall component based on local industry for house and building in the tropical area
10	2008	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Research Center for Fine Arts and Design	Setiawan Sabana, Prof. Dr. MFA.	Transformation strategy of inheritance management and skill innovation system: the Case Study of traditional industrial centers in the Balinese territory
11	2008	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Research Center for Fine Arts and Design	Budi Isdianto, Drs. M.Sn.	Identification of regeneration crisis of small industrial craftsman bamboo in West Java
12	2008	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Research Center for Fine Arts and Design	Dwinita Larasati, Dr. MA.	Development of industrial product based on bamboo material using Press-Board technique
13	2008	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Research Center for Fine Arts and Design	Achmad Syarief, Dr. MSD.	Standardization of Sundanese traditional colour: Formalization of standard for typical Sundanese traditional colour in format of RGB and CMYK
14	2008	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Research Center for Fine Arts and Design	Oemar Handojo, Ir. M.Sn.	Development of piece machine for salak-branch (strengthening efforts for Quality, Cost, Delivery (QCD) on small and medium industries of salak-branch craftman)
15	2008	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Research Center for Sustainable Energy	Sri Nanan Widiyanto, Dr.	Development of bio-kerosene production system from Pittosporum spp.: Reproduction and Productivity of Seed

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
16	2008	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Research Center for Sustainable Energy	Taufikurrahman, Dr.	Integration of the utilization of water hyacinths plants Eichornia crassipes as biogas and biofertilizer in the pilot scale
17	2008	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Research Center for Sustainable Energy	Erly Marwani, Dr.	Evaluation of potential for various green algae freshwater as bio/vegetable oil sources and optimization condition for algae culture with highest oil content
18	2008	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Research Center for Sustainable Energy	I Nyoman P. Aryantha, Ph.D.	Assessment and development of Microbial Fuel Cell (MFC) technology based on locally Litotrof bacteria
19	2008	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Research Center for Sustainable Energy	IGBN Makertihartha, Dr. Ir.	Development of reform process of Methanol steam as the provider of Hydrogen of Fuel Cell using catalyst of CuO/ZnO/Al2O3
20	2008	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Research Center for Sustainable Energy	Tri Partono Adhi, Ph.D.Ir.	Processing of glycerol, the waste from Biodiesel industry, became beneficial product through biological process
21	2008	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Research Center for Sustainable Energy	Priyono Sutikno, Dr. Ir.	Water pump as water turbine for Micro Hydro Power Plant equipped with Load Controller; the selection, use and management system (Year 3)
22	2008	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Research Center for Sustainable Energy	T. A. Fauzi Soelaiman, Dr. Ir.	Development and application of the Savonius wind turbine prototype for the commercial application
23	2008	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Research Center for Sustainable Energy	Didin Mujahidin, Dr. rer.nat.	Development of additive to decrease the Biodiesel cloud point: Synthesis and testing of methyl Acetylricinoleic
24	2008	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Research Center for Informatics and Communication Engineering	Yusep Rosmansyah, Dr. Ir.	Development of e-Farming wireless application
25	2008	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Research Center for Informatics and Communication Engineering	Suhardi, Dr. Ing. Ir.	Planning and optimization for Test Bed Smart Village
26	2008	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Research Center for Informatics and Communication Engineering	Armein Z.R. Langi, MSc. Ph.D. Ir.	Research on ICT Against Digital Divide: Future Village based on Rural-ICT
27	2008	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Research Center for Informatics and Communication Engineering	Nana Rachmana Syambas, Ir. M.Eng.	The 2nd Stage of Planning and Implementation of Wireless Mesh Node
28	2008	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Research Center for Informatics and Communication Engineering	Tati L. Mengko, Prof. Dr. Ir.	Development of multimedia recorded medical system to support rural telemedicine
29	2008	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Research Center for Informatics and Communication Engineering	Dwi Hendratmo, Ph.D.	Development of Vertical Search Engine for Rural Community

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
30	2008	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Research Center for Informatics and Communication Engineering	Joko Siswanto, Dr. Ir. MPA.	Implementation of franchising system for the media centre using Next Generation Network technology for the densely-populated urban community
31	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Management of Environmental, Regional and Infrastructure	Widiarto, Dr. Ir. MCRP.	Alternative application of appropriate technical irrigation system to the agricultural land with water difficulty
32	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Management of Environmental, Regional and Infrastructure	Ibnu Syabri, B.Sc., MSc.	Estimation matrix O-D using limited interview approach and Remote Sensing for structure marking of urban spatial in Indonesia
33	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Management of Environmental, Regional and Infrastructure	Sri Maryati, ST., MIP.	Evaluation model of welfare with the hindrance of the road capacity
34	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Management of Environmental, Regional and Infrastructure	Wiwik Dwi Pratiwi, Dr. Ir. MES.	Environmental management and transformation of human settlement post Tsunami in the south coast, West Java
35	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Management of Environmental, Regional and Infrastructure	Hastu Prabatmodjo, MS., Ir. Ph.D.	Action Framework for Carrying Capacity management of the rural environment: Case of Bandung Selatan
36	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Management of Environmental, Regional and Infrastructure	Haryo Winarso, M.Eng., Ir. Ph.D.	Urban Development Throught Local Partnership (U DeveLoP)
37	2008	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Research Center for Management of Environmental, Regional and Infrastructure	Johnny Patta, Ir. MURP.	Policy of solid waste management in urban areas based on local community preference: Case of Bandung city, the Bandung regency, and Cimahi city
38	2008	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Research Center for Management of Environmental, Regional and Infrastructure	Ade Sjafruddin, Ir. MSc., Ph.D.	Study on the Road Fund application for regency road and city road
39	2008	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Research Center for Management of Environmental, Regional and Infrastructure	Krishna S. Pribadi, Dr. Ir.	Selection model of co-operation scheme between government and private enterprise for drinking water investment using the analytic network process (ANP)

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
40	2008	Prime Research - ITB	Faculty of Earth Sciences and Technology (FITB)	Research Center for Management of Environmental, Regional and Infrastructure	Prihadi Soemintadiredja A., Dr. Ir.	Fathoming of hydrogeology system fracture media in Karst topography region of southern part Java. The 1st stage: Fathoming of underground river channel in the Cijulang subdistrict, Ciamis regency, West Java.
41	2008	RISET ITB DANA PENDAMPING RAPID	Faculty of Mechanical and Aerospace Engineering (FTMD)	Mechanical Engineering Production	Muljo Widodo Kartidjo, Prof.Dr.Ir.	Development of Unmanned Submarine Vehicle for "Surveillance" of marine resources survey
42	2008	RISET ITB DANA PENDAMPING RAPID	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Mukmin Widyanto Atmopawiro, Dr.Ir.	Designing and production of prototype for low head micro hydro power generation (PLTM) turbine
43	2008	RISET ITB DANA PENDAMPING RAPID	Faculty of Mechanical and Aerospace Engineering (FTMD)	Energy Conversion	Aryadi Suwono, Prof.Dr.Ir.	Development of pilot factory for advanced reforming process of low quality coal
44	2008	RISET ITB DANA PENDAMPING RAPID	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Zeily Nurachman, Dr. MS	Production of alpha-amylase for textile industry
45	2007	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Enny Ratnaningsih, Dr.	Utilization of Blue-Green Algae as Biofertilizer for Rice-field Paddy
46	2007	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Erly Marwani, Dr.	Application and testing for biofertilizer MP06 and JPC compost towards the growth of seed biomass as well as the oil content of “Jarak Pagar” (Jatropha curcas)
47	2007	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Taufikurahman, Dr.	Utilization exploration of water hyacinths plants (Eichornia crassipes) as biofertilizer, animal feed, biogas, and pulp
48	2007	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Microbiology, Genetics and Molecular Biology	Maelita Ramdani Moeis, Ph.D.	Isolation and characterization of cellulase genes from bacteria of the Cimanggu hot springs water
49	2007	Prime Research - ITB	Faculty of Mining and Petroleum Engineering (FTTM)	Drilling Engineering, Management and Productions of Oil-Gas	Rudi Rubiandini R.S., Dr. Ing.Ir,	Appropriateness testing for biodiesel from Jatropha seed as base oil in oil base mud
50	2007	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Rizkita Rachmi Esyanti, Dr.	Induction of bio-oil production from Jatropha Curcas in In Vitro technique
51	2007	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Design and Development Process Chemical Engineering	Mubiar Purwasasmita, Dr.Ir.	Biogas production from Jatropha solid wastes
52	2007	Prime Research - ITB	Faculty of Earth Sciences and Technology (FITB)	Atmosferics Science	Armi Susandi, Dr.	Study on economics and potential of Clean Development Management (CDM) from development of biodiesel and wind energy in Indonesia
53	2007	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Energy Conversion	T.A. Fauzi Soelaiman, Dr. Ir.	Development and finishing of turbine blade and power generator system from prototype of Savonius wind turbine for toll street lighting
54	2007	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Toto Winata, Dr.	Manufacturing of solar cell devices based on Hydrogenationed Germanium Silicon Micro-crystal by using HWC-VHF-PECVD technique

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
55	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Mukmin W. Atmopawiro, Dr. Ir.	Study on designing and implementation of micro-hydro generator in the Siliwangi Valley, Bandung as the micro-hydro electric power installations (PLTMH) laboratory
56	2007	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Products Design and Development Chemical Engineering	Achmad Ali Syamsuriputra, Drs.	Utilization of Endomycopsis fibuligera as saccharification agent in ethanol production from cassava by using saccharification process simultaneous fermentation
57	2007	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Energy Conversion	Priyono Sutikno, Dr. Ir.	Selection, use and management system of pump as water turbine for Micro Hydro Power equipped by Load Controller
58	2007	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Sarwono Hadi, Drs.	Production and Application of alpha-amylase Recombinant Thermostable
59	2007	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Endra Joelianto, Dr. Ir.	Making of instrumentation system and control on the pilot plant for production process of bio-ethanol production in Chemical Engineering ITB
60	2007	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Sri Nanan Widiyanto, Dr.	Feasibility study of production and field-test of micro-propagation seedling of Physic nut (Jatropha curcas L.)
61	2007	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Air and Waste Management	Puji Lestari, Ph.D. Ir.	Influence of use of bio-ethanol fuel towards emissions and performance of motor vehicles
62	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Building Technology	Aswin Indraprastha , ST, MT.	Study on adaptation mechanism of earthquake disaster in architecture vernaculars in the cultural territory of western part of Java
63	2007	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Design and Visual Culture Sciences	Yasraf Amir Piliang, Drs. MA.	Semiotics as a research method of Fine Arts, Design and Crafts the Indonesian Archipelago
64	2007	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Human and Interior	G. Prasetyo Adhitama, Drs.MSn.	Utilization of the salak branch material for component product of interior and furniture
65	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Building Technology	Surjamanto Wonorahardjo, Ir.MT.	Identification of thermal environment in configuration of urban environment in the context of tropical culture (as a study case: Central Business District/CBD in Bandung)
66	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural Design	RR. Dhian Damajani, Ir.MT.	Vernacularism of urban space in Bandung City (Case Study: Cikapundung Delta and Lapangan Gasibu)
67	2007	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Design and Visual Culture Sciences	Yan Yan Sunarya, Drs. MSn.	Semantic Study of Tasik's batik cloth: Identification of perception of the subject towards appearance meaning of colour, feature, and texture of Tasik's batik cloth by using SDM (Semantic Differential Method) analysis
68	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural History, Theory and Criticism	Sri Rahaju B.U.K., Dr. ir. MSA.	Study on phenomenology-hermeneutics to the Sundanese architecture vernaculars' public space and Its utilization prospect: Case of Ciptagelar- and Ciptarasa- Village, West Java
69	2007	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Visual Communication and Multimedia	Priyanto Sunarto, Dr.	Transformation of Arts culture to Indonesian illustration of 1850-1950 periods (efforts enriched the concept of Fine Arts illustration of present and in the future)

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
70	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Building Technology	Dewi Larasati, ST, MT.	The development of the local construction method to speed up the reconstruction period of the house after disaster (study focus: the culture for build up in the community over West Java, Central Java and Yogjakarta)
71	2007	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Visual Communication and Multimedia	Riama Maslan, Dra. MSn.	Study of street graphics in Bandung city
72	2007	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Aesthetics and The Science of Art	Nuning Damayanti A., Dipl. Art. Dra.	Aesthetics and the symbolic meaning of the shape of the Cirebon skin puppet (efforts to enriched the concept fine Arts for Indonesian future)
73	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Sugihartono, Dr.Ir.	Development of Physical Layer of NonLOS Broadband Wireless Access Based on MIMO-OFDM by Using Software Defined Radio
74	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Afwarman Manaf, MSc., Ph.D.Ir.	NoteBOX: Integrated Messaging System for Virtual Knowledge Community
75	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Iping Supriana Suwardi, Dr. It.	The introductory system to the content of the image document
76	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Andriyan B. Suksmono, Ph.D.	The development of the computation method with high performance on the NGC infrastructure for the signal processing and the radar data
77	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Electronics Engineering	Trio Adiono, Ph.D.	System on Chip Design for IPTV
78	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Biomedical Engineering	Joko Suryana, Ir. MT.	The development of the smart antennae system 2,4 GHz for the application in the area with the high interference and in simple tower in the rural area
79	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Armein Z.R. Langi, MSc., Ph.D. Ir.	Informatics engineering and communication for development of knowledge society in the context of the rural and backward community in Indonesia
80	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Dwi Hendratmo Widyantoro, Dr. Ir.	Improvement of search efficiency with automation of classification and summarization of the presentation information
81	2007	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Hermawan K. Dipojono, Ph.D., MSEE., Ir.	The development of Grid Computing for the Next Generation Computing
82	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Electronics Engineering	Adi Indrayanto, MSc, Ph.D. Ir.	Knowledge Discovery by using Visual Self-Organising Map (VSOM)
83	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Muhammad Ridwan Effendi, MSc. Ir.	Planning/designing and production of radio prototype using OFDM technique for the NLOS telecommunications

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
84	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Suhono Harsosupangkat, Dr.Ir.	The interactive IPTV portal to build community applications
85	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Yusep Rosmansyah, Dr. Ir.	Rural Next Generation Network (R-NGN): Wireless Mes Network for Rural Areas
86	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Budiman Dabarsyah, Ir. MSEE.	The development of e-Health application towards post disaster restoration
87	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Albarda, Ir.MT.	Study on policy compilation of rural telecommunications operator
88	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Ibnu Syabri, BSc., MSc.	The "Open Source" model for spatial effect exploration in the regional development
89	2007	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Industrial Management	Joko Siswanto, Dr. Ir.MPA.	The development of the franchising system of telecommunications service/ media centre based on next generation network technology
90	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Control System and Computer	Bambang Riyanto, Dr.Ir.	The software development for software-defined radio (SDR)
91	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Biomedical Engineering	Tati L. Mengko, Prof. Dr. Ir.	The sending of the medical image using wireless system to support the rural telemedicine system
92	2007	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Nana Rachmana Syambas, Ir. M.Eng.	The development of Mesh Ad Hoc Testbed network
93	2007	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Craft and Tradition	Dian Widiawati, MSn.	The exploration of waste processing of coconut husk (Cocos Nucifera) as raw material alternative for textile. Development efforts of sustainable textile Industry
94	2007	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Environmental Management Technology	Indah Rachmatiah Dr. Ir. S.S.	Study on the influence of quality of water reservoir on the heavy metal contents to the fish of the floating net cultivation (case study of the Cirata reservoir-dam)
95	2007	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Mechanical Design	Indra Nurhadi, Prof. Dr. Ir.	The development of configuration of main component design on "the articulated bus low deck"
96	2007	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Structural Engineering	Dyah Kusumastuti, Dr. Ir.	Study on experimental structure using MTMD system to reduce response structure resulting from the dynamic loads
97	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Widiarto, MCRP., Ph.D. Ir.	The form- and mechanism- alternative of water development fund in the context of Indonesian
98	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Iwan P. Kusumantoro, Ir.MSTR.	The relevance of the spectrum transport demand management (TDM) application in the urban transportation problems, Case Study of cities over Indonesia

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
99	2007	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Water and Wastewater Engineering	Suprihanto Notodarmojo, Ir.Ph.D.	The comparison of effectiveness and efficiency of domestic waste water recycling systems in various scales
100	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Policy Planning and Development Management	Andi Oetomo, Ir.MPl.	Institutionally Inter-regional co-operation for the regional macro infrastructure development
101	2007	Prime Research - ITB	Faculty of Earth Sciences and Technology (FITB)	Remote Sensing and Geographical Information Science	Ketut Wikantika, Dr. Ir.	The identification of the Regional Spatial structure through the digital image processing and the rural potential data
102	2007	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Ecology and Biosystemics	Endah Sulistiawati, Dr.	Testing of the use of compost from agricultural waste for rice cultivation through the joint experiment with farmers
103	2007	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Housing and Human Settlement	Suparti Amir Salim, Dr. Ir.MSP.	The funding pattern of housing settlement development for low income community in the informal sector in Bandung regency
104	2007	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Air and Waste Management	Tri Padmi Damanhuri, Dr. Ir.	Study of comparison between process and economics cost of waste composting system in the household level using composting technology of landfill mining in the Bandung City
105	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Software Engineering and Data	G.A.Putri Saptawati, Ir., M.Comm.	Next Generation Data Mining on Multidimensional Database
106	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Control System and Computer	Arief Syaichu Rohman	The MPC implementation with algorithm of QP Fixed-point
107	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Biomedical Engineering	Oerip S. Santoso, Dr., M.Sc.	Segmentation of the brain images on MRI (Magnetic Resonance Imaging) by using the Level Set Methods
108	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Redy Mardiana, Dr., Ir., MT	The development of single-station for lightning detection with incident information based on Web
109	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Suwarno, MT., Dr., Ir.	The application of jatropha castor oil and rhicinnus castor oil for isolation of renewable high-tension transformer and environment-friendly (bio degradable)
110	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Computer Engineering	Kuspriyanto, Dr., Ir.	Analysis and development of computation system for decision making based on the Interval Method
111	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Computer Engineering	Yudi Satria Gondokaryono, Ir., MSEE., Ph.D.	Design of java memory simulator system to produce reference memory recorder for object oriented Program
112	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Endon Bharata, Ir., MT.	The development of synthesizing for the low frequency crackling phase for the application in Stepped frequency continuous Wave (SFCW) ground penetrating the Radar

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113	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Effrina Yanti Hamid, Dr., Ir.	Development of methodologies and equipments for communication signal analyzer
114	2007	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Adit Kurniawan, Dr., Ir.	Design and realization of the dual tape antennae composition using equilateral triangle micro-stripes with V form slot for WLAN application
115	2007	Research of Research Group ITB	School of Life Sciences and Technology (SITH)	Fisiologi, Biologi Perkembangan, dan Biomedika	Anggraini Barlian, Dr.	Identification of Protein for Gender determining
116	2007	Research of Research Group ITB	School of Life Sciences and Technology (SITH)	Fisiologi, Biologi Perkembangan, dan Biomedika	Lulu Lusianti Fitri, Dr.	Induction of learning processes and consideration for sinaptogenesis modification on hippocampus mouse (Rattus Norvegicus)
117	2007	Research of Research Group ITB	School of Life Sciences and Technology (SITH)	Microbiology, Genetics and Molecular Biology	I Nyoman Pugeg Aryantha, Ph.D.	Increasing production of anti cholesterol lovastatin compound by the pleurotus ostreatus fungus in biomass culture
118	2007	Research of Research Group ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Rina Ratnasih P., Dra., M.Sc.	The oil content of Azadirachta indica, terminalia catappa and Cerbera odollam in various conditions of environment
119	2007	Research of Research Group ITB	School of Pharmacy (SF)	Biology Pharmacy	Komar Ruslan Wirasutisna., Dr.	Screening and isolation of lignin active compound from Indonesian medicine plants
120	2007	Research of Research Group ITB	School of Pharmacy (SF)	Biology Pharmacy	Elfahmi, Dr.	The production of the Pharmacology Active Compound from Hair Follicle Culture on Several Indonesian Medicine plants of Genetics Transformation results
121	2007	Research of Research Group ITB	School of Pharmacy (SF)	Chemistrypharmacy	Slamet Ibrahim Surantaatmadja, Dr.	The activity of antigout preparations and elucidation of isolate structure from ethyl extract acetate faction of salak (Salacca edulis Reinw.) with bent variety
122	2007	Research of Research Group ITB	School of Pharmacy (SF)	Chemistrypharmacy	Daryono Hadi Tjahjono, Dr., M.Sn	The prediction of humankind telomere stabilization by cationic porphyrin compound as a candidate of anti Cancer
123	2007	Research of Research Group ITB	School of Pharmacy (SF)	Pharmacology - Pharmacy Clinic	Andreanus Andaja Soemardji, Dr., Apt., DEA.	Towards self-supporting community health: an alternative/complementary analysis method for the prevention and recuperation of illness through the program community based health care (CBHC)
124	2007	Research of Research Group ITB	School of Pharmacy (SF)	Pharmacology - Pharmacy Clinic	I Ketut Adnyana, Ph.D.	Isolation, Elucidation of Chemistry Structure and Assessment of Work Mechanism of “Babadotan” leaves Antimicrobial (Ageratum conyzoides L.)
125	2007	Research of Research Group ITB	School of Pharmacy (SF)	Pharmaceutical	Heni Rachmawati, Dr.	Utilization of nature polymer as an orally therapeutic protein escort and intestinal absorpsivitas test to the mouse
126	2007	Research of Research Group ITB	School of Pharmacy (SF)	Pharmaceutical	Debbie Soefie Retnoningrum, Ph.D.	Increasing in recombinant pure groove streptokinase stability towards plasmin degradation through chemistry modification
127	2007	Research of Research Group ITB	School of Pharmacy (SF)	Pharmaceutical	Yeyet Cahyati Sumirtapura, Dr.	The formulation of glimepiride tablet that filled similarities factor towards the supply innovator through the application of various techniques to increase dissolution rate
128	2007	Research of Research Group ITB	School of Pharmacy (SF)	Pharmaceutical	Sundani Nurono S, Dr.	Nano-encapsulation papain for "Gastric Resistance" supply and increase in absorption through the intestines mucosa

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129	2007	Research of Research Group ITB	School of Pharmacy (SF)	Sports Science	Nia Sri Ramania, Dra., M.Sc.	The influence of relaxed sports exercise on stress (physiological reaction especially) to the ITB students
130	2007	Research of Research Group ITB	School of Pharmacy (SF)	Sports Science	Samsul Bachri, Dr., Ir., M.Eng.	The influence of giving various supplements on the lactate acidity level of the Athlete's blood
131	2007	Research of Research Group ITB	School of Business and Management (SBM)	Human Resources Management and Entrepreneurship	Utomo Sardjono Putro, Dr., Ir., M.Eng.	Agent Based Simulation in Confrontation analysis in Citarum Riverbasin Problem
132	2007	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural Design	Woerjantari KS, Dr., Ir, MT	The influence of the development of creative community's economics in the physical quality of the industrial village in Bandung city
133	2007	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Urban Planning and Design	Denny Zulkaidi, Ir., MUP.	The impact of development of large scale land on the land market and periurban transformation within Jakarta City
134	2007	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Urban Planning and Design	Iwan Kustiwan, Ir., MT.	The compactness measurement as an indicator of sustainability city and the development requirement of compact city on grew fast region over Indonesia
135	2007	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Rural Planning	Tommy Firman, Prof., Ir., Ph.D.	The development of Jakarta-Bandung region: continuities and formation change of the mega-urban Region in Indonesia
136	2007	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Housing and Human Settlement	Ismet Belgawan Harun,Dr. Ir. MSc.	The model of procurement system of self-supporting housing for low-income communities in urban areas
137	2007	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Pradono, Dr., Eng., SE., M.Ec.Dev.	The assessment for indicators of sustainable transportation system in land use of city outskirts regions
138	2007	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural History, Theory and Criticism	Indah Widiastuti, ST. MT.	The study on the comparison of the vernacular roof typology design between traditional "Batak Karo" in North Sumatra and "Kerala" in South India
139	2007	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Building Technology	Sugeng Triyadi, Ir, MT	The study of knowledge on local-indigenous structure and earthquake resistance construction to the Sunda traditional vernacular house. The case study: Pangandaran.
140	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Design, Operation and Maintenance of Aircraft	Taufiq Mulyanto, Dr., MT.	The development of aircraft without crew member (unmanned air vehicle/ UAV) for the tactical surveillance missions: modification and testing
141	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Energy and Process System Chemical Engineering	Herri Susanto, Dr., Ir.	Modeling of pre-heater and calciner systems: study on influence of fuel alternative use
142	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Energy and Process System Chemical Engineering	Dwiwahyu Sasongko, Dr.	The analysis of life-cycle process of coal gasification as the source of alternative energy and chemical materials
143	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Energy and Process System Chemical Engineering	Azis Trianto, Dr., Ir., MSc.	The separation of lactate acid with ion exchange process
144	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Energy and Process System Chemical Engineering	Yazid Bindar, Dr.	The production of the prototype of plastic waste processing implementation machine for factory's solid fuel

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145	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Flight Physics	Hari Muhammad, Dr., Ir.	The formation model of transport vehicle movement through the swarm phenomenon
146	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Materials Science and Engineering	Mardjono Siswosuwarno, Prof., Dr., Ir.	The development of quality improvement process of high strength low alloy steel (HSLA) from commercial steel
147	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Farida I.Muchtadi, Dr., Ir.	The development of the classification method on the signal electroencephalogram pattern resulting from motor skill activity stimulus as the part of brain computer interface
148	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Deddy Kurniadi, Dr. Eng.	The development of early detection equipment based on tomography electric for breasts cancer detection
149	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Amoranto Trisnobudi, Dr., Ir.	The development of measurement system of the volumetric mass density, bulk modulus and liquid viscosity
150	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Agus Samsi, Dr., Ir., MT.	Prototype of smart equipments to predict the oil paint pigment compositions
151	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Endang Juliastuti, Dr., Ir.	The development of instrumentation system to monitor the concentration of ammonia and urea in the industrial sewage
152	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Energy Conversion	Ari Darmawan Pasek, Dr., Ir.	The development of correlation equality of pond boiling for refrigerant hydrocarbons were not easy to be burnt (non-flammable hydrocarbons)
153	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Industrial Management	Yassierli, Ph.D.	The development of the measurement method of anthropometry based on the image processing (for the dimension of body circle) to produce anthropometry database in Indonesia
154	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Products Design and Development Chemical Engineering	Tjandra Setiadi, Ph.D., Ir., M.Eng.	Production of acetic acid from ethanol's stillage
155	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Design and Development Process Chemical Engineering	Yogi Wibisono Budhi, Dr., Ir.	The development of technology of tar conversion within gas producer using reverse flow Reactor
156	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Design and Development Process Chemical Engineering	Melia Laniwati Gunawan,Ir., M.Sc.	Production of Low Temperature Shift Conversion (LTSC) Catalyst based on Cu/Zn
157	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Mechanical Design	Kemas Rifian, Ir., M.Sc.	Designing, making and testing of horizontal fused wind turbine generator blade that made use of pliancy torsion as mechanism for corner regulator pitch of the blade
158	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Manufacturing System	Isa Setiasyah Toha, Prof., Dr., Ir.	The development on technology of assisted Braille device for the blindness sufferer: Beta prototype
159	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Lightweight Structure	Muhammad Kusni, Ir., MT.	The production, structure strength test and absorbs test of panel voice material of natural fiber composite
160	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Ida Bagus Ardhana Putra, Ph.D., Ir.	The development on model of acoustics and articulator multi current for the recognize system for continued voice-said using temporal classification technique of Signal EEG pattern to the human brain
161	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Suyatman, Dr., Ir., M.Eng.	Synthesis of Nano-particles of Hexagonal - Ferrite

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162	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Aman Mostavan, Dr., Ing., DEA	The use of photovoltaic (PV) energy to support the practical work activity in the academic programs of Engineering Physics, and the analysis of electricity power measurement from PV with Remote
163	2007	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	I Gde Nyoman Merthayasa, Dr., Ir., M.Sc.	The response of physio-acoustics factor temporal time sound from Balinese gamelan music
164	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Geodesy	Wedyanto Kuntjoro, Dr., Ir., M.Sc.	The precursor of earthquake in the ionosphere using GPS Data
165	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Geodesy	Hasanuddin Z. Abidin, Dr., Ir., M.Sc	The study of the activity of Baribis Fault by using GPS survey data and "Sismisita"
166	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Geodesy	Mipi Ananta Kusuma, Ir.	Survey and development of demographic database on the Guntur volcanoes region
167	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Geodesy	Dina Anggreni Sarsito, Ir., MT.	The zones determination and the potential size for the earthquake in the Palu-Kobo fault by using technology of global positioning system.
168	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Remote Sensing and Geographical Information Science	Dudung Muhally Hakim, Dr., Ir., MSc.	The compilation of spectral dictionary for the identification of land covers in digital image data processing
169	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Remote Sensing and Geographical Information Science	T. Lukman Aziz, Dr., MSc.	Study on implementation of shared street concept to disentangle the traffic jam level in the protocol roads in the Bandung city using the geographical information system.
170	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Remote Sensing and Geographical Information Science	Ishak Hanafiah Ismullah, Dr., Ir., DEA	Modeling of period planted pattern (the Agriculture Calendar) by using the Satellite image data.
171	2007	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Construction Engineering and Management	Reini D. Wirahadikusuma, Dr., Ir.	The study of inter-group relations that were involved in the supplier chain of the building construction projects
172	2007	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Water & Wastewater Engineering	Prayatni Soewondo, Dr.Ing., Ir.	The utilization of sewerage as bioreactor of liquid waste domestic processing to reduce the pollution burdens in urban areas.
173	2007	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Structural Engineering	Muslinang Moestopo, Ir., MSEM, Ph.D	The study of link continuation achievement that could be changed to the eccentric steel Structure.
174	2007	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Structural Engineering	Iswandi Imran, Ph.D., Ir., MASc.	The behavior of the strength and ductility of concrete column with high quality bone was curbed by the high quality steel.
175	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Hydrographical Science and Engineering	Poerbandono, Dr., ST., MM.	The identification of erosion pattern and accretion estuary with the coast representative of North Java using analytical study of flow and sediment interaction.
176	2007	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Ocean Engineering	Krisnaldi Idris, Ph.D.	The testing of energy conversion equipments on ocean surface waves

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177	2007	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Air and Waste Management	Benno Rahardyan, MT.	The analysis of recycling system through material flow analysis on potential recycling waste materials
178	2007	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Environmental Management Technology	Katharina Oginawati, Ir., M.Sc.	Mapping of Insecticide organophosphate pollution to agriculture area as an information level of pesticide pollution around the upstream of DAS (Watershed) Citarum
179	2007	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Craft and Tradition	Biranul Anas Zaman, Dr.	The craft products based on city community waste: the waste and development of the printed glasses material as decorative element raw material.
180	2007	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Human and Industrial Products	Imam Damar Djati, Drs., M. Sn.	The application of visual product evaluation technique in product planning: study of application the VPE in product planning and its implications to the design quality as well as the student's creativity level
181	2007	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Fine Arts	Innes Indreswari, Dra.	The process of design and politics in Soekarno's era (19-59-1966) and Soeharto era (1966-1975)
182	2007	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Fine Arts	Tisna Sanjaya, Drs., Dipl. Art.	Processing of an-organic waste that was useful for fine arts materials
183	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Algebra	Irawati, Dr.	(Around) the direct number of co-hereditary co-module
184	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Analysis dan Geometry	Hendra Gunawan, Ph.D	The development of interpolation method that minimized Energy
185	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Astronomy	Mahasena Putra, Dr.	Spectroscopic Studies of H-Alpha Emission Line Variation in Be Stars
186	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Astronomy	Suhardja D Wiramihardja, Dr.	Study of the cluster of galactic star by using the data of Hipparcos and Tycho-2: the Case on LO 807
187	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Astronomy	Djoni N. Dawanas, Dr.	Spectroscopic Monitoring of Southern Be Stars
188	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Akhmaloka, Ph.D.	Cloning the lipase gene from the isolate local thermopile bacteria
189	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Rukman Hertadi, Ph.D.	Enzyme thermo-stability through the Unfolding DNA POL I Mechanism by using the Molecule dynamics Simulation
190	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Zeily Nurachman, Dr.	Alpha-Amylase from the peryonix exacavatus earthworm
191	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Sukirno, Ph.D.	Manufacture of silicon Nanowire using Plasma Enhanced Chemical Vapour Deposition (PECVD) method and the development of its application as Field Effect Transistor (FET)
192	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Mikrajuddin Abdullah, Ph.D.	Synthesis and testing of nano-catalyst for conversion of Methanol into Hydrogen for Direct Methanol Fuel Cells (DMFC) application
193	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Pepen Arifin, Ph.D	Growth and characterization of the heterosexual structure dual GaN/AIGaN/InGaN with the plasma method assisted by MOCVD for the LED Application

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194	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Euis Sustini, Dra., M. Si	The Manufacture and characterization of photograph detector of the ultra violet was based on the structure M.-S-M. Al (x) Ga (1-x) N that was cultivated on the Si Substrate (111)
195	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Nuclear Physics and Biophysics	Freddy Haryanto, Ph.D.	The production of the standard of linear accelerator model using the Carlo beads method the early stage from the dose of the illumination in Radiotherapy verification radiotherapy
196	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Nuclear Physics and Biophysics	A. Waris, Ph. D, M. Eng	The study of thorium Utilization as boiling water reactor (BWR) Fuel on Burn up Equilibrium model
197	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Nuclear Physics and Biophysics	Rizal Kurniadi, M.Si	The Evaporation model to support the Nuclear Data Reproduction: Calculation of Level Density
198	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Complex System	Umar Fauzi, Dr., rer. nat.	Study of Up-Scaling based on the Space Structure of Rock pores
199	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Complex System	Doddy Sutarno, Ph.D.	The estimation of function robust of impedance CSAMT based on Estimator-M on step II: Application of Robust Estimation-M procedure in the processing of CSAMT Data
200	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Theoretical High Energi Physics & Instrumentation	Freddy Permana Zen, M. Sc, D. Sc	The modified solution by using the brane-world models with bulk asymmetric background
201	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Theoretical High Energi Physics & Instrumentation	Triyanta, Dr.	The aspect of perturbed in Chern-Simons-Witten theory
202	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic and Physical Chemistry	Cynthia L.Radiman, Dr. Ing.	Modify of Chitosan from waste of prawns' skin in load Ionizing Membrane Synthesis for Fuel Cells Application
203	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	Kuntjoro. A. Sidarto, Dr.	Modeling and Development of calculation software on head-loss water Pipe network of water distribution. The case study: Network of the distribution of PDAM Water
204	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	Agus Yodi Gunawan, Dr.	The analytical and numerical study for the problem resolution of the droplet formation to the Fluids Thread of Viscoelastic Linear
205	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	Roberd Saragih, Ph.D	Reduction of Vibration in the Elastics System by using H~-Control minimum order
206	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Combinatorial Mathematics	Rinovia Mery Garnierita S. Dr.	Optimize Network based on the order, the level, and diameter
207	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Combinatorial Mathematics	R.A.D. Kooswinarsinindyah , Dra., M.Sc.	The existence of Palindrome to the Line of tree-Symbol cutter
208	2007	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Statistics	Sutawanir Darwis, Dr.	The simulation of the Fluids Current Injection in the Geothermal Field
209	2007	Research of Research Group ITB	Faculty of Mining and Petroleum Engineering (FTTM)	Exploration of the Earth Resources	Komang Anggayana, Dr., Ir.	The role of ground Water in the Formation of Laterite Sediment
210	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Applied Geology	Prihadi Soemintadiredja .A., Dr., Ir.	Design - Engineering of the logger data equipment on "Geolostrik" configuration of Mise-a-la-Masse for monitoring oil field (Enhanced Oil Recovery) and Geothermal

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211	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Applied Geology	Niniek Rina Herdianita, Ir., M.Sc.	Manifestation of geothermal surface in the Cidanau Area and Surrounding Area of Anyer- Banten Province
212	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Applied Geology	Andri Slamet Subandrio Ir.Dipl. Geol.	The characteristics of Alteration Hydrothermal in the surface area of Cisolok-Cisukarame, Sukabumi-West Java
213	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Oceanography	Ivonne M Radjawane, Dr., M. Si.	The integrated study of sensitivity on gulf coast area of Jakarta
214	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Atmosferics Science	Bajong Tjasjono H K, Dr., DEA	The interaction monsoon-ENSO and its influence to the season in Indonesia
215	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Atmosferics Science	Atika, M.S	Visualization of Disaster Meteorological Mechanism in Indonesia
216	2007	Research of Research Group ITB	Faculty of Earth Sciences and Technology (FITB)	Atmosferics Science	Saryono, Drs., MS	The application of the water balance model to the crop area (the case study of the sugar cane crops)
217	2007	Research of Research Group ITB	Faculty of Mining and Petroleum Engineering (FTTM)	Geophysical Science and Engineering	Agus Laesanpura, Dr.	The geophysics analysis using the combination seismic reflection method and the potential method in the tectonic subduction system in Aceh-Simeulue waters
218	2007	Research of Research Group ITB	Faculty of Mining and Petroleum Engineering (FTTM)	Geophysical Science and Engineering	Mohammad Rachmat Sule, Dr.	The continued study of integrated geology-geophysics: geology mapping on low surface in Karang Sambung (Kebumen) and study of the potential landslide in Cadas Pangeran (Sumedang)
219	2007	Research of Research Group ITB	Faculty of Mining and Petroleum Engineering (FTTM)	Mining Engineering	Ridho Kresna Wattimena, Dr., Ir., MT.	The improvement in vigilance of the stability level in open-mine with the rock mass classification approach
220	2007	International Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Dessy Natalia, Ph.D	Biochemical Characterization of Raw Starch Degrading alpha-Amylase from Indonesia Isolates
221	2007	International Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Combinatorial Mathematics	Edy Tri Baskoro, Ph.D.	Finding Ramsey Numbers for Union of Graphs
222	2007	International Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Analysis dan Geometry	Johan Matheus Tuwankotta, Dr.	A Singularly Perturbed Conservative System: A Toy Model for Atmospheric Ultra-Low Frequencies Variability
223	2007	International Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Water and Wastewater Engineering	Wisjnuprapto, Prof. Dr.	Optimization of Vioemulsifier Production for Bioremediation of Petroleum Oil Contaminated Soil
224	2007	International Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Magnetism and Photonics	Alexander A. Iskandar, Ph.D.	Study of Wave Propagation in (Optically Linear) Photonic Crystals with Defect Using Green Tensor Methods
225	2007	International Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Urban Planning and Design	Haryo Winarso, Ir., M.Eng., Ph.D.	The Influence of Large Scale Land Development on The Changing Spatial Structure of Peri-urban Jakarta
226	2007	International Research - ITB	Faculty of Mining and Petroleum Engineering (FTTM)	Geophysical Science and Engineering	Sri Widiyantoro, Ph.D.	New Information from Seismic Attenuation Tomography: Application to Guntur Volcano
227	2007	International Research - ITB	Faculty of Earth Sciences and Technology (FITB)	Atmosferics Science	Tri Wahyu Hadi, Dr.	Model Comparison and Ensemble Forecast Scheme for Weather Prediction in The Maritime Continenet

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228	2007	International Research - ITB	Faculty of Fine Arts and Design (FSRD)	Human and Industrial Products	Achmad Syarief, Dr., MSD.	The Suitability of Colored Interface Design on Public ATM : Using The Psychophysical of Colors Presented on Display Monitor to Identify Suitable ATM Interface Layouts of Indonesia
229	2007	International Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Nuclear Physics and Biophysics	Zaki Su'ud, Dr., M.Eng	Design Study of Modular Pb-Bi Colled Fast Reactors Based on Modified Candle Burnup Scheme
230	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Resources Exploration	Komang Anggayana, MS. Dr.ir.	Study on coal mineralizes with high mineral content for the recommendation of its utilization strategy
231	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Geophysics	Wahyu Triyoso, Dr.	The research on fault and earthquake mechanics for subduction Zones in Sumatra. The continued study of anticipation "probability based on the integration of geological data GPS and Seismology”.
232	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Geology and Paleontology	Chalid Idham Abdullah, Dr.ir. H	The study of magmatisme and the regional geology structure pattern in Ciparay and surrounding area, Cihurip sub-district, Garut district, West-Java
233	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Applied Geology	Deny Juanda P., Dr.ir.	The characterization of hydrogeology of the strato-volcanoes regions of the West-Java Province. The case study: Ciremai Mountain, Tangkuban Perahu Mountain, Gede-Pangrango Mountain
234	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Oceanography	Nining Sari Ningsih, Dr. Eng	The prediction of tidal front for mapping of the potential zone for fishing in Indonesian waters by using the numerical model
235	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Atmosferics Science	Zadrach L. Dupe, M.Si.	Study on wind energy potential for the environment-friendly electric generation system
236	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Metallurgical Engineering	Edy Sanwani, MT. Ir.	The preliminary study of coal washing using silica sand as the heavy media
237	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Mining Engineering	Aryo P. Wibowo, M.Eng., Dr.Ir.	Analysis for the mining sector potential in the development of Sumbawa regency region of West Nusa Tenggara (NTB) province
238	2006	Research of Research Group ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Reservoar Engineering	Septoratno Siregar, Prof.Dr.Ir.	Determination of increasing income method for crude petroleum mining and its economic
239	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Algebra	Irawati, Dr.	(Around) Co-algebra co-hereditary and its development to co-module co-hereditary
240	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Analysis & Geometry	Hendra Gunawan, Ph.D.	Generalization of Olsen inequalities' in Morrey space
241	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Astronomy	Mahasena Putra, Dr.	Revitalization of mechanized system for Goto 45 cm telescope
242	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Sarwono Hadi, Drs.	Proteomics’ Analysis of the gene expression that played a role in the invasion process of Salmonella enterica serovar typhi of the Indonesian groove in the typhoid fever illness
243	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Magnetism and Photonics	Alexander A. Iskandar, Ph.D.	Study of Green's Tensor Methods for Periodic Optical Systems

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244	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Euis Sustini, M.Si. Dr.	Manufacturing and characterization of the thin film semiconductor's blend based on Arsenates
245	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Nuclear Physics and Biophysics	Widayani Sutrisno, Dr.	Development of the Molecular Imprinting Polymer (MIP) techniques as the preliminary study of production for the active materials of biosensor based on polymer materials
246	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Complex System	Doddy Sutarno, Ph.D.	Estimation of Robust Impedance Function of Controlled Source Audio-frequency Magneto-Telluric (CSAMT) based on Estimator-M.
247	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Theoretical High Energi Physics & Instrumentation	Jusak Sali Kosasih, Dr.	Application of the Maxwell-Harmuth's equations in the wave guide
248	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Analytical Chemistry	Saepudin Suwarsa, Drs. M.Si	Development of pre-concentration method with the column of ion exchanger resin and pull upper resin for the analysis of heavy metal ions in flow water of the Citarum river and Saguling reservoir dam
249	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic and Physical Chemistry	Rita Anggraeni, MS., MSc., Dra.	Designing of reactions to change the carbon dioxide molecule, CO2, into the derivative compounds, carbamates, using the hybrid catalyst of Cobalt Ions and Nickel Ions
250	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic and Physical Chemistry	I Nyoman Marsih, Dr.	The synthesis of Oxides of Cu/Zn/Al as the reaction catalyst of Hydrogen formation in the fuel-cells system
251	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	Muhammad Syamsuddin, Ph.D.	Modeling and development of the life insurance premium with the function of stochastic discount method
252	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	R.A.D. Kooswinarsinindyah , MSc., Dra.	About the characteristics balance to Cutting Sequence three symbols
253	2006	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Statistics	Sumanto W.H., M.Com.	Development of the Process Capability in Bio-statistics
254	2006	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Aesthetics and the Sciences of Arts	Yustiono, Dr.	Research on Aesthetics and the Sciences of Arts as the basic for compilation for the curriculum formulation on the Sciences of Arts academic programs
255	2006	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Design Sciences and Visual Culture	Yan Yan Sunarya, M.Sn.. Drs.	The development of the arts design in Indonesia of the period of 1900-2005: A Study of historiography on the modern aesthetic values in the social context
256	2006	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Humanity Sciences	Miftah Faridl, Dr.	Development of models for human sciences in the Institute of Teknologi Bandung. The contribution of technology based human sciences in supporting the sustainable national development
257	2006	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Visual Communication and Multimedia	Dody Achmad, M.Si., Drs.	Persuasive Visualization in the "kretek" cigarettes advertisement
258	2006	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Craft and Tradition	Ratna Panggabean, M.Sn., Dra.	Development of "Anyaman Purun" Handicrafts in the Kuala Kapuas Regency, Central Kalimantan
259	2006	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Human and Industrial Products	Muhammad Ihsan, M.Sn.	Fibreboo as the material alternative to the Fiberglass replacement
260	2006	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Human and Interior	G. Prasetyo Adhitama, M.Sn., S.Sn.	The correlation of Nirmana 3D's subject of Common Preparatory Level (TPB) at Faculty of Fine Arts and Design (FSRD) towards the assignment of interior design planning

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261	2006	Research of Research Group ITB	Faculty of Fine Arts and Design (FSRD)	Fine Arts	A. Rikrik Kusmara, M.Sn.	Study on the technological aspect and materials' ideology in the development of works of three dimensions Fine Arts. The case study of metals and ceramics based materials during the period of 1995-2005
262	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Design, Operation and Maintenance of Aircraft	Rais Zain, M.Eng. Ir.	Development of three dimensions graphically model of the aircraft: The approach of hierarchy relations between Product - Parts of CATIA-V5 software
263	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Energy and Process System	Yazid Bindar, Ph.D.	Utilization of glycerin from by product of the biodiesel production processes as the alternative fuels
264	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Flight Physics	Hari Muhammad, Dr.	Development of the image processing correlation method for Object Tracking
265	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Materials Science and Engineering	Rochim Suratman, Prof. Dr.	Investigation on the environmental impacts of the polymer composites reinforced by natural fibers
266	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Parsaulian Siregar, Dr.Ing-.	The relevance and competence of the Instrumentation and Control field with the industry demand
267	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Energy Conversion	Imam Kartolaksono R. Dr.ir.	Production of the Test Implement Injector for Gasoline Motor
268	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Products Design and Development	G. Handi Argasetya Ir.	Production of absolute bio-ethanol by using the non-conventional methods
269	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Design and Development Process	Subagjo, Dr.ir.,	Towards miniaturization micro system technology in the provisions of in-situ hydrogen production for the fuel-cells of motor vehicles
270	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Mechanical Design	I Wayan Suweca, Dr.ir.	Compilation of database and programming for planning module of the impacts absorber
271	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Industrial System and Techno Economy	Andi Cakravastia, Dr.	Development of the integrated inbound logistics systems
272	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Manufacturing System	Isa Setiasyah Toha, Prof.Dr.Ir.	Development of Technology Assisted Braille Device for the Blindness Sufferer: the Early Prototype
273	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Lightweight Structure	Ichsan Setya Putra, Dr.Ir.	Development of new method for the field movement measurement based on the digital image for the folding test on the skin panel of aircraft body
274	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Harijono A. Tjokronegoro, Prof.	The strategic development plan and research roadmap of the scientific groups of the Engineering Physics
275	2006	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Mechanical Engineering Production	Taufiq Rochim, Dr.Ir.	Development of research equipments for the machinery processes
276	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Geodesy	Kosasih Prijatna, MSc., Ir.	Study on the characteristics of Indonesian sea surface waters level-rise (sea level rise) in the periods of 1992-2006 by using the Satellite altimetry technique
277	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Remote Sensing and Geographical Information Science	Albertus Deliar, MT., Ir.	Modeling for prediction of the land cover change by using Geographical Information System and the satellite image data (the Case Study of Bandung Territory)
278	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Construction Engineering and Management	Biemo W. Soemardi, MSIE, Ph.D.Ir.	Development of the Earned Value system for the management of construction project in Indonesia

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279	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Water & Wastewater Engineering	Hardjono, Ir.	Influence of the welding surfactant in the coagulation - flocculation processes in the dose around the dose of the optimum coagulant in the drinking water processing
280	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Geotechnical Engineering	Endra Susila, Ph.D.	The detection of potential landslide at the uniform and stratification soft clay slope by using Cone Penetration Test (CPT)
281	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Structural Engineering	Herlien D. Setio, Dr.ir.	Evaluation of the behaviors for continuation-column of composites steel-concrete and reinforced concrete beam with the static cyclic loading
282	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Site Transportation Engineering	Bambang Sugeng, DEA. Dr.Ir.	Research on the Rigid Pavement structure of the Padalarang-Cileunyi toll road by using the asphalt Institute method and the "ELCON" computer programming
283	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Hydrographical Science and Engineering	Dwi Wisayantono, MT.	Application and test model for the sensitivity level of coast regions by using Environmental Sensitivity Index as the element of the spatial decision support system.
284	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Surveying and Kadaster	S. Hendriatiningsih, MS. Dr.ir.	Assessment and identification model of the cadaster 3-Dimension for the Indonesian needs
285	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Ocean Engineering	Krisnaldi Idris, Ph.D.	Testing of the support structure for the tides flow turbine
286	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Water Resources Engineering	M. Cahyono, Dr.Ir.	Modeling Study on morphology and the estuary stability resulting from the waves, tides and river flows phenomenon
287	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Air and Solid Waste Management	Moh. Irsyad, M.Si. Drs.	Determination of emissions factors for carbon monoxide (CO) and hydrocarbons (HC) from the open waste burning in the urban regions
288	2006	Research of Research Group ITB	Faculty of Civil and Environmental Engineering (FTSL)	Environmental Management Technology	Arwin Sabar, MS., Dr.ir.	The comparison research of the reliability of river water and spring water as source for provisions of the urban drinking water and irrigation water
289	2006	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Policy Planning and Development Management	Suhirman, SH., MT. Drs.	The role of social sciences and humanities in the development of Policy Planning and Development Management research groups
290	2006	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Rural Planning	Pradono, Dr	The Prospects of Middle-Small City in pushing the Development of Under Developed Regions: Case Study of the Southern part of West Java province
291	2006	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural Design	Woerjantari Soedarsono, MT. Dr.Ir,	Space Syntax to the Dwelling of the industrial Village
292	2006	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Urban Planning and Design	Ross Akbar, MSc., Ph.D., Ir.	Consideration and compilation approach of the Standard for the spatial planning

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293	2006	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Housing and Human Settlement	Suparti Amir Salim, MSP, Dr.ir.	The prospect of improving for the spatial quality of Housing and Human Settlement in focusing on the community, the Case Study: the settlement environment of Street Gagak
294	2006	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Binsar P. Naipospos, MSP. Ir.	Analysis of the Appropriateness of the Road Pricing Implementation in the Bandung City
295	2006	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural History, Theory and Criticism	Indah Widiastuti, ST., MT.	The pattern of community behaviors in the street and field between-building of the city- village in the home-industrial estates of the Binong region, Bandung city
296	2006	Research of Research Group ITB	School of Architecture, Planning and Policy Development (SAPPK)	Building Technology	Lily Tambunan, MT. Ir.	Saving Efforts for the building costs through structural engineering and constructions. The case study: the Dwelling to human settlement of the city-village in Bandung city
297	2006	Research of Research Group ITB	School of Business and Management (SBM)	Operations and Finance Management	Togar M. Simatupang, Ph.D. Ir.	Mapping of the realization values from Customer Relationship Management (CRM)
298	2006	Research of Research Group ITB	School of Business and Management (SBM)	Human Resources Management and Entrepreneurship	Jann Hidajat Tjakraatmadja, MSIE. Prof.Dr.Ir.	Influence relations of psychology capital and studying environment against the achievement index of the ITB students
299	2006	Research of Research Group ITB	School of Pharmacy (SF)	Biology Pharmacy	Siti Kusmardiyani, MSc. Dra.	Isolation and Identification of the Contents of Tiwai Onion (Eleutherine Americana)
300	2006	Research of Research Group ITB	School of Pharmacy (SF)	Chemistrypharmacy	Daryono Hadi Tjahjono, MSc. Dr.	Study on chemical reactivity of the Mustards' group of anti-cancer medicines: Molecular modeling for the priority election in the use
301	2006	Research of Research Group ITB	School of Pharmacy (SF)	Pharmacology - Pharmacy Clinic	Lia Amalia, M.Si. Dra.	The influence of the ethanol extraction for roots layer of the Allium Schoenoprasum L., Liliaceae (Kucai) against the level of nitrogen oxides, as one of the determination of the work mechanism of anti-hypertensions
302	2006	Research of Research Group ITB	School of Pharmacy (SF)	Pharmaceutical	Yeyet Cahyati. S. Prof. Dr.	Formulation and evaluation of the quality of the oral solution supply for alcohol free paracetamol by using the formation of the complex compounds with cyclo-dextrin
303	2006	Research of Research Group ITB	School of Pharmacy (SF)	Sports Science	Tommy Apriantono, MSc., Ph.D.	Injury epidemiology that happened to the badminton Athletes in Indonesia
304	2006	Research of Research Group ITB	School of Life Sciences and Technology (SITH)	Ecology and Biosystemics	Tati S. Subahar, Dr.	Materials cycling in the Ecosystems: the dynamics of Carbon cycling in the Forest Crops
305	2006	Research of Research Group ITB	School of Life Sciences and Technology (SITH)	Physiology, Developmental Biology and Biomedics	Intan Ahmad, Ph.D.	The insecticide resistance mechanism of Aedes aegypti mosquitoes (Siptera: Culicidae) which is the vector of the dengue fever illness against insecticide Pyrethroids in Indonesia
306	2006	Research of Research Group ITB	School of Life Sciences and Technology (SITH)	Microbiology, Genetics and Molecular Biology	Nuryati Juli, M.Si. Dra.	The improvement in productivity of diatom culture Chaetoceros Amami by using the ratio optimization of N:P:Si and the development of its preservation technology in the form of algae paste
307	2006	Research of Research Group ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Rina Ratnasih, MS., MSc., Dra.	Bio-prospecting of the producer's plants for the Biodiesel raw materials

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308	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Electronics Engineering	Waskita Adijarto, ST., MT., Dr.	SMART NODE: "the Design and Implementation of Smart Router with the Management of QoS to NGN"
309	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Munawar Achmad, Dr.Ir.	Ganesa Project as the information and all in knowledge gate
310	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Software Engineering and Data	M. Sukrisno Mardiyanto, Dr.	Problem Definition in the Exploration of New Paradigm for the Development of Software
311	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Control System and Computer	Iyas Munawar Dr.Ir.	The comparison of Use of the Micro-controller and Microcomputer in the Control and Instrumentation Devices Series
312	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Biomedical Engineering	Oerip Slamet I. Santoso, MSc., Dr.dr.	Development of practical work software for the Bio-medics image processing system
313	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Bambang Anggoro, Ir. M,Sc.	Study on the mitigation influences of the Electromagnetic fields from the extra high-voltage electric power transmission lines 500 kV
314	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Computer Engineering	Yoga Priyana, Dr.Ir,.	Accessing of the 3-Dimensions objects by using the similarity technique based on geometry in the spatial database system
315	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Effrina Yanti Hamid, Dr.ir.	Development of identification equipments for the communication signal modulation by using the Wavelet transformation method
316	2006	Research of Research Group ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Budiman Dabarsyah, Ir.	Designing of E-learning Systems for Industrial Technology Research Groups
317	2006	Prime Research - ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Resources Exploration	Wawan Gunawan A. Kadir, Dr	Study on Reservoir Fluid Dynamics of Geothermal Reservoir by using 4-D Micro Gravitation Method, the Case Study: Kamojang Geothermal Fields
318	2006	Prime Research - ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Resources Exploration	Darharta Dahrin, Dr	Measurements of GPS, GPR, and 4-D Micro Gravitation for Preliminary Model of Subsidence Monitoring at Special Capital Territory of Jakarta Region
319	2006	Prime Research - ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Oceanography	Safwan Hadi, Ph.D.	Study and Mapping of Potentials for Wind- and Sea Waves- Energy for Environmentally Friendlier Power Generation Systems in Indonesia
320	2006	Prime Research - ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Oceanography	Ivonne M. Radjawane, Ph.D.	Information System for Prediction of the Availability of Clean Water in the Coastal Region by using the 3D mathematical Model of the Sea Water Intrusion and the Balance Model of the Ground Water - Surface Water

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321	2006	Prime Research - ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Metallurgical Engineering	Eddy Agus Basuki, MSc., Dr.Ir.	Research and study of the utilization of Indonesian iron ore to support the national steel industry (Continuation study: increasing of the Fe contents in the iron ore by using methodology of concentration the other alternatives)
322	2006	Prime Research - ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Drilling Engineering, Management and Productions of Oil-Gas	Tutuka Ariadji, MSc., Ph.D. Ir.	Economically Analysis of Vibro-seismic Stimulation Technology
323	2006	Prime Research - ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Mining Engineering	Rudy Sayoga Gautama, Dr.Ir.	The influence of ground water in the mine planning, ventilation systems and environmental management to the underground mining
324	2006	Prime Research - ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Mining Engineering	Suseno Kramadibrata, Dr.Ir.	Testing for the hydraulic cracked and acoustics emissions for the determination of the In-situ tension
325	2006	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Toto Winata, Ph.D.	Development of system for HWC-VHF-PECVD to grow the thin layers of hydrogenated micro-crystal silicon as well as its application of the solar cells devices
326	2006	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Complex System	Satria Bijaksana, Ph.D.	The compilation inventory of the higher valuable added products from iron sands as well as the preliminary study of prototype production of magnetic separator and the in-situ iron sand processing systems
327	2006	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Combinatorial Mathematics	M. Salman A.N. Dr.	Development of methodology and software for frequency management of Wireless Communication
328	2006	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Design Sciences and Visual Culture	Agus Sachari, M.Sn. Dr.	Study on the characteristics of the aesthetic value in the design-work of Javanese community's tradition (the palace building, various styles batik's decorated arts and "keris")
329	2006	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Human and Industrial Products	Dudy Wiyancoko, Dr.	Ergonomics and aesthetics of the public's transport in the city (Angkot)
330	2006	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Human and Interior	Bagus Handoko, S.Ds., MT.	The influence of adaptive occupant's behaviors of the simple house towards the different composition of the mass of interior space (Study of the aspects that influenced interior planning of house settlements to the middle to low class income community's groups)
331	2006	Prime Research - ITB	Faculty of Fine Arts and Design (FSRD)	Fine Arts	Setiawan Sabana, MFA. Prof. Dr.	Identification of problems of the Fine Arts-, Design- and Crafts- fields in Indonesia. (With Territory of Javanese and Balinese Cultures as the preliminary research)
332	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Design, Operation and Maintenance of Aircraft	Mahardi Sadono, MT. Ir.	Development of Data mining Methodology for Flight Data Recorders
333	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Energy and Process System	Tatang Hernas Soerawidjaja, Dr.Ir.	The compilation of methodologies and the accumulation of data for designing of the bio-ethanol production process technologies via the operation of pilot's factory of bio-ethanol with several raw materials
334	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Energy and Process System	Tirto Prakoso, M.Eng. Dr.	Intensification of Processing Technology for Biodiesel Production
335	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Endra Joelianto, Dr.Ir.	Development of dynamic modeling for ethanol fermentation system and designing of the control systems for production processes of the ethanol production

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336	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Energy Conversion	Priyono Sutikno, Dr.Ir.	The pump as water turbine for Micro Hydro electric Power Generation equipped by Load Controller, the selection, use and management system
337	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Energy Conversion	T.A. Fauzi Soelaiman, Dr.Ir.	Research for production and testing for prototype of the Savonius wind turbine for toll street lighting
338	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Energy Conversion	Hendrawan, Dr.Ir.	Study on the development of the integrated water turbine to the dam lock for micro-hydro electric power generation
339	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Industrial Management	Joko Siswanto, MPA. Dr.Ir.	Development of the service system for rural telecommunications by using informatics engineering and wireless communication (Wireless Phone)
340	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Products Design and Development	Tjandra Setiadi, M.Eng., Ph.D. Ir.	Mutation of Saccharomyces cerevisiae to reach the level of alcohol more than 10% in the fermentation broth
341	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Products Design and Development	Achmad Ali S. Drs.	Increasing productivity of Alpha-amylases and Gluco-amylases enzymes from the Aspergillus Niger Fungus
342	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Products Design and Development	Ukan Sukandar, Dr.	Fermentation of Gycerol into Ethanol
343	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Mechanical Design	Indra Nurhadi, Prof. Dr. Ir.	Study of design parameters of "Low Deck Articulated Bus" for the Mass Transports in Urban area
344	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Industrial System and Techno Economy	Lucia Diawati, Dr.Ir.	Development of fishermen's operation system with the Fleet Approach and collaboration intra fishermen to support the formation for fisheries industry cluster
345	2006	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Hermawan K. Dipojono, MSEE., Ph.D.Ir.	Production and development of parallel computer were based on the Open Source application with cluster of personal computer: Achievement test for simulation of structure molecule dynamics and the nano blending dynamics
346	2006	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Water & Wastewater Engineering	Suprihanto Notodarmojo, Ph.D. Ir.	The influence of water quality and distribution network length against the costs and optimal scale of the clean water provisions
347	2006	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Structural Engineering	Dyah Kusumastuti, Dr.Ir.	The behaviors of structure with the MTMD system to reduce the structure responses resulting from the earthquake burdens
348	2006	Prime Research - ITB	Faculty of Civil and Environmental Engineering (FTSL)	Structural Engineering	Saptahari M. Soegiri, Dr.Ir.	The experimental study of utilization of nickel-clinker as the aggregate and fly ash as the ballast of concrete matrix for the offshore gas pipes
349	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Policy Planning and Development Management	Sonny Yuliar, Dr.Ir.	Study on the social construction of biodiesel in the context of application frameworks of the Good Governance principle in the renewable energy policy
350	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Policy Planning and Development Management	Johnny Patta, MURP. Ir.	Attainability of the community towards the urban transportation system
351	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Policy Planning and Development Management	Andi Oetomo, M.PI, Ir.	Evaluation (Ex- Ante) of policy for development of the toll roads by local government

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352	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural Design	Hanson Endra Kusuma, Dr. Eng	Co-relational relations between residential attachment and environmental responsibility on the environment of the "'kampung kota" (city village) dwelling
353	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Rural Planning	Hastu Prabatmodjo, MS., Ph.D. Ir.	The exploration of the sustainable rural area and the transport role: the case of Southern of West Java
354	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Iwan P. Kusumantoro, MSTR. Ir.	The opportunity of the adjustment of beginning and end activity time as a part of the management instrument of transport demand
355	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	BS Kusbiantoro, Prof. Dr.	The requirement and opportunity of pedestrian development on the road system in urban areas
356	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Ibnu Syabri, MSc., Ph.D.	The characteristics and the pattern of urban commuting
357	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Miming Miharja, MSc.Eng., Ir.	The influence of public and private institutional towards the performance of urban public transport
358	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Urban Infrastructure System	Heru Purboyo H.P., DEA. Dr.Ir.	The aim and distance of daily trip in urban areas and its association with the spatial structure of the city
359	2006	Prime Research - ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural History, Theory and Criticism	Sri Rahaju B.U.K., MSA, Dr.Ir.	The study of the visual language on public's space in the case of vernacular Sunda architecture
360	2006	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Ecology and Biosystemics	Gede Suantika, M.Si.Dr.	Empowerment of the coastal community economics with the development on backyard farming of the giant prawns
361	2006	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Ecology and Biosystemics	Achmad Sjarmidi, Dr.	The improvement on the function of open green space (RTH) in Bandung region
362	2006	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Microbiology, Genetics and Molecular Biology	Maelita R. Moeis, Ph.D.	Screening and characterization of the Xilanase enzyme activity from Bacillus Sp
363	2006	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Microbiology, Genetics and Molecular Biology	Sony Suhandono, Ph.D.	Filtering on the indigent bacteria as an isomaltulose producer from sugar cane in a molecular manner
364	2006	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Roberd Manurung, Dr	The production of ethanol and porous material from rice straw with the biorefinery concept
365	2006	Prime Research - ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Sri Nanan Widiyanto, Dr.	Provision of germ of kemurgi crop (dedicated energy crops) according to In vitro
366	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Electronics Engineering	Sarwono Sutikno, M.Eng. Dr.Ir.	Study and design planning of platform to Embedded Security System
367	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Electronics Engineering	Trio Adiono, ST., MT, Ph.D.	Quarter Pixel Resolution Motion Estimator For H.264/MPEG-4 Video Codec

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368	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Nur Ulfa Maulidevi, ST., MSc.	Architectural soft switch design based on the cognitive system model for the smart distributed system (System terdistribusi Cerdas)
369	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Afwarman Manaf, MSc., Ph.D.Ir.	NoteBOX : Message-Based Call Centre
370	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Iping Supriana Suwardi, Dr.Ing,- Ir.	Next Generation Graphical Information System
371	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Dwi Hendratmo Widyantoro, Dr.	The development of Prime (Excellent) Test Bed Next Generation Search Engine
372	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Control System and Computer	Bambang Riyanto T. Dr.Ir.	The development of the computation reconfigurable platform software - defined radio to next generation network (NGN)
373	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Biomedical Engineering	Tati Latifah R. Mengko, Dr.Ir.	Very Low Bit-rate Tele-Ophthalmology for Rural Area Application
374	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Biomedical Engineering	Joko Suryana, MT. Ir.	The development and Implementation of the prototype of mobile Tele-Cardio car System
375	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Redy Mardiana, Dr.Ir.	Digital protection technology of the security for the channeling of Electricity energy by using Technology of Digital Signal Processing (DSP)
376	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Computer Engineering	Sigit Haryadi, Ir.	The design engineering of traffic next generation Network in topology Multi-Ring network
377	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Computer Engineering	Ian Yosef M. Edward, MT. Ir.	Northbound interface based hanuman framework
378	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Tutun Juhana, Dr.	Planning Design and implementation soft switch for NGN test bed in ITB on the stage II
379	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	M. Ridwan Effendi, Dr.Ir.	Development and Implementation of the Wireless IP Telephony for the Rural Communication Application
380	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Nana Rachmana, M.Eng. Ir.	Planning design and implementation context-aware service to NGN
381	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Hendrawan, Dr.	PThe development of Fraud Management Systems (FMS) for the Telecommunication Network Mobile (Continued)

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382	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Andriyan Bayu Suksmono, Ph.D.	Development of the smart computation method, the complex system and the high achievement computation for the information processing on the NGC and NGN infrastructure
383	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Jaka Sembiring, Dr.Ir.	SOFT RADAR : Processing of the Radar Signal
384	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Albarda, MT. Ir.	Prototype and evaluation of the radio achievement using OFDM technique as the infrastructure rural NGN
385	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Yusep Rosmansyah, Dr.Ir.	Improving on network quality of Wireless Rural NGN
386	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Suhono Harso Supangkat, M.Eng., Dr.Ir.	Towards NGN numbering governance, the development of the ENUM Manager application.
387	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Arry Akhmad Arman, Dr.	The development of the 'Interactive Voice Respond' System using Text to speech Indonesian language (as part of the NGN application) Stage II
388	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Armein Z.R. Langi, MSc., Ph.D. Ir.	Virtual Research Center : Next Generation Computing
389	2006	Prime Research - ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Kusprasapta Mutijarsa, ST., MT.	The development of Text to Speech Indonesia language on Platform of Symbian and Pocket Personal Computer (PC)
390	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Astronomy	Moedji Raharto, Dr.	The study of Metonic “Hilal” Parameter
391	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Astronomy	Suhardja D. Wiramihardja, Dr.	The study on the movement of the sun using the parallax data of hipparcos star
392	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Astronomy	Dhani Herdiwijaya, Dr.	The analysis of relationships between the activity of the high energy sun and the geomagnetic fluctuation by using the De-trended fluctuation analysis (DFA) method
393	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Astronomy	Djoni N. Dawanas, Dr.	The overshooting effect and the impact mass lost in the evolution of the star BD+60º2522
394	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Zeily Nurachman, D.Sc.	The isolation of gene coding enzyme fibrinolytic from Local earthworm
395	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Rukman Hertadi, Dr.	The simulation approach of the molecule dynamics to understand Enzyme DNA Polymerase Thermo-stability

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396	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Biochemistry	Akhmaloka, Dipl.Biotech., Ph.D.	Biodiversities thermophilic micro-organisms from the hot water source on the West Java region
397	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Theoretical High Energi Physics & Instrumentation	Mitra Djamal, Dr. Ing-	The production of Material Giant Magneto resistance (GMR) for the Magnetic Censor
398	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Theoretical High Energi Physics & Instrumentation	Bobby Eka Gunara, Dr.re.nat	The Nonlinear dynamics in the Theory N=1 Super Gravitation
399	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic and Physical Chemistry	Ismunandar, Dr.	The simulation atomic defect to the Aurivillius Oxide
400	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic and Physical Chemistry	I Made Arcana, Dr	Synthesis of the co-polymer from 2,2-Dimetil-1,3 propandiol and d-Valerolakton for the production of the biodegraded plastic material (biodegradable Polymers)
401	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Organic Chemistry	Lia Dewi Juliawaty, Dr.	The isolation of active compound from "Salam" plants (Syzygium polyanthum) as Indonesian Medicine plants
402	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	Edy Soewono, Prof. Dr.	The Dynamic analysis of the model dengue virus population in Human Body
403	2006	Research of Faculty Year 2005 funded by Year 2006	School of Life Sciences and Technology (SITH)	Ecology and Biosystemics	Undang A. Dasuki, MS., Drs.	The Utilizations of Various plants in Aceh Typical Food
404	2006	Research of Faculty Year 2005 funded by Year 2006	School of Life Sciences and Technology (SITH)	Microbiology, Genetics and Molecular Biology	I Nyoman P. Aryantha, Dr.	The development of bio-fertilizer from nitrogen fixing bacteria for application on the Black soybean crop
405	2006	Research of Faculty Year 2005 funded by Year 2006	School of Life Sciences and Technology (SITH)	Microbiology, Genetics and Molecular Biology	Pingkan Aditiawati, Dr.	Making of cheese using fermentation of the Lactococcus bacteria lactis, Streptococcus thermophillus and Leuconostoc mesenteroides
406	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Fine Arts and Design (FSRD)	Human and Industrial Products	Imam Damar Djati, M.Sn.. Drs.	The development of design on the grinder machine equipped by the dust pump installation for the small-middle footwear industry
407	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Fine Arts and Design (FSRD)	Human and Industrial Products	Nedina Sari, M.Sn., Dra.	The design development on product made of leather waste material using the cold formation printing technique
408	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Fine Arts and Design (FSRD)	Human and Interior	Prabu Wardono, M.Des.. Drs.	The Test implement of Ergonomic seating position with aided Computer
409	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Fine Arts and Design (FSRD)	Human and Interior	Ahadiat Joedawinata, Dr.	The programmatic study for the guidance compilation of multipurpose social space design for the rural Community

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410	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Fine Arts and Design (FSRD)	Human and Interior	Dona Saphiranti, MT., Dra.	The development on Module of lecture of the design technique interior with the computer Program 3D
411	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Fine Arts and Design (FSRD)	Fine Arts	Muksin, M.Sn.	The material processing of natural fiber using the microbiology enzyme system as the media of the two dimensions art expression
412	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Fine Arts and Design (FSRD)	Fine Arts	Rr. Innes Indreswari S., MT., Dra.	The study of cast-metal Technique with the main printed material of potential silica sand in order to development improving the sculpture art, the metal craft product, and “trimatra”
413	2006	Research of Faculty Year 2005 funded by Year 2006	School of Electrical Engineering and Informatics (STEI)	Electronics Engineering	Rio Seto Yudoyono, Ir.	The development initiative of Motherboard PC Competence Design in ITB
414	2006	Research of Faculty Year 2005 funded by Year 2006	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Suwarno, Dr.Ir.	The application of oil palm for isolation of environment-friendly extra high volage transformer
415	2006	Research of Faculty Year 2005 funded by Year 2006	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Mukmin W. Atmopawiro, Dr.Ir.	The study of planning design and its implementation of the micro hydro electricity power generator of in the Lebak Siliwangi Bandung
416	2006	Research of Faculty Year 2005 funded by Year 2006	School of Pharmacy (SF)	Pharmacology - Pharmacy Clinic	Elin Yulinah Sukandar, Prof. Dr.	The activity test on the fraction of finger shaped tuber of the Red ginger (Zingiber officinale Rosc. var rubrum) to the Mycobacterium tuberculosis and the production for supply of Anti-tuberculosis capsule
417	2006	Research of Faculty Year 2005 funded by Year 2006	School of Pharmacy (SF)	Pharmacology - Pharmacy Clinic	I Ketut Adnyana, Ph.D., Apt.	The activity test on Anti-obesities Extract “Rimpang Teki” (Cyperus rotundus L.) to the mouse induced by high-fat food.
418	2006	Research of Faculty Year 2005 funded by Year 2006	School of Pharmacy (SF)	Pharmacology - Pharmacy Clinic	Endang Kumolosasi, M.Si., Dr.	The characterization of Gondii Isolat Toxoplasmosis from the sufferer's Toxoplasmosis placenta for the production reacted diagnostic kit with the agglutination method
419	2006	Research of Faculty Year 2005 funded by Year 2006	School of Pharmacy (SF)	Pharmaceutical	Sukmadjaja Asyarie, Dr.	The influence of the Ethanolamine Salt formation of and the Dispersion solid PVP from the Supply of Gel Meloxic (Meloksikam) to the penetration “perkutan”
420	2006	Research of Faculty Year 2005 funded by Year 2006	School of Pharmacy (SF)	Pharmaceutical	Sundani Nurono S.Dr.rer.nat	Cold method to detect the physics interaction of Benzerazid-Levodopa
421	2006	Research of Faculty Year 2005 funded by Year 2006	School of Pharmacy (SF)	Pharmaceutical	Sasanti T. Darijanto, MS., Dr.	The supply development of the aromatic of “kenanga oil” (Cananga odorata) base cream for the SPA supply
422	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Civil and Environmental Engineering (FTSL)	Remote Sensing and Geographical Information Science	Ketut Wikantika, Dr. Ir.	The study on the land boundary of regions (municipalities and districts) using image satellite (Case Study: the Bandung City – Bandung municipality)
423	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Civil and Environmental Engineering (FTSL)	Construction Engineering and Management	Rizal Z. Tamin, Dr.Ir.	The combination between bottom-up and top down approach in the transportation planning system on the province area (the Case Study of Propinsi Nanggroe Aceh Darussalam)

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424	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Civil and Environmental Engineering (FTSL)	Construction Engineering and Management	Khrisna S. Pribadi, DEA., Dr.Ing-Ir.	The identification of Supply Chain in the Indonesian construction industry for the development of the guaranteeing system of the quality
425	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Civil and Environmental Engineering (FTSL)	Site Transportation Engineering	Ade Sjaruddin, MSc., Dr.Ir.	The analysis of the transportation policy in the Era of the Autonomy Region (the Case Study of Propinsi Nanggroe Aceh Darussalam)
426	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Civil and Environmental Engineering (FTSL)	Water Resources Engineering	M. Syahril Badri Kusuma, Dr.ir.	The modeling study of turbulent flow to the “bangunan terjun” (Backward Facing Step Flow)
427	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Civil and Environmental Engineering (FTSL)	Environmental Management Technology	Indah Rachmatiah SS, MSc., Dr.Ir.	The method development of depuration heavy metal copper to Oreochromis niloticus (nila fish) and the effect of its hispatologi
428	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Resources Exploration	Lilik Eko Widodo, MS. Dr.Ir.	The calculation of ground water recharge in Bandung basin for the integrated management of the basin ground water resources in Bandung
429	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Geophysics	Nanang T. Puspito, Dr.	The simulation of Web based tsunami for the early-warning system of the tsunami disaster in West Java
430	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Geology and Paleontology	Yan Rizal, Dipl.Geo., Dr.Ir.	Geology and palaeontology vertebrate of “Jembarwangi” region and its surrounding area, kabupaten Sumedang, West Java
431	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Geology and Paleontology	Yahdi Zaim, Prof. Dr.Ir.	Paleontology vertebrate of the whale fossil and geology on Surade Jampang region - West Java
432	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Geology and Paleontology	Rubiyanto Kapid, Dr.	The micro-fauna as the indicator of the environment change: the case study in Balongan waters, Indramayu-West Java
433	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Geology and Paleontology	Benyamin Sapiie, Ph.D. Ir.	Modeling of analogous sandbox for the structure formation mechanism in the compression tectonics condition
434	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Applied Geology	Budi Brahmantyo, MSc., Ir.	The evaluation on zones of the landslide sensitivity using statistical multivariate method and SIG
435	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Applied Geology	Imam A. Sadisun, Dr. Eng.	The study of the re-sliding mechanism of the slope Breksi volcanic on Batulempung Gombel, Semarang, Central Java
436	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Applied Geology	Prihadi Sumintadireja, Dr.	Design engineering of the logger data implement for monitoring oil field (Enhanced Oil Recovery) and Geothermal
437	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Geophysical Engineering	Agus Laesanpura, Dr.	The Geophysics analysis to Land-Sea Aquifer System in the Islands

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438	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Geophysical Engineering	Wahyudi W. Parnadi, Dr.rer.nat	Modeling on electromagnetic 2-Dimension using the complex electrical characteristics on the Radio frequency
439	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Mining Engineering	Budi Sulistianto, MT., Dr.Ir.	The analysis of the long-term behavior of the rock mass using numeric model
440	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Reservoar Engineering	Sutopo, Dr.ir.	Numeric Model for the flow and transport in the heterogeneous porous media with not uniform grid
441	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Reservoar Engineering	Taufan Marhaendrajana, Dr.ir.	The study of identification, screening and method in the recovery process on gas retrograde reservoir (Gas Condensate)
442	2006	Research of Faculty Year 2005 funded by Year 2006	Faculty of Earth Science and Mineral Technology (FIKTM)	Reservoar Engineering	Asep Kurnia Permadi, Dr.Ir.	The research to overcome problem of flow assurance of oil pipelines on the seabed
443	2006	Research of Faculty Year 2005 funded by Year 2006	School of Architecture, Planning and Policy Development (SAPPK)	Policy Planning and Development Management	Khrisna Nur Pribadi, Dr.ir.	Integrated Water Resource Management through the development of Sustainable development policy in Bandung basin
444	2006	Research of Faculty Year 2005 funded by Year 2006	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Rural Planning	Myra P. Gunawan, MT., Dr.ir.	The identification of Tourism Places in Bandung and its surrounding area in the development of tourism Information System
445	2006	Research of Faculty Year 2005 funded by Year 2006	School of Architecture, Planning and Policy Development (SAPPK)	Regional and Rural Planning	Teti Armiati Argo, MES., Dr.Ir.	The prospect of development on Small City through clean water provision
446	2006	Research of Faculty Year 2005 funded by Year 2006	School of Business and Management (SBM)	Human Resources Management and Entrepreneurship	Utomo Sarjono Putro, M.Eng.Dr.ir.	Simulation model based on Agent for knowledge management
447	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Analytical Chemistry	Buchari, Prof. Dr.	The production on Module of Multi Ion Potentiometric Sensor Based on Electrode Selective Ion typed into coated Wire and Carbon Paste
448	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Atmosferics Science	Tri Wahyu Hadi, Dr.	The study on the effectiveness of weather modification technology on Java Island based on cloud dynamic model
449	2006	Research of Faculty-ITB	Faculty of Civil and Environmental Engineering (FTSL)	Geodesy	Hasanuddin Z. Abidin, Dr.Ir.	Activity study on Lembang fault using GPS survey method
450	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Nuclear Physics and Biophysics	Abdul Waris, M.Eng., Ph.D.	Recycling of Plutonium and Minor actinide to the Boiling water Nuclear Reactor
451	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Energy and Process System	Herri Susanto, Dr.	Study on hydrodynamic mixed particle of coal, a rice camp and raw meal in the calcining Process on the Semen Factory.
452	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Control System and Computer	Arief Syaichu Rohman, Dr.Ir.	SOFT RADAR : Development of Radar & Testbed Control

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453	2006	Research of Faculty-ITB	School of Pharmacy (SF)	Chemistrypharmacy	Slamet Ibrahim, Dr.	Isolation and Characterization of the Chemical Compound of Antioxidant and Anti-gout in Salak (Salacca edulis Reinw.) with Bongkok Variety
454	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Design and Development Process	Danu Ariono, Dr.Ir.	The development on the correlation of the mass moving coefficient the dispersion phase and continued phase in liquid to liquid contacting in the fill in Column F
455	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Geophysical Engineering	Mohammad Rachmat Sule, Dr.	Monitoring of potential landslide disaster using geoelectrics resistivities method and seismic refraction
456	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Statistics	Udjiana S. Pasaribu, Dr.	Convergences smallest quadrant value to the Model Space Time GSTAR (I1) through the Martingale process: Case Study of the distribution of Bradysia Osellarus insects
457	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Combinatorial Mathematics	Hilda Assiyatun, Dr.	Set (mathematics) of minimal domination on the Graf cubic random
458	2006	Research of Faculty-ITB	Faculty of Civil and Environmental Engineering (FTSL)	Air and Solid Waste Management	Enri Damanhuri, Prof. Dr.	Simulation of the Management Pattern of Waste and Potential for Recycling influence in the 3-R based waste Management in the Application of System Dynamic Model in the Waste Management in Bandung City
459	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Oceanography	Dadang K. Mihardja, Dr.rer.nat.	The Numeric simulation of the Flow Circulation and traffic flow of in Makasar Strait, Indonesia using 3D baroclinic model
460	2006	Research of Faculty-ITB	School of Life Sciences and Technology (SITH)	Microbiology, Genetics and Molecular Biology	Dea Indriani Astuti, Dr.	The utilization of the Microbe in the provisions of alternative Energy source (Hydrogen and Ethanol)
461	2006	Research of Faculty-ITB	School of Business and Management (SBM)	Human Resources Management and Entrepreneurship	Nurhajati Ma'mun, MSc., Ir.	First Step Toward Microsoft Research Center in Indonesia
462	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Organic Chemistry	Sadijah Achmad, DEA.. Dr.	The correlation between clusters of the function in histidine and its activity as corrosion inhibitor of the Carbon Steel
463	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Design and Development Process	IGBN Makertihartha, Dr.Ir.	The Reformation process of methanol steam as the Hydrogen Provider of Fuel Cell with the catalyst CuO/ZnO/Al2O
464	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Metallurgical Engineering	Syoni Soepriyanto, Dr.Ir.	The study of Creep Endurance to the Steel with high Temperature for the Boiler PLTU Application
465	2006	Research of Faculty-ITB	Faculty of Fine Arts and Design (FSRD)	Aesthetics and the Sciences of Arts	Irma Damayanti, M.Sn.	Fine Arts Curatorship (Art Curatorship): the practice, prospect and its development in Indonesia (as one of alternative provision of the Fine Arts curator ship subject in the Program “magister seni murni” (Magisterial Pure Art Science) in Faculty of Fine Arts and Design (FSRD) ITB
466	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Mechanical Design	Zainal Abidin, Dr.	The development of the FRF testing Method using startled excitation with high accurate
467	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Biomedical Engineering	Soegijardjo Soegijoko, Prof. Dr.	The System development of telemedical information to the internet based Community for Detection and Control of the Extraordinary Incident (the Plague)

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
468	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Statistics	Sutawanir Darwis, Dr.	The characterization of geothermal reservoir from Producing wells around the Injects Well through the Markov Chain assessment
469	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Analysis & Geometry	Johan Matheus Tuwankotta, Dr.	The Conservative system using singular perturbation
470	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Sugihartono, Dr.	Design and Implementation of Smart Antenna for Wireless LAN with the Digital Control
471	2006	Research of Faculty-ITB	School of Life Sciences and Technology (SITH)	Physiology, Developmental Biology and Biomedics	Anggraini Barlian, Dr.	Protein expression which influenced by temperature in the gender determination
472	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Energy Conversion	Prihadi Setyo Darmanto, Dr.Ir.	Study of the utilizations of palm oil waste as an alternative Fuel in the cement Factory
473	2006	Research of Faculty-ITB	Faculty of Civil and Environmental Engineering (FTSL)	Remote Sensing and Geographical Information Science	Agung Budi Harto, M.Eng. Dr.Ir.	Automatists Extraction of Spatial Information in the Process of the Photogrametry Mapping
474	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Informatics	Kridanto Surendro, MSc., Ph.D. Ir.	The identification of the measurement Method of E-Readiness kabupaten//Kota for the E-Government Implementation
475	2006	Research of Faculty-ITB	School of Pharmacy (SF)	Pharmacology - Pharmacy Clinic	Joseph I. Sigit, Dr.rer.nat.	Activity Test of maize/corn silk (Maydis stigma) Extraction to the mouse with failed Kidneys which induced by Gentamicin (aminoglycoside antibiotic)
476	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Suhardi, Dr.Ing.Ir.	Increasing on the Quality of Services guarantee c (QoS) with the Routing Adaptive Application to the Network of the next Generation network (NGN) Mesh Wireless
477	2006	Research of Faculty-ITB	School of Life Sciences and Technology (SITH)	Physiology, Developmental Biology and Biomedics	Sony Heru Sumarsono, Dr.	The effect methoxyacetic acid (MAA) towards the change in the Appearance of Protein that was responsible in the Exencephaly Occurrence
478	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Pekik Argo Dahono, Dr.Ir.	The motion system Motor AC 9 Phases with Discontinue Modulation
479	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Atmosferics Science	Armi Susandi, MT. Dr.rer.nat	The climate change in the Special Capital District of Jakarta territory: the study of the past and its projection for the future
480	2006	Research of Faculty-ITB	School of Life Sciences and Technology (SITH)	Science & Biotechnology of Plant	Rizkita Rachmi Esyanti, Dr.	Collection and Plan Propagation for Increasing numbers of Multipurpose Energy Crops
481	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	Iwan Pranoto, Ph.D.	Design of multi-agent system control using optimum control application
482	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic and Physical Chemistry	Cynthia L. Radiman, Dr.Ing.	Synthesis of the polyclinic (urethane-urea) based on the palm oil oleic acid to gain biopolymer from the Renewable source materials.
483	2006	Research of Faculty-ITB	Faculty of Fine Arts and Design (FSRD)	Aesthetics and the Sciences of Arts	Nuning Damayanti Adisasmito, Dipl.Art. Dra.	Spirituality load on Fine Arts Traditional Dwimatra-illustration the Indonesian Archipelago. Efforts to delved Fine Arts Traditional to enrich the concept of Indonesian illustration art now and the Future
484	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	Roberd Saragih, Dr.	Minimal-order Robust control for the linear system with the parameter changed towards time

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
485	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Endang Yuliastuti, MT., Dr.Ir.	Design and production of the measurement equipment for the water level in alcohol
486	2006	Research of Faculty-ITB	School of Pharmacy (SF)	Pharmaceutical	Lucy DN Sasongko Dr.	The development of the combination and isoniazid salute enteric pellet to prevent the interaction between Rifampicin and isonlazid within gastric acid in fixed dose combination therapy for tuberculosis
487	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic and Physical Chemistry	Muhammad A. Martoprawrio, Ph.D.	Forecasting on the reactivity and the characteristics interaction of graphite hydrogen with Mechanical Quantum Method
488	2006	Research of Faculty-ITB	Faculty of Civil and Environmental Engineering (FTSL)	Air and Solid Waste Management	Benno Rahardyan, ST, MT. Dr.	Study on the collection time based waste sorting to increase obtains recyclable material from the domestic waste: (the response to the capacity crisis of TPA waste)
489	2006	Research of Faculty-ITB	School of Pharmacy (SF)	Pharmaceutical	Jessie Sofia Pamudji, MS. Dr.	Study on the influence of giving time to Interactions pharmacokinetic medicine anti TBS rifampisin and isoniazid to the Indonesian healthy volunteer
490	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Power Engineering	Reynaldo Zoro, Dr. Dip;.Ing-,	Design and production of the early warning equipment of close stroke lightning for the person safety
491	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Analytical Chemistry	Muhammad Ali Zulfikar, S.Si., M.Si.	Synthesis, characterization and the use of the membrane hybrid Organic - An organic for the processing of Textile Industry Waste
492	2006	Research of Faculty-ITB	School of Architecture, Planning and Policy Development (SAPPK)	Urban Planning and Design	Haryo Winarso, M.Eng., Ph.D. Ir.	Study on the informal Land development in urban areas. The case study: Cirebon and Palangkaraya
493	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Algebra	Maman A. Djauhari Prof. Dr.	On The Search Of Effective and Efficient Robust Estimation of Location and Scale
494	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	FX. Nugroho Soelami, MBEnv., Ph.D. Ir.	Study of the characteristics the voice system field of the voice order 5.1 in the closed room
495	2006	Research of Faculty-ITB	School of Life Sciences and Technology (SITH)	Physiology, Developmental Biology and Biomedics	Marselina Irasonia Tan, Dr.	The effect fucoidan as the anti-cancer compound to the death of the apoptosis cell through the caspase route to the breasts cancer cell MCF-7
496	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Organic Chemistry	Yana Maolana Syah Dr.	The study Phytochemicals and characteristics the Cytotoxicity compound of oligostilbenoid from plants dipterocarpus hasseltii
497	2006	Research of Faculty-ITB	School of Life Sciences and Technology (SITH)	Physiology, Developmental Biology and Biomedics	Lulu Lusianti Fitri, MSc. Dr.	Measuring the level of Micro- Nutrient, Vitamin and Neurotransmitter to the brain Area (Hippocampus, Hypothalamus and Hipofise) the Mouse (Rattus norvegicus): the Influence of Giving of the Papaya leaf Extract (Carica L. pawpaws) to learning ability and considering mouse Albino
498	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Atmosferics Science	Bayong Tjasyono HK., DEA. Prof. Dr.	The mechanism of the flood natural disaster in Indonesia
499	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Nuclear Physics and Biophysics	Rizal Kurniadi, Dr.	The evaporation model to support the Nuclear Data reproduction

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
500	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Pepen Arifin, Ph.D.	The development of the plasma assisted MOCVD method in the growth of thin film InGaN and its hetero structure for the application of optoelectronics devices
501	2006	Research of Faculty-ITB	School of Pharmacy (SF)	Pharmaceutical	Heni Rachmawati, Dr.	The determination of the pharmacokinetic appearance, the biology availability test, and the Effect Test of Pharmacology from the system of Disperse Solid Gliklazid-Peg 6000 to mouse
502	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Computer Engineering	Kuspriyanto, Dr.Ir.	Design prototype interactive learning service System based on Web with smart Adaptive respond refereed to Scorm
503	2006	Research of Faculty-ITB	School of Business and Management (SBM)	Human Resources Management and Entrepreneurship	Dwi Larso, Ph.D. Ir.	Product development metrics survey companies in Indonesia: A Descriptive Study
504	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Applied Geology	Niniek R. Herdianita, MSc. Ir.	Study of the order ground water system and the intrusion of sea water in the system aquifer alluvial sediment the coast
505	2006	Research of Faculty-ITB	Faculty of Civil and Environmental Engineering (FTSL)	Geodesy	Wedyanto Kuntjoro, Dr.Ir.	Mapping and Prediction of the ionosphere on the over Indonesian Territory from the GPS Data
506	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Telecommunication Engineering	Adit Kurniawan, M.Eng., Dr.Ir.	Design and Development of dual bands antennae for the application of nirkabel (wireless) communication in the isolated Areas
507	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Agus Samsi, Dr.Ir.	Design prototype equipment to predict the oil paint pigment composition
508	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Atmosferics Science	Saryono, MS., Drs.	Characteristics model of rainfall and the area water balance in the dry climate area
509	2006	Research of Faculty-ITB	School of Business and Management (SBM)	Operations and Finance Management	Sudarso Kaderi Wiryono, Dr.Ir.	Management of risks on the cellular cards marketing
510	2006	Research of Faculty-ITB	School of Electrical Engineering and Informatics (STEI)	Information Technology	Syahirul Hakim Ad Dairi, Ir.	SOFT RADAR: the Development of PC-RF interface
511	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Mechanical Design	IGN Wiratmaja Puja, Dr.Ir.	The design development to increase the performance of the brake bloc composite by using coconut shell waste utilization
512	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Joko Sarwono, MT. Ir.	Characterization of the absorption for single layer voice panel from rice husks Materials
513	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Amoranto Trisnobudi, Dr.Ir.	Development of ultrasonic System to determine the quality of Crude Palm Oil as a raw material for cooking oil
514	2006	Research of Faculty-ITB	Faculty of Earth Science and Mineral Technology (FIKTM)	Geophysics	Sri Widiyantoro, Dr.	Advanced investigation of the seismic structure 3D super volcano under caldera in Toba using wave shear Non-Linier tomography
515	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Manufacturing System	Dradjad Irianto, Dr.Ir.	Determination on process capability of the milling machine retrofit

No. Urut	Year	Program	Faculty / school	Research group	Pelaksana	Title of activity
516	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Theoretical High Energi Physics & Instrumentation	Hendro, MS. Drs.	Production of the Fluxgate Based Vibration Censors
517	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Theoretical High Energi Physics & Instrumentation	Supriyadi, Dr.	Development of Environmental Control System based on Logical Fuzzy and Neural Networks
518	2006	Research of Faculty-ITB	School of Life Sciences and Technology (SITH)	Ecology and Biosystemics	Agus Dana Permana, Dr.	The utilization of parasitoid as the local potential for controlling the fruit fly in West Java
519	2006	Research of Faculty-ITB	School of Architecture, Planning and Policy Development (SAPPK)	Architectural Design	Andry Widyowijatnoko, ST., MT.	Engineering design for cheap house bamboo reinforced concrete preprint Low Technology: Development an alternative sustainable cheap building materials and affordable housing
520	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Industrial and Financial Mathematics	Sri Redjeki Pudjaprasetya, Dr.	Wave breakers shore protection of the coast using the soaked beam
521	2006	Research of Faculty-ITB	Faculty of Industrial Technology (FTI)	Instrumentation and Control	Suprijanto, MT. Ir.	The development of the automatic segmentation images method using Active Contour for the medic's images analysis
522	2006	Research of Faculty-ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Sukirno, Ph.D.	The 2nd stage of Manufacture, Characterization and Simulation of Transport Electron Carbon Nanotubes
523	2006	Research of Faculty-ITB	Faculty of Fine Arts and Design (FSRD)	Fine Arts	Ira Adriati, M.Sn.	The study of visual arts culture in West Java
524	2006	Research of Faculty-ITB	Faculty of Fine Arts and Design (FSRD)	Fine Arts	Sunaryo, Drs.	Conservation of the statue of culture conservation the case study Hofland statue in the Subang Regency

Appendix 1.3-2 Nano Researches at ITB from 2003 to 2008

1	2003	Research	PENELITIAN DANA MANDIRI	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Sukirno, Ph.D.	Manufacture of nanowire silicon using Plasma Enhanced Chemical Vapour Deposition (PECVD) method and development of its application as nanowire transistor
2	2003	Research	Directorate General of Higher Education (DGHE)		Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Mitra Djamaf. PhD	Deposition of this layer of nano-paticles utilizing DC unbalanced Magnetron Sputtering Double Targets
3	2003	Research	PENELITIAN DANA MANDIRI	Research of Research Group ITB	Faculty of Mining and Petroleum Engineering (FTTM)	Metallurgical Engineering	Sunara Purwadaria, M.Sc	Electroplating multilayer consisted of layers of white and yellow Cu-Sn blending with nanometer thickness at intervals manner; Use of Pulsed Current to increase micro hardness of the layer
4	2003	Research	PENELITIAN DANA MANDIRI	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Mikrajuddin Abdullah, Ph.D.	Development steam reformer based on Ultrasonic Nebulizer for conversion of Methanol into Hydrogen using nano-catalyst Cu/ZnO/Al2O3
5	2003	Research	PENELITIAN DANA MANDIRI	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Nugraha, Ir.,Ph.D.	Production of thin layer for nano porous ZnO as sensitive material for VOC gas censor
6	2005	Research	PENELITIAN DANA MANDIRI	Prime Research - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Sukirno, Ph.D.	Manufacture, Characterization and Simulation of Transport Electron Carbon Nanotubes
7	2005	Research	Osaka gas Fundation	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Mikrajuddin Abdullah, Ph.D.	Synthetis of Luminescent nanoparticles emitting ultraviolet light for decomposing organic pollutants in water and air
8	2006	Research	PENELITIAN DANA MANDIRI	Research of Faculty - ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Sukirno, Ph.D.	The 2nd stage of Manufacture, Characterization and Simulation of Transport Electron Carbon Nanotubes
9	2006	Research	Indonesia Toray Science Foundation	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Mikrajuddin Abdullah, Ph.D.	Synthetis of luminescent nano-ink for security application using Zinc Oxide nanoparticles

10	2006	Research	PENELITIAN DANA MANDIRI	Prime Research - ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Hermawan K. Dipojono, MSEE., Ph.D.Ir.	Production and development of parallel computer were based on the Open Source application with cluster of personal computer: Achievement test for simulation of structure molecule dynamics and the nano blending dynamics
11	2007	Research	PENELITIAN DANA MANDIRI	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Sukirno, Ph.D.	Manufacture of silicon Nanowire using Plasma Enhanced Chemical Vapour Deposition (PECVD) method and the development of its application as Field Effect Transistor (FET)
12	2007	Research	PENELITIAN DANA MANDIRI	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Mikrajuddin Abdullah, Ph.D.	Synthesis and testing of nano-catalyst for conversion of Methanol into Hydrogen for Direct Methanol Fuel Cells (DMFC) application
13	2007	Research	PENELITIAN DANA MANDIRI	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Suyatman, Dr., Ir., M.Eng.	Synthesis of Nano-particles of Hexagonal - Ferrite
14	2007	Research	PENELITIAN DANA MANDIRI	Research of Research Group ITB	School of Pharmacy (SF)	Pharmaceutical	Sundani Nurono S, Dr.	Nano-encapsulation papain for "Gastric Resistance" supply and increase in absorption through the intestines mucosa
15	2007	Research	Directorate General of Higher Education (DGHE)	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Mikrajuddin Abdullah, Ph.D.	Design and simulation of nano devices memory utilizing Silicon quantum DOT with Germanium core and strage media
16	2007	Research	Ministry of Research and Technology (RISTEK)	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Physics of Electronic Materials	Yudi Darma	Research and development of basic nano carbon for super capacitor
17	2007	Research	Asahi Glass Foundation	Research of Research Group ITB	Faculty of Industrial Technology (FTI)	Engineering Physics	Ahmad Nuruddin	Synthesis of Barium Ferrite nano particles by a modified Sol-Gel auto-combusiotn
18	2007	Research	Asahi Glass Foundation	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic Chemistry and Chemical Physics	Bambang Prijamdoedi	Study of the electric field effect on the growth of arrayed znO nanostructure thin film from chemical solution
19	2007	Research	Indonesia Toray Science Foundation	Research of Research Group ITB	Faculty of Mathematics and Natural Sciences (FMIPA)	Inorganic Chemistry and Chemical Physics	Bambang Prijamdoedi	Synthesis and characterrization of SeTiO3 nano particle deped with rare earth elements for photoluminescence materials

Appendix 2.2-1 Equipment List

In the list below, some numbers are skipped because some items were deleted as a result of discussion between ITB and the SAPROF team.

I. Center for Infrastructure and Built Environment

I. 1 Laboratory of Construction Engineering and Management

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
I.1.1	personal Computer	20	1	GOI
I.1.2	Printer 1	2	1	GOI
I.1.3	Printer 2	2	1	GOI
I.1.4	Scanner	2	1	GOI
I.1.5	LCD Projector	3	1	GOI
I.1.6	Fujitsu A6020S Lifebook Notebook	2	1	GOI
I.1.7	Video recorder	2	1	GOI
I.1.8	Audio recorder	2	1	GOI
I.1.9	Sound System	2	1	GOI
I.1.10	Telephone Answering Machine	2	1	GOI
I.1.11	Fotocopy Machine	1	1	GOI
I.1.12	Wireless web cam	4	1	GOI
I.1.13	Server Wi fi Hub	1	1	GOI
I.1.14	Camera Digital Nikon D 300	1	1	GOI
I.1.15	DVD Player + sound system	1	1	GOI
I.1.16	HDTV 42"	1	1	GOI
I.1.17	Model 3D Construction Equipment	25	1	JICA
I.1.18	Workstation, LCD 21" Replay	2	1	GOI
I.1.19	PPE (Personal Protection Equipment)	30	1	GOI
SOFTWARE				
I.1.20	Video konstruksi	100	1	GOI
I.1.21	Software Win Est	20	1	JICA
I.1.22	Software Primavera	20	1	JICA
I.1.23	Software @Risk	20	1	JICA
I.1.24	Sofware Crystal Ball	20	1	JICA
I.1.25	Sofware SPSS	20	1	JICA
I.1.26	Software Decision pro	20	1	JICA
I.1.27	Software Wincart	20	2	
I.1.28	Software TimePro	2	2	
I.1.29	Software VR	2	2	

I. 2 Laboratory of Highway and Traffic

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
I.2.1	DARTEC Machine EL45-9170	1	1	JICA
I.2.2	CET 2200 C – Combination Emission Tester	1	1	JICA
I.2.3	Chassis Dynamometer Single Axle LPS 2810	1	1	JICA
I.2.4	Chassis Dynamometer for Motor Cycle	1	1	JICA
I.2.5	Universal Material Testing Aparatus	1	1	JICA
I.2.6	Wheel Tracking Machine	1	2	
I.2.7	EL45-6820 series Marshall Test 25-E with Chart Recorder	1	2	
I.2.8	Software Traffic Macro-Micro Simulation	1	2	
I.2.9	TDC-12 Traffic Data Collector + PETRAPro Software Kit	12	2	
I.2.10	Speed Check Camera	2	2	

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
I.2.11	The Stalker Sport Premium Radar Gun	4	2	
I.2.12	Type 2 Digital Sound Meter with RS-232	4	2	
I.2.13	Garmin GPSMAP 478 Chartplotter and Land Navigator	2	2	
I.2.14	Laptop	3	2	
I.2.15	Desktop Personal Computer	5	2	

I. 3 Laboratory of Ocean Engineering

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
I.3.1	AWAC (Acoustic Wave and Current Profiler)	1	1	JICA
I.3.2	Hydrographic Echo Sounding	1	1	JICA
I.3.3	DGPS with Real Time Kinematic (RTK)	1	1	JICA
I.3.4	Ultrasonic Distance	1	1	JICA
I.3.5	Ground Penetration Radar (GPR)	1	1	JICA
I.3.6	3-D Directional Wave Maker	1	2	

I. 4 Laboratory of Soil Mechanic, Arrange according to the sequence

No	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
Improvement & Replacement of Existing Equipments				
I.4.2	**fixing exisiting CPT 2.5 ton driver**			
I.4.2.a	anchor and rod	25	1	GOI
I.4.2.b	vertical gear	1	1	GOI
I.4.2.c	gear head	1	1	GOI
I.4.2.d	manometer	1	1	GOI
I.4.2.e	conus	1	1	GOI
I.4.3	**Electricity Step up**			
I.4.3.a	Capacity of 3500 watt (8 unit)	8	1	GOI
I.4.5	**Replacing the existing Jack for Loading Test**			
I.4.5.a	capacity of 50 ton (seal + manometer)	1	1	GOI
I.4.5.b	capacity of 30 ton (seal + manometer)	1	1	GOI
I.4.5.c	capacity of 200 ton (seal + manometer +dial gauge 20 units + plate)	1	1	GOI
I.4.6	**Replacing the existing Oedometer**			
I.4.6.a	porous stones, dia 6.3 cm 24 sets	24	1	GOI
I.4.6.b	oedometer 10 units	10	1	GOI
I.4.6.c	loading devices 12 sets	12	1	GOI
New Equipments				
I.4.7	CPTu (with pore pressure measurement)	2	1	JICA
I.4.8	Triaxial Test (devices and data acquisition system) - Adding Equipment	3	1	JICA
I.4.9	Crosshole	1	1	JICA
I.4.10	PDA test	1	1	JICA
I.4.11	Inclinometer	1	1	JICA
I.4.12	Cyclic Triaxial (device and data acquisition system)	1	1	JICA
I.4.13	GR system (loading control) for Cyclic Triaxial	1	1	JICA
I.4.14	Oven	3	1	JICA
I.4.15	Boring Machine	2	1	JICA
I.4.16	Soil Vibration Measurement Device (Accelerogram & Data Acquisition System)	1	1	JICA
I.4.17	SASW	1	1	JICA
I.4.18	CPT (without pore pressure measurement)	4	2	
I.4.19	Hand Auger Boring	4	2	
I.4.20	Jacking for Loading Test	2	2	

No	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
I.4.21	Flat Blade Dilatometer	1	2	
I.4.22	Vane Shear Test	1	2	
I.4.23	CPTu Vehicle	1	2	
I.4.24	Rubber Membrane for Rowe Consolidometer	2	2	
I.4.25	Devices for Calibration Chamber Test	1	2	
I.4.26	Computers and Peripherals			
I.4.26.a	Personal Computer	4	2	
I.4.26.b	Notebook	2	2	
I.4.26.c	Fax Machine	1	2	
I.4.26.d	Printer	2	2	
Softwares (Plaxis, Ensoft, Geoslope, etc.)				
I.4.27	**PLAXIS**			
I.4.27.a	Plaxis 3D Foundation V2	1	2	
I.4.27.b	Plaxflow	1	2	
I.4.28	**GRLWEAP**			
I.4.28.a	GRLWEAP Version 2005	1	2	
I.4.29	**ENSOFT Software**			
I.4.29.a	LPILE Plus 5.0 for Windows	1	2	
I.4.29.b	GROUP 7.0 (3-D) for Windows	1	2	
I.4.29.c	APILE Plus 5.0 for Windows	1	2	
I.4.30	**GEOSTUDIO 2007**			
I.4.30.a	Slope/W	1	2	
I.4.30.b	Seep/W	1	2	
I.4.30.c	Sigma/W	1	2	
I.4.30.d	Quake/W	1	2	
I.4.30.e	Vadose/W	1	2	

I. 5 Laboratory of Structure & Material

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
I.5.1	V-Meter MK III	1	2	
I.5.2	CANIN +	1	2	
I.5.3	Crane	1	1	JICA
I.5.4	MECA1	1	2	
I.5.5	MUP	1	2	
I.5.6	MTP	1	2	
I.5.7	MFV	1	2	
I.5.8	MTB	1	2	
I.5.9	MFLT	1	2	
I.5.10	MVS	1	2	
I.5.11	MFL	1	2	
I.5.12	MPO	1	2	
I.5.13	MDB	1	2	
I.5.14	MMF	1	2	
I.5.15	MVL	1	2	
I.5.16	MVLF	1	2	
I.5.17	STRONG FLOOR	• 3252 m^3 concrete • 5078 ton reinforcement bars	1	JICA
I.5.18	STRONG WALL	• 80 m^3 concrete • 2074 kg plain bars (32 @ 12 m φ 29 mm) • 2592 kg plain bars (80 @ 6 m φ 29 mm) • 520 kg plain bars (32 @ 3 m φ 29 mm)	1	JICA

No.	Name	Volume	SEQUENCE 1st or 2nd	Financed by JICA or GOI
I.5.19	Loading Frame for Lateral Loading	• 6880 kg steel profile (H-Beam 400 x 400) • 624 kg steel plate	1	JICA
I.5.20	2 linear hydraulic actuators	1 Set	1	JICA
I.5.21	1 linear hydraulic actuators	1 Set		
I.5.22	hydraulic servovalve	1 Set		
I.5.23	Load Cell	1 Set		
I.5.24	Control system	1 Set		
I.5.25	Measurement Instrumentation	1 Set	2	
I.5.26	Universal Testing Machine	1 Set	1	JICA
I.5.27	SAP 2000	2 Unit	2	
I.5.28	ETABS	2 Unit	2	
I.5.29	ANSYS	1 Unit	2	

I. 6 Laboratory of Water Quality

No	Name	Volume	SEQUENCE 1st or 2nd	Financed by JICA or GOI
I.6.1	Atomic Absorption Spektrophotometry (AAS)	1	1	JICA
I.6.2	Gas Chromatograpy-Mass Spectrometry (GC-MS)	1	1	JICA
I.6.4	Scanning Electron Microscope	1	1	JICA
I.6.6	Ion Analyzer	1	2	

I. 7 Laboratory of Water Rescource

No.	Name	Volume	SEQUENCE 1st or 2nd	Financed by JICA or GOI
I.7.1	Glass sided tilting flume 12.5 m length	1	2	
I.7.2	Electric equipment (pump, motors etc)	1	2	
I.7.3	Sediment Loop system	1	2	
I.7.4	Electric powered jack / tilting system	1	2	
I.7.5	Accessories:		2	
I.7.6	Instrument carrier	1	2	
I.7.7	Velocity meter and mounting	1	2	
I.7.8	Hook and point gauge 300 mm	1	2	
I.7.9	Hook and point gauge 450 mm	1	2	
I.7.10	Sediment Transport Demonstration Channel	1	1	JICA
I.7.11	Multipurposes Teaching Flume & Acessories	1	1	JICA
I.7.12	Pitot tube and manometer board	1	1	JICA
I.7.13	Culvert fitting	1	1	JICA
I.7.14	Flow splitters	1	1	JICA
I.7.15	Spillway and toe blocks	1	1	JICA
I.7.16	Siphons	1	1	JICA
I.7.17	Radial Gate model	1	1	JICA
I.7.18	False floor sections	2	1	JICA
I.7.19	Roughened bed plates	2	1	JICA
I.7.20	Windows program	1	1	JICA
I.7.21	Fluid properties and Hydrostatics Bench	2	1	JICA
I.7.22	Osborne Reynolds Apparatus	2	1	JICA
I.7.23	Impact of a jet	2	1	JICA
I.7.24	Hydraulic Ram	1	1	JICA
I.7.25	Fluid Friction Measurements	1	1	JICA
Accessories:				JICA
I.7.26	Data Logging accessory with software	1	1	JICA
I.7.27	Windows program for fluid friction measurements	1	1	JICA
I.7.28	1m Pressurized water manometer	1	1	JICA
I.7.29	Basic portable pressure meter	1	1	JICA

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
I.7.30	Flow in Pipe Networks	2	1	JICA
I.7.31	Hydrogen Bubble Flow Visualization	1	2	
I.7.32	MicroADV 16 MHz , Downlooking	1	1	JICA
I.7.33	MicroADV 16 MHz , Sidelooking	1	1	JICA
I.7.34	MicroADV 16 MHz , Uplooking	1	1	JICA
I.7.35	Data Acquisition System	1	1	JICA
I.7.36	PC for Data Acquisition	2	1	GOI

II. CENTER FOR LANGUAGE

II. 1 Equipment for Classroom and Office

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
II.1.1	Printer	2	2	
II.1.2	Scanner	7	2	
II.1.3	LCD Projector	8	1	GOI
II.1.4	Screen for LCD Projector	21	1	GOI
II.1.5	CPU D Dual Core	63	1	GOI
II.1.6	Headset	31	2	
II.1.7	TV	4	2	
II.1.16	Photo copy machine	2	2	
II.1.17	Fax Machine	1	2	

II. 3 Equipment for Langauge Laboratory

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
II.3.1	Software	58	1	JICA
II.3.2	Personal Computer for students	58	1	GOI
	Windows XP Pro	58	1	GOI
II.3.3	Personal Computer for steacher	1	1	GOI
	Windows Server	1	1	GOI
II.3.4	Accessories system (Hub)	1	1	GOI
II.3.5	Cabling (Lot)	1	1	GOI

III. CENTER FOR RESEARCH AND COMMUNITY SERVICE

III.1 Studio

No.	Name		Volume	SEQUENCE	PORTION
				1st or 2nd	JICA or GOI
Digital Camera				1	JICA
III.1.1	Digital Camera CCD Digital Camera included: - AC Adaptor - InfoLithium Rechargeable Battery Pack - Electoret Condensor Microphone - Wide Conversion Lens - Hood for Wide Conversion Lens & Hood Cop - Lens Cap built in Hood, Lens Cap - Wirelles Remote Comander - Operation and Maintenance Manual		3		
III.1.2	Digital Camera	CCD Digital Camera remote control	1		
III.1.3	Tripod System	Tripot incl: Tripot Head and Bag	3		
		Dolly	3		
		Basic Pro Remote Control	4		
III.1.4	Camera Hanger	Camera moving remote control: tilt, pan, zoom and focus	1		
III.1.5	Camera Cable (roll)	Camera Cable IEEE1394 40 meter 6 to 6 pin	4		
III.1.6	Digital Video Repeater	DV Reapeter One to one	3		
III.1.7	Tally Cable	Tally Cable 50 meter	4		
PC Based Character Generator				1	JICA
III.1.8	Character Generator	SDI I/O Character Generator Turnkey System included:	1		
		Original Data Video Software CG 100 and OS Wibndows XP 4:2:2 I/0 SDI Frame Buffer			
		1GB DDR2, 80GB HDD, CDRW Drive			
		PS/2 Keyboard & Mouse			
III.1.9	Monitor	17" SVGA LCD Color Monitor	1		
Digital Multi Effect/ Switcher System				1	JICA
III.1.10	Digital Video Mixer	Prosesor & Control Panel w/ DV I/O & SDI O/P	1		
		Preview & Tally Box With LED Modul	1		
		4X4" TFT LCD Monitor with Tally Preview	1		
		2x7" inc TFT LCD Monitor	1		
III.1.11	Rack	19" Mobile Rack 10 U	1		
III.1.12	AV Switcher	6 Input Audio Video Switcher	1		
Digital Recorder				1	JICA
III.1.13	Recorder & Player	DV Digital Recorder	1		
III.1.14	DV Bank Recorder	DV Bank Recorder with 120GB HDD for 9 hours DV Recording	1		
III.1.15	DV Converter	DV Convertor to CCVS	1		
III.1.16	Video Monitor	14"LCD Video Monitor	2		
Master Monitor				1	JICA
III.1.17	Video Monitor	14" LCD Video Monitor	2		

No.	Name		Volume	SEQUENCE	PORTION
				1st or 2nd	JICA or GOI
Intercom System				1	JICA
III.1.18	Communication System	- 1 Unit Master for Produser - 4 Unit for Cameraman	1		
Audio Playback, Mixer & Speaker				1	JICA
III.1.19	Professional Mixer	Professional 12x4x2 compact mic/ line Mixer (1604)	1		
III.1.20	Operator Speaker Monitor	Germany Active Speaker Plus Media 3	1		
III.1.21	Monitor Speaker	8" spaeker box with amplifier	1		
Wireless Microphone				1	JICA
III.1.22	Clip-On Microphone	Wirelles Clip On Condesor Microphone	2		
III.1.23	Dynamic Microphone	Wirelles Henheld Microphone	2		
DV Distributor Amplifier				1	JICA
III.1.24	DV Amplifier	DV Repeater One input to Five output VP-332	1		
III.1.25	CCVS Distributor	Composite Distributor 1:4	1		
III.1.26	Audio Distributor	Stereo Audio Distributor 1:4	1		
III.1.27	DV Converter	DV Convertor to CCVS	1		
III.1.28	MMP Convertor	Multi Media to DV Convertor	2		
Multi Media Projector				1	JICA
III.1.30	MMP	XGA (1024x768), 2200 ANSI LUMENS, DLP TECHNOLOGY	3		
III.1.31	Screen	Projector Screen 2x3 meter	3		
Installation Material				1	JICA
III.1.32	Installation Material - Belden Coaxial cable for Video, Audio cable - Canare ADC/ BNC Crimp connector - XLR/ Cannon connector - Neutrik Cable power, AC plug & Socket, Cable tie, labelling etc		1		

III.2 Small Classroom

No.	Name		Volume	SEQUENCE	Financed by
				1st or 2nd	JICA or GOI
Digital Camera				1 Set for 1st 1 Set for 2nd	JICA
III.2.1	Digital Camera CCD Digital Camera included: - AC Adaptor - Wirelles Remote Comander Operation and Maintenance Manual		1		
III.2.2	Tripod System	Tripot incl: Tripot Head and Bag	1		
		Dolly	1		
		Basic Pro Remote Control	1		
III.2.3	Celling Camera	CCD Digital Camera	1		
		Motorized Camera Mounting with remote control	1		
		Hanger for Celling	1		
III.2.4	Camera Cable	Camera Cable IEEE1394 40 meter 6 to 6 pin	1		
		Video Camera Cabel	1		

No.	Name		Volume	SEQUENCE 1st or 2nd	Financed by JICA or GOI
III.2.5	Tally Cable	Tally Cable 50 meter	4		
Multi Media Projector				1 Set for 1st 1 Set for 2nd	JICA
III.2.6	MMP	XGA (1024x768), 2200 ANSI LUMENS, DLP TECHNOLOGY	3		
III.2.7	Screen	Projector Screen 3x4 meter	1		
III.2.8	Screen	Projector Screen 1.5x2.75 meter	2		

III. 3 Multimedia Room

No.	Name		Volume	SEQUENCE 1st or 2nd	Financed by JICA or GOI
Digital Camera Equiptment				2 sets for 2nd	
III.3.1	Digital Camera CCD Digital Camera included: - AC Adaptor - Wirelles Remote Comander - Operation and Maintenance Manual		1		
III.3.2	Tripod System	Tripot incl: Tripot Head and Bag	1		
		Dolly	1		
		Basic Pro Remote Control	1		
III.3.3	Celling Camera	CCD Digital Camera	1		
		Motorized Camera Mounting with remote control	1		
		Hanger for Celling	1		
III.3.4	Camera Cable	Camera Cable IEEE1394 40 meter 6 to 6 pin	1		
		Video Camera Cabel	1		
III.3.5	Tally Cable	Tally Cable 50 meter	4		
Telepromt				2 sets for 2nd	
III.3.6	Telepromt Screen size – 15” (38.1 cm) Useable range - 2-35 ft (10.67 m) System weight - 16.5 lbs (7.48 kg) Brightness - 450 nits Mounts to all ENG and DV cameras (1) VGA, (1 in, 1 out) Composite and (1) S-Video inputs Lightweight construction Anti-Reflective monitor glass Minimal assembly Unique Fold & Go! Design Locking power and video connectors Battery operable - Custom Case (CFPS150) - 5 lb Counterweight and Adapter Plate (CTW-LCD) - 2” Riser (RIS020) - Battery Adapter Plate (CBGDC) - Upgrade to 1,800 nit monitor (FPS150VHB) - telescript pro		1		

III. 4 Editing Room

No.	Name		Volume	SEQUENCE	Financed by
				1st or 2nd	JICA or GOI
Video Tape Player/Recorder				1	JICA
III.4.1	Video Tape Player/ Recorder :	- Videocassette Recorder/Player	1		
		- Terminal Interface Board	1		
		- Editing Controler	1		
Offline Editing				1	JICA
III.4.2	Offline Editing - Matrox RT.X2 System + original software Matrox RTX2 w/Adobe Premier Pro CS3 inc. Adobe Encore, On-Location ,Device-Central, Bridge (RTX2/PP3) with PC Editing		3		

III.5 Voice Room

No.	Name		Volume	SEQUENCE	PORTION
				1st or 2nd	JICA or GOI
Voice Over set				1	JICA
III.5.1	Video Tape Player/ Recorder :	Voice Over Set	1		
		Kramer 1:8 Balance Stereo Audio Distribution	1		
		Personal Computer VIC-RAT	1		

IV. CENTER FOR ADVANCED SCIENCES

No.	Name	Volume	SEQUENCE 1st or 2nd	Financed by JICA or GOI
IV.1 NANO TECHNOLOGY				
IV.1.1	High-resolution transmission electron microscopy (TEM)	1	1	JICA
IV.1.2	Low-resolution transmission electron microscopy (TEM)	1	2	
IV.1.3	Scanning Electron Microscope + EDS	1	1	JICA
IV.1.4	Field Emisson Scanning Electron Microscope + EDS	1	1	JICA
IV.1.5	Scanning Probe Microscope	1	2	
IV.1.6	Optical Microscope with digital camera	1	2	
IV.1.7	Consumable/Accecories for SEM/TEM	1	2	
IV.1.8	Focused Ion Beam	1	2	
IV.1.9	Precission Etching Coating System	1	1	JICA
IV.1.10	Ion Slicer	1	1	JICA
IV.1.11	Nano Viewer (low angle X-Ray)	1	2	
IV.1.12	Nanoparticle Analyzer	1	1	JICA
IV.1.13	SURFACE AREA AND PORE SIZE ANALYZER	1	1	JICA
IV.1.14	thermogravimetry/differential thermal analysis (TG-DTA)	1	1	JICA
IV.1.15	Differential Scanning Calorimeter (DSC)	1	2	
IV.1.16	X-Ray (XRD)	1	2	
IV.1.17	FT-IR	1	2	
IV.1.18	XRF	1	1	JICA
IV.1.19	Server 1	4	1	JICA
IV.1.20	Server 2	2	1	JICA
IV.1.21	High Level Cluster Computing	128	1	JICA
IV.1.22	High Level Cluster Computing	128	2	
IV.1.23	Middle Level Cluster Computing	64	1	JICA
IV.1.24	Middle Level Cluster Computing	64	2	
IV.1.25	Low Level Cluster Computing	64	1	JICA
IV.1.26	Computer Class Room	50	1	GOI
IV.1.27	Cluster Switch	3	1	GOI
IV.1.28	Switch	3	1	GOI
IV.1.29	Server Rack 42 U	6	1	GOI
IV.1.30	Server Rack	6	1	GOI
IV.1.31	Wireless Access Point	8	1	GOI
IV.1.32	Color Laser Printer	2	1	GOI
IV.1.33	B/W Laser Printer	2	1	GOI
IV.1.34	Inkjet Printer	2	1	GOI
IV.1.35	Scanner	1	1	GOI
IV.1.36	Consumable/Accecories (Network cabel, RJ-45 connector, tools, etc)	1	1	GOI
IV.1.37	ICP	1	2	
IV.1.38	Double Monochromator	1	2	
IV.1.39	Computer Control Monochromator	1	2	
IV.1.40	Small Monochromator	1	2	
IV.1.41	Optical System Measurement (vibration isolation table, lense with lense stage, laser stage)	1	2	
IV.1.42	He-Ne Laser	1	2	
IV.1.43	Photon-Counting PMT Detector	1	2	
IV.1.44	Germanium Detectors	1	2	
IV.1.45	MCT Cryogenic Detectors	1	2	
IV.1.46	Optical Chopper	2	2	
IV.1.47	Solar Cell Characterization Station	1	1	JICA
IV.1.48	Electromagnet for Hall Measurement	1	2	
IV.1.49	Impedance Analyzer	1	2	

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
IV.1.50	cryostsat	1	2	
IV.1.51	DC Bench Power Supplies	2	2	
IV.1.52	Digital Multimeter	4	2	
IV.1.53	RF Lock-In Amplifier	1	2	
IV.1.54	Single Phase Lock-In Amplifier	2	2	
IV.1.55	Precision Current Preamplifier	2	2	
IV.1.56	Low-Noise Voltage Preamplifier	1	2	
IV.1.57	Low-Noise Current Preamplifier	1	2	
IV.1.58	Spectrum Analyzers	1	2	
IV.1.59	Low Distortion Function Generator	1	2	
IV.1.60	Function Generator	2	2	
IV.1.61	FFT Spectrum Analyzers	1	2	
IV.1.62	Sol-Gel Evaporation	2	1	JICA
IV.1.63	Automatik Titrator	2	1	JICA
IV.1.64	Multiposition Hot Plate Stirrers	1	1	JICA
IV.1.65	Spin coating apparatus	2	1	JICA
IV.1.66	Spinner	1	1	JICA
IV.1.67	Heat Treatment Furnace	1	1	JICA
IV.1.68	Vacuum Box Furnace	1	1	JICA
IV.1.69	Furnace with temperatur and humidity control	2	1	JICA
IV.1.70	Constant Temperatur Dryer	2	1	JICA
IV.1.71	Force Convection Oven	1	1	JICA
IV.1.72	1 Zone Ceramic Tube Heater 50mm	1	2	
IV.1.73	1 Zone Ceramic Tube Heater 80mm	1	2	
IV.1.74	1 Zone Ceramic Tube Heater 100mm	1	2	
IV.1.75	1 Zone Ceramic Tube Heater 60mm	1	2	
IV.1.76	2 Zone Ceramic Tube Heater 60mmL	1	2	
IV.1.77	3 Zone Ceramic Tube Heater 80mm	1	2	
IV.1.78	Programmable Temperature Controller with Current Regulator	10	2	
IV.1.79	PID Temperature Controller with Current Regulator	20	2	
IV.1.80	RF Plasma Power Generator with Matching Network	2	2	
IV.1.81	DC Plasma Power Generator	1	2	
IV.1.82	DC Magnetron Power Supply	1	2	
IV.1.83	rotary vane pumps	3	2	
IV.1.84	Water-Cooled Diffusion Pumps	3	2	
IV.1.85	Dry Vacuum Pumps 22L/min	3	2	
IV.1.86	Dry Vacuum Pumps 60L/min	2	2	
IV.1.87	Vacuum Gauge Controller	4	2	
IV.1.88	Glass-tubulated Pirani Gauge	6	2	
IV.1.89	Convection Enhanced Pirani Gauge	4	2	
IV.1.90	Vacum system Accessories	1	2	
IV.1.91	Liquid N2 Supply Devices	1	1	JICA
IV.1.92	Cryogenic Container 5 lt	4	1	JICA
IV.1.93	Draft Chamber with scrubber	4	1	JICA
IV.1.94	Experiment Table	4	1	JICA
IV.1.95	pH Meter	2	1	JICA
IV.1.96	Laboratory Glass Ware Dryer	2	1	JICA
IV.1.97	Laboratory Glass Ware	1	1	JICA
IV.1.98	Stirring Hot Plate	3	1	JICA
IV.1.99	Ultrasonic Cleaner With Timer	3	1	JICA
IV.1.100	Micro pipet (0.1 - 2500 mL)	10	1	JICA
IV.1.101	Multiposition Stirrers	3	1	JICA
IV.1.102	Upward Flow Strirer	3	1	JICA
IV.1.103	Electro Deposisition Apparatus	1	1	JICA
IV.1.104	Acrylic Desiccators with Gas Ports 24"x24"x18"	6	1	JICA
IV.1.105	Dry-Seal Glass Vacuum Desiccators	5	1	JICA

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
IV.1.106	Digital Balance	1	1	JICA
IV.1.107	Digital Analytical Balance	1	1	JICA
IV.1.108	Ball mill	2	1	JICA
IV.1.109	autoclave (20 sets)	1	1	JICA
IV.1.110	Llow Speed Cutter	1	1	JICA
IV.1.111	Lapping and Polishing Machine	2	1	JICA
IV.1.112	Pressing Machine	1	1	JICA
IV.1.113	Die Set 1/4"	1	1	JICA
IV.1.114	Die Set 1/2"	1	1	JICA
IV.1.115	Die Set 3/4"	1	1	JICA
IV.1.116	Consumable/Accecories (alumina and SiC powder/ball, diamond paste, resin, etc)	1	2	
IV.1.117	Vibrating Sample Magnetometer	1	2	
IV.1.118	Laptop	6	1	GOI
IV.1.119	LCD Proyektor	4	1	GOI
IV.1.120	Screen	2	1	GOI
IV.1.121	Loudspeaker system	4	1	GOI
IV.1.122	Power Mixer	1	1	GOI
IV.1.123	Audio-Video Player	1	1	GOI
IV.1.124	Wireless Mic	4	1	GOI
IV.1.125	Recorder	1	1	GOI
IV.1.126	Computer	10	1	GOI
IV.1.127	Printer	2	1	GOI
IV.1.128	Scanner	1	1	GOI
IV.1.129	PABX System with building audio system	1	1	GOI
IV.1.130	Copy Machine	1	1	GOI
IV.1.131	Fax Machine	1	1	GOI
IV.1.132	Electrical Power Facility	To Facility		
IV.1.133	Chemical Waste Treatment Facility	To Facility		
IV.1.134	Building Security System	1	1	JICA
IV.1.135	ELECTRO DIALYSIS WATER PURIFIER FACILITY	2	1	JICA
IV.1.136	Glass Blowing Production Equipment and Tools	1	2	
IV.1.137	Metal workshop Equipment	1	2	
IV.1.138	Consumable/Accecories for X-Ray	1	2	
IV.1.139	Consumable/Accecories for Sample preparation	1	1	JICA
IV.1.140	Consumable/Accecories for composisition characterization	1	1	JICA
IV.1.141	Consumable/Accecories for Thermal Properties chacterization	1	1	JICA
IV.1.142	Consumable/Accecories for Electrical Properties Characterization	1	2	
IV.1.143	Microwave Reactor	1	2	
IV.1.144	Magnetic and Sound Sealing Apparatus		1	JICA
IV.2 NANO BIO				
IV.2.1	DNA Sequencer	1	1	JICA
IV.2.2	DNA Synthesizer	1	2	
IV.2.3	RT-PCR	1	1	JICA
IV.2.4	PCR	4	1	JICA
IV.2.5	Fermenter 1L	5	1	JICA
IV.2.6	Fermentor 15 L	2	1	JICA
IV.2.7	Distiller	3	1	JICA
IV.2.8	Fermenter 150 L	1	1	JICA
IV.2.9	HPLC	1	1	JICA
IV.2.10	Laminar airflow	5	2	
IV.2.11	Freeze Drying	2	2	
IV.2.12	Electrophoresis Set:Power Supply	2	2	
IV.2.13	Electrophoresis Set:Pulsed Field	3	2	

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
IV.2.14	Electrophoresis Set:Gel Casting Tray	3	2	
IV.2.15	Sonicator	1	2	
IV.2.16	Microcentrifuge	1	2	
IV.2.17	Microscope	2	2	
IV.2.18	Gene Gun (Particle Bombardment)	1	2	
IV.2.19	UV Transilluminator	1	2	
IV.2.20	Automatic Autoclave	1	2	
IV.2.21	Magnetic stirrer/hot plates	3	2	
IV.2.22	pH meter	1	2	
IV.2.23	Centrifuge	2	2	
IV.2.24	Spectrophotometer	1	2	
IV.2.25	Vortex	1	2	
IV.2.26	Microwave	1	2	
IV.2.27	Precision Balance	1	2	
IV.2.28	Freezer	2	2	
IV.2.29	Incubator	2	2	
IV.2.30	Shaker Incubator	3	2	
IV.2.31	Shaker	1	2	
IV.2.32	Manual Autoclave	1	2	
IV.2.33	Shake and Stack	1	2	
IV.2.34	Static Waterbath	1	2	
IV.2.35	Recirculating Waterbath	1	2	
IV.2.36	Vacuum pump	1	2	
IV.2.37	Nitrogen tank	1	2	
IV.2.38	Membrane Filter	1	2	
IV.3 NANO MEDICINE				
IV.3.1	LC/MS/MS	1	1	JICA
IV.3.2	HPLC	1	1	JICA
IV.3.3	Dissolution tester	1	1	JICA
IV.3.4	GC-MS	1	2	
IV.3.5	Freezer -80C	1	1	JICA
IV.3.6	Centrifuge (refrigerated)	1	1	JICA
IV.3.7	Microcentifuge	1	1	JICA
IV.3.8	Micropippette	1	1	JICA
IV.3.9	Multiplepippette	1	1	JICA
IV.3.10	Sample evaporation system	1	1	JICA
IV.3.11	Biohazard Hood	1	1	JICA
IV.3.12	Chemical Fume Hood	1	1	JICA
IV.3.13	Solvent cabinet (corrosive solvent)	1	1	JICA
IV.3.14	Solvent cabinet (flammable solvent)	1	1	JICA
IV.3.15	Double blood drawing chair	1	1	JICA
IV.4 ADVANCE ACCOUSTIC				
IV.4.1	Advanced Integrated Sound Level Meter	2	2	
IV.4.2	Sound intensity probe	1	2	
IV.4.3	Hydrophone	2	2	
IV.4.4	Head and Torso simulator	1	2	
IV.4.5	1/2 free field microphone + accessoris	2	2	
IV.4.6	1/8 " pressure field microphone + accessories	2	2	
IV.4.7	Binaural microphone	1	2	
IV.4.8	Pressure field 1/4 inch microphone	2	2	
IV.4.9	Omdirectional sound source	1	2	
IV.4.10	Array Microphone +accessories	1	2	
IV.4.11	Anechoic Box	1	2	

V. CENTER FOR ART & DESIGN

V.1. Laboratory of Graphic Art (Etching and Lithography)

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.1.1	Computer console (custom made, including table and chair)	20	1	GOI
V.1.2	Archive Saving Unit A0	2	1	GOI
V.1.3	Tools Storage Unit (Custom made)	4	1	GOI
V.1.4	Etching Press Unit	1	1	GOI
V.1.5	Acid Tray System	1	1	GOI
V.1.6	Hotplate VTL	2	1	GOI
V.1.7	Dust Box (Rosin)	1	1	GOI
V.1.8	UV Exposure Unit	1	1	JICA
V.1.9	Drying Cabinet	1	1	GOI
V.1.10	Aquatint Spray	1	1	JICA
V.1.11	Relief Printing Press	1	1	GOI
V.1.12	Digital Repro Unit / Digital CtP	1	2	
V.1.13	Screen Printing System	1	1	GOI
V.1.14	Lithography Machine	1	1	JICA
V.1.15	Graining Lithographic Sink	1	1	GOI
V.1.16	Levigator	1	1	GOI

V.2. Laboratory of Visual Perception and Product Ergonomics

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
V.2.1	Computer console (custom made, including table and chair)	20	1	GOI
V.2.2	Tools Storage Unit (Custom made)	4	1	GOI
V.2.3	Stand Alone Desktop Computer	10	1	GOI
V.2.4	Authorized PANTONE Web Color Software	1	1	JICA
V.2.5	InCube Voice Recognition Software	1	1	JICA
V.2.6	Munsell Hue 100Test Set	1	1	JICA
V.2.7	Chromameter Minolta CL300	1	1	JICA
V.2.8	Munsell Color Charts	1	1	JICA
V.2.9	Color Monitor	2	1	JICA
V.2.10	Spectrometer	1	1	JICA
V.2.11	Physiological Performance Analysis Unit: 1. Main Amplifier 2. Interface for EMG 3. Interface for EMG 4. EMG 100C 5. Electrodes of EMG 6. Ground Electrodes 7. Electrodes for ECG 8. Goniometer sensors 9. Interface for goniometer 10. Bridge unit for Kyowa loadcell 11. Footscan Plate 12. Footscan insole	1	1	JICA
V.2.12	Anthropometric Analysis Unit (Anthropometer Kit)	5	1	JICA
V.2.13	Body Motion Analysis Unit: 1. Multi reflector markers 2. MCU camera 3. Data Transfer cable 4. A/D Converter	1	2	

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
V.2.14	Eye Movement Acquisition System: a. View Tracker Headmounted b. Authorized Image processing Software	1	2	

V.3. Laboratory of Digital Textiles

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
V.3.1	Computer console (custom made, including table and chair)	20	1	GOI
V.3.2	Tools Storage Unit (Custom made)	4	1	GOI
V.3.3	Stand Alone Desktop Computer	10	1	GOI
V.3.4	Authorized Floriani Suite Pro 2008 (Textile Printing Software)	1	1	JICA
V.3.5	Textile Printer	1	1	JICA
V.3.6	UPS ~5kVA, Electrical Installation Set	1	1	JICA

V.4. Laboratory of Multimedia and Animation

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
V.4.1	Computer console (custom made, including table and chair)	41	1	GOI
V.4.2	Graphic Desktop Computers	41	1	JICA
V.4.3	Tablet	41	1	JICA
V.4.4	PC Audio system	40	1	JICA
V.4.5	Multimedia Projector	1	1	JICA
V.4.6	Screen	1	1	GOI
V.4.7	Public Announcement sound system set	1	1	JICA
V.4.8	Printer for A3 paper size	1	1	GOI
V.4.9	Printer for A4 paper size	1	1	GOI
V.4.10	Printer LaserJet	1	1	GOI
V.4.11	Scanner	10	1	GOI
V.4.12	Ethernet Switch	1	1	GOI
V.4.13	Tools Storage Unit (Custom made)	4	1	GOI
V.4.14	CG software *standard price list: U$ 2499	41	1	JICA
V.4.15	CG software	1	1	JICA
V.4.16	CG software *standard price list: U$ 400	41	1	JICA
V.4.17	Sound editing software	41	1	JICA
V.4.18	Backup and recovery software	41	1	JICA
V.4.19	Canon XL-H1 Professional 3CCD High Definition Camcorder with 20x Optical Zoom	4	1	JICA
V.4.20	Sony DSR-PD170 3-CCD MiniDV Camcorder w/ wide angle adapter included	2	1	JICA
V.4.21	ARRI Light Kit #571984 Softbank I Lighting Kit	1	1	JICA
V.4.22	SP5000 Video / Photo Background Kit- Background Stands + Chromakey Green Screen	1	1	JICA
V.4.23	Polycom VSX™ 7000s	1	1	JICA
V.4.24	V-4 Four Channel Video Mixer	1	1	JICA
V.4.25	MD-P1-S motion dive.tokyo Performance Package	1	1	JICA
V.4.26	SE-1000 6 input HD/SD Switcher Package	1	1	JICA
V.4.27	DSR-45 DVCAM VTR	2	1	JICA
V.4.28	Hollywood Soft Light Kit II	1	1	JICA
V.4.29	Electro Voice ENG 618CF Integrated Shotgun Mic/Boom	2	1	JICA
V.4.30	A/T 1100 Series Dynamic Handheld Wireless Systems	2	1	JICA

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
V.4.31	Monitor Editing	2	2	
V.4.32	Avid Media Composer Nitris DX System	2	2	
V.4.33	Computer Editing (FinalCut Pro)	7	2	
V.4.34	Software Final Cut Pro	1	2	
V.4.35	Antivirus software	41	2	

V.5. Laboratory of Photography

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
V.5.1	Computer working unit (custom made, including table and chair)	20	1	GOI
V.5.2	Tools Storage Unit (Custom made)	4	1	GOI
V.5.3	Camera Canon EOS 40D Body.	1	1	JICA
V.5.4	Camera Canon EOS 5D	1	1	JICA
V.5.5	Camera Canon EOS-1Ds MarkII	1	1	JICA
V.5.6	Canon EF-S 10-22mm f/3.5-4.5 USM	1	1	JICA
V.5.7	Canon EF-S 17 - 85 mm F4 - F5.6 IS USM	1	1	JICA
V.5.8	Canon EF-S 60 mm F2.8 macro lens	1	1	JICA
V.5.9	Canon EF 100-400mm f4.5-5.6L IS USM	1	1	JICA
V.5.10	Canon EF 16-35mm f2.8L USM	1	1	JICA
V.5.11	Canon EF 24-70mm f2.8L USM	1	1	JICA
V.5.12	Canon EF 70-200 f4.0L USM	1	1	JICA
V.5.13	Canon EF 35mm f1.4L USM.	1	1	JICA
V.5.14	Canon EF 300mm f4.0L IS USM	1	1	JICA
V.5.17	Canon Wireless Flash Trigger ST-E2	1	2	
V.5.18	Macro Ring Lite MR-14EX.	1	2	
V.5.19	Canon RC-1 Wireless Remote Control	1	2	
V.5.20	Canon Remote Switch RS-60E3	1	2	
V.5.21	Canon Remote Switch RS-80N3	1	2	
V.5.22	Canon Timer Remote Control TC-80N3	1	2	
V.5.23	Canon BG-E2 for EOS 40D	1	2	
V.5.24	Canon BG-E4 for EOS 5D	1	2	
V.5.25	Canon Charger CB-2LWE (for NB-2LH Battery)	1	2	
V.5.26	Logos 1600	6	2	
V.5.27	Soloflex 80x160	2	2	
V.5.28	Soloflex 15x125	2	2	
V.5.29	Standard reflector	1	2	
V.5.30	Set of Honeycomb Grids	1	2	
V.5.31	Barndoor to universal reflector	1	2	
V.5.32	Foba Maxi Kit 3x6m,	1	2	
V.5.33	Color Filter NIKON	1	2	

V.6. Laboratory of Spatial Perception and Lighting Simulation

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.6.1	Tools Storage Unit (Custom made)	2	1	GOI
V.6.2	Metal Triangle Lighting Trussing/Ceiling mounted lighting track	6	1	GOI
V.6.3	Adjustable metal ceiling	5	1	GOI
V.6.4	Downlight Unit (Armatur)	6	1	GOI
V.6.5	Adjustable downlight unit (Armatur)	6	1	GOI
V.6.6	Follow spot + lamp	2	1	GOI
V.6.7	Spot light (Armatur)	5	1	GOI
V.6.8	Working-table	4	1	GOI
V.6.35	Control Panel	1	1	GOI

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.6.36	Scaffold Clamp	10	1	GOI
V.6.37	400cm folding Ladder	2	1	GOI
V.6.38	Cabling and Installations	1	1	GOI
V.6.39	Chair with writing pad	60	1	GOI
V.6.40	High End Desktop Computer	2	1	JICA
V.6.41	Proxima DP 1000x Projector plus stand/ rack	3	1	JICA
V.6.42	Ceiling Mounted Projection Screen	3	1	JICA
V.6.43	Authorized Auto CAD Software, complete	1	1	JICA
V.6.44	Authorized 3DS Max Software complete	1	1	JICA
V.6.45	Authorized Stereo-image viewers Software	1	1	JICA
V.6.46	Authorized Quicktime VW Software	1	1	JICA
V.6.47	Home theater set	1	1	JICA
V.6.48	Building Material Display Partitions	20	2	
V.6.49	Building Material Display Rack	10	2	
V.6.50	Canon Digital Scanner	1	2	
V.6.51	Camera Canon EOS 30D Body	1	2	
V.6.52	Canon EF-S 60 mm F2.8 macro lens	1	2	
V.6.53	Camera Tripot Standard	1	2	
V.6.54	Light (lux) photo meter	1	2	
V.6.55	Distance meter	1	2	
V.6.56	Cabling and Installations	1	2	
Interior Material Sample products:			2	
V.6.57	Fabricated Metal Ceiling system	1	2	
V.6.58	Fabricated Gypsum ceiling system	1	2	
V.6.59	Fabricated Raised floor system with Carpet	1	2	
V.6.60	Fabricated Raised floor system with vinyl	1	2	
V.6.61	Samples of 10 types of granite	1	2	
V.6.62	Samples of 10 types of marble	1	2	
V.6.63	Samples of 20 types of solid wood	1	2	
V.6.64	Samples of 15 types of plywood	1	2	
V.6.65	Samples of wood & rattan Finishing (ex Impra/Propan)	1	2	
V.6.66	Samples of solid paint (ICI metal paint)	1	2	
V.6.67	20 Samples of Essenza Homogenous Ceramic	1	2	
V.6.68	20 Samples of Roman Ceramic	1	2	
V.6.69	ICI Dulux color book	1	2	
V.6.70	Samples of High Pressure Laminate (Formica)	1	2	
V.6.71	Loop pile tile Carpet with underlayer	5	2	
V.6.72	Cut pile tile Carpet with underlayer	5	2	
V.6.73	Samples of 15 types of glasses	1	2	

V.7. Laboratory of Digital Modeling and Rapid Prototyping

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
V.7.1	Computer console (incl table+chair)	20	1	GOI
V.7.2	Tools Storage Unit (Custom made)	4	1	GOI
V.7.3	Stand-Alone Desktop Computer	20	1	GOI
V.7.4	LCD Projector	1	1	GOI
V.7.5	Authorized MAYA 3DSoftware	1	1	JICA
V.7.6	Authorized MannequinPro Bundle	1	1	JICA
V.7.7	Authorized 3DS Max Software	1	2	
V.7.8	Screen	1	2	
V.7.9	A4 Printer/Scanner	1	2	
V.7.10	Color Plotter	1	2	
V.7.11	3D Digitizer/Scanner	1	2	
V.7.12	3D Printer	1	2	
V.7.13	UPS 5kVA , Electrical Installation Set	4	2	

V.8 3D Modelling

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.8.1	Working console (custom made, including table and chair)	20	1	GOI
V.8.2	Tools Storage Unit (Custom made)	4	1	GOI
V.8.3	Portable sanding machine	5	1	GOI
V.8.4	Clamp Sets	5	1	GOI
V.8.5	Portable Styrofoam Cutting Machine	5	1	GOI
V.8.6	Portable exhaust unit	5	1	GOI
V.8.7	Plastic Vacuum Forming Machine	1	1	GOI
V.8.8	Gluing and assembling workstations	5	1	GOI
V.8.9	Painting workstations	5	1	GOI

V.9 Ceramics (Kiln Room, Molding and Glazing)

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.9.1	Gas Kiln Set	1	1	JICA
V.9.2	Electric Kiln Set	1	1	JICA
V.9.3	Test Kiln Set	1	1	JICA
V.9.4	Thermocouple+ Pyrometer	2	1	JICA
V.9.5	Kiln Furniture		1	JICA
V.9.5.a	(Plat)	50	1	JICA
V.9.5.b	Support)	100	1	JICA
V.9.5.c	(Burner)	15	1	JICA
V.9.6	Electric Wheel	10	1	JICA
V.9.7	Working Console Unit	10	1	GOI
V.9.8	Shrinkage Ruler	10	1	JICA
V.9.9	Clay Extruder	1	1	JICA
V.9.10	Spray Glaze Unit	1	1	JICA
V.9.11	Centrifugal Mill Set	3	1	JICA
V.9.12	Pug Mill	1	1	JICA
V.9.13	Double Ball Mill	2	2	
V.9.14	Technical Balance	2	2	
V.9.15	Casting Tables	2	2	
V.9.16	Air Cleaning System	2	2	

V.10 Sculpture

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.10.1	Working console unit (custom made)	10	1	GOI
V.10.2	Tools Storage Unit (Custom made)	4	1	GOI
V.10.3	Inverter Plasma Cutter	1	1	JICA
V.10.4	Melting Furnace (Custom made)	1	1	JICA
V.10.5	Stone Carving Sets	2	1	GOI
V.10.6	Wood Carving Tools	5	1	GOI
V.10.7	Wood Carving Tools Small	10	1	GOI
V.10.11	Portapack Kit with Heavy Duty Torch (Gas Welding)	2	1	GOI

V.11 Textile Weaving and Dyeing

No.	Name	Volume	SEQUENCE	PORTION
			1st or 2nd	JICA or GOI
V.11.1	Carding Machine Semi Auto	1	1	GOI
V.11.2	Foot Power/Spinning Wheel	1	1	GOI
V.11.3	Mini Weaving Machine	2	1	GOI
V.11.4	Weaving Machine	1	1	JICA
V.11.5	Jaquard Machine	1	1	JICA
V.11.6	Heat Transfer	1	1	JICA
V.11.7	Hemming Machine	1	1	JICA
V.11.8	Knitting Machine	2	1	JICA
V.11.9	DL Garment Linker	1	1	JICA
V.11.10	Knitting Machine Ribber	1	1	JICA
V.11.11	Electronic Scale	1	1	JICA
V.11.12	Embroidery Machine Automatic	1	1	JICA
V.11.13	Embroidery Machine Semi Automatic	1	1	JICA
V.11.14	Sample Fabric Test Print	1	1	JICA

V.12 Materials (Wood, Metal, and Plastic)

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.12.1	Angle Drill	2	1	GOI
V.12.2	Hand Drill	2	1	GOI
V.12.3	Tool Speed Hammer Drill	2	1	GOI
V.12.4	Cordless Driver Drill	6	1	GOI
V.12.5	Cordless Right Angle Drill	1	1	GOI
V.12.6	Jigsaw	4	1	GOI
V.12.7	Electric Chain Saw	1	1	GOI
V.12.8	Petrol Chain Saw	1	1	GOI
V.12.9	Jig Saw	2	1	GOI
V.12.10	Jig Saw	2	1	GOI
V.12.11	Jig Saw	2	1	GOI
V.12.12	Hand Circular Saw	2	1	GOI
V.12.13	Hand Circular Saw	1	1	GOI
V.12.14	Disc Grinder	3	1	GOI
V.12.15	Angle Grinder	3	1	GOI
V.12.16	Die Grinder	1	1	GOI
V.12.17	Mini Grinder	3	1	GOI
V.12.18	Hand- Power Planner	5	1	GOI
V.12.19	Hand-Power Planner	2	1	GOI
V.12.20	Variable Speed Plunge Router	1	1	GOI
V.12.21	Hand Router	2	1	GOI
V.12.22	Hand Router	2	1	GOI
V.12.23	Hand Router	2	1	GOI
V.12.24	Finishing Sander	3	1	GOI
V.12.25	Finishing Sander	2	1	GOI
V.12.26	Vertical Sander	1	1	GOI
V.12.27	Orbital Sander	2	1	GOI
V.12.28	Hand Disc Sander	3	1	GOI
V.12.29	Pneumatic Tools	2	1	GOI
V.12.30	Pneumatic Tools	2	1	GOI
V.12.31	Pneumatic Tools	2	1	GOI
V.12.32	Pneumatic Tools	2	1	GOI
V.12.33	Pneumatic Tools	2	1	GOI
V.12.34	Heat Gun	2	1	GOI
V.12.35	Screwdriver	2	1	GOI
V.12.36	Hand Cutter	2	1	GOI

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.12.37	Power Scraper	1	1	GOI
V.12.38	Rotary Hammer	2	1	GOI
V.12.39	Blower	2	1	GOI
V.12.40	Trimmer	5	1	GOI
V.12.41	Polisher	2	1	GOI
V.12.42	Nibbler	1	1	GOI
V.12.43	Shear	1	1	GOI
V.12.44	Slide Compound Saw	2	1	GOI
V.12.45	Portable Band Saw	1	1	GOI
V.12.46	Metal Cutting Saw	1	1	GOI
V.12.47	Scroll Saw	2	1	GOI
V.12.48	Sliding Compound	2	1	GOI
V.12.49	Bench Grinder	6	1	GOI
V.12.50	Portable Cut-Off	2	1	GOI
V.12.51	Portable Cut-Off	2	1	GOI
V.12.52	Sharpener	1	1	GOI
V.12.53	Sharpener	1	1	GOI
V.12.54	Belt Sander	2	1	GOI
V.12.55	Inverter: TIG (Tungsten Inert Gas)	1	1	GOI
V.12.56	Inverter: Plasma Cutting	1	1	GOI
V.12.57	Manual Metal Arc	1	1	GOI
V.12.58	Spot Welding	1	1	GOI
V.12.59	High Pressure Cleaner	1	1	GOI
V.12.60	Air Compressor	2	1	GOI
V.12.61	Bench Drill/Press Drill	3	1	GOI
V.12.62	Drill Press	1	1	GOI
V.12.63	Bench Circular Saw/Table Saw	1	1	GOI
V.12.64	Radial Arm Circular Saw	1	1	GOI
V.12.65	Band Saw	2	1	GOI
V.12.66	Band Saw	1	1	GOI
V.12.67	Table Saw	2	1	GOI
V.12.68	Portable Jobside Table Saw With Stand	1	1	GOI
V.12.69	Radial Arm Saw	1	1	GOI
V.12.70	Radial Arm Saw	1	1	GOI
V.12.71	Radial Arm	1	1	GOI
V.12.72	Radial Arm	1	1	GOI
V.12.73	Table Saw With Extension Wings	1	1	GOI
V.12.74	Cutting Band Saw	1	1	GOI
V.12.75	Horizontal Band Saw	2	1	GOI
V.12.76	Bench Planner	1	1	GOI
V.12.77	Jointer (bench)	1	1	GOI
V.12.78	Planer (bench)	2	1	GOI
V.12.79	Thicknesser Planer (bench)	2	1	GOI
V.12.80	Thickneser Planer (bench)	1	1	GOI
V.12.81	Planer (bench) 4 Knifes Cutter Head	1	2	
V.12.82	Oscillating Edge Sander	1	2	
V.12.83	Belt/Disc Sander With Dust Bag	1	2	
V.12.84	Benchtop Disc Sander	1	2	
V.12.85	Solid Spindle	1	2	
V.12.86	Wood-Working Lathe	2	2	
V.12.87	Metal-Working Lathe	1	2	
V.12.94	Working Console Unit	30	2	
V.12.95	Tools Storage Unit	10	2	
V.12.96	Generator	1	2	
V.12.97	Generator	1	2	
V.12.98	Dust Collector	3	2	

V.13 Library

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
V.13.1	Assembly Computer library	3	1	GOI
V.13.2	Computer server : HP ProLiant ML 310 GS Sever series	1	1	JICA
V.13.3	Assembly Computer visitor	10	1	GOI
V.13.4	Toshiba : REGZA 32AV500E	5	1	GOI
V.13.5	DVD Sony DAV-S800 Intregated AV System	4	1	GOI
V.13.6	Head Phone unit Panasonic SBC HN 110	8	1	GOI
V.13.7	UPS 800W	15	1	GOI
V.13.8	Wireless 802.11N	4	1	GOI
V.13.10	Book eye A2 Scanner color 600dpi optical	1	1	JICA
V.13.11	NCI BookMan Software (book register)	1	1	JICA
V.13.12	WASP TECH Wasp WPS150 Omni-Directional Laser Barcode Scanner - Barcode scanner	2	1	JICA
V.13.13	Epson TM-L 90 printer Label Barcode	3	1	JICA

V.14 Sub: R&D Coordination Office

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
Aesthetics and The Science of Art				
V.14.3	Desktop Computer unit, for the office of:	5	1	GOI
V.14.4	Ethernet Switch 24 Port for the office of:	1	1	GOI
V.14.5	Filing Cabinet (Custom made) for the office of:	10	1	GOI
V.14.6	UPS ~5kVA), Cables, and Installation Set:	1	1	GOI
Visual Art				
V.14.12	Desktop Computer unit, for the office of:	5	1	GOI
V.14.13	Ethernet Switch 24 Port for the office of:	1	1	GOI
V.14.14	Filing Cabinet (Custom made) for the office of:	10	1	GOI
V.14.15	UPS ~5kVA), Cables, and Installation Set:	1	1	GOI
Craft and Tradition				
V.14.21	Desktop Computer unit, for the office of:	10	1	GOI
V.14.22	Ethernet Switch 24 Port for the office of:	1	1	GOI
V.14.23	Filing Cabinet (Custom made) for the office of:	20	1	GOI
V.14.24	UPS ~5kVA), Cables, and Installation Set:	2	1	GOI
Visual Communication Design				
V.14.30	Desktop Computer unit, for the office of:	10	1	GOI
V.14.31	Ethernet Switch 24 Port for the office of:	1	1	GOI
V.14.32	Filing Cabinet (Custom made) for the office of:	20	1	GOI
V.14.33	UPS ~5kVA), Cables, and Installation Set:	2	1	GOI
Human and Interior Space				
V.14.39	Desktop Computer unit, for the office of:	10	1	GOI
V.14.40	Ethernet Switch 24 Port for the office of:	1	1	GOI
V.14.41	Filing Cabinet (Custom made) for the office of:	20	1	GOI
V.14.42	UPS ~5kVA), Cables, and Installation Set:	2	1	GOI
Human and Industrial Product				
V.14.48	Desktop Computer unit, for the office of:	10	1	GOI
V.14.49	Ethernet Switch 24 Port for the office of:	1	1	GOI
V.14.50	Filing Cabinet (Custom made) for the office of:	20	1	GOI
V.14.51	UPS ~5kVA), Cables, and Installation Set:	2	1	GOI
Design Science & Visual Culture R&D Office				
V.14.57	Desktop Computer unit, for the office of:	5	1	GOI
V.14.58	Ethernet Switch 24 Port for the office of:	1	1	GOI
V.14.59	Filing Cabinet (Custom made) for the office of:	10	1	GOI
V.14.60	UPS ~5kVA), Cables, and Installation Set:	1	1	GOI

No.	Name	Volume	SEQUENCE 1st or 2nd	Financed by JICA or GOI
Humanity Science R&D Office				
V.14.66	Desktop Computer unit, for the office of:	10	1	GOI
V.14.67	Ethernet Switch 24 Port for the office of:	1	1	GOI
V.14.68	Filing Cabinet (Custom made) for the office of:	20	1	GOI
V.14.69	UPS ~5kVA), Cables, and Installation Set:	2	1	GOI

V.16 Sub: Visual Presentation and Exhibition Hall

No.	Name	Volume	SEQUENCE 1st or 2nd	Financed by JICA or GOI
V.16.A	**Exhibition Hall**			
V.16.A.1	Visual Exhibition/Display Sets (Custom made)	50	1	GOI
V.16.A.2	Display Lighting Sets (Incl stands, lamps, and control unit)	20	1	GOI
V.16.A.3	Sound System set	4	1	JICA
V.16.A.4	Mic wireless TOA	4	1	GOI
V.16.A.5	Spotlight Lighting System (including stage lights, stand, and control unit)	1	1	JICA
V.16.A.6	Digital projector with ceiling mount & portable LCD screen	2	1	JICA
V.16.B	**Visual Presentation**			
V.16.B.1	**Front Projection System**			
V.16.B.1.a	Front LCD projection screen, 2 × 1.5 m	1	2	
V.16.B.2	**Video conference system**			
V.16.B.2.a	Video conference codec	1	2	
V.16.B.2.b	Matrix switcher	1	2	
V.16.B.2.c	Scan converter	1	2	
V.16.B.2.d	Visualiser	1	2	
V.16.B.2.e	Video conference camera	2	2	
V.16.B.2.f	Lectern display monitor	1	2	
V.16.B.2.g	Video recorder	1	2	
V.16.B.3	**Audio equipment**			
V.16.B.3.a	Audio conference controller (microphone mixer), 12 channel	2	2	
V.16.B.3.b	Matrix signal router	1	2	
V.16.B.3.c	Table-mounted microphones	6	2	
V.16.B.3.d	Lectern microphone	6	2	
V.16.B.3.e	Ceiling loudspeakers	6	2	
V.16.B.3.f	Front-of-house loudspeakers	2	2	
V.16.B.3.g	Induction loop amplifier	1	2	
V.16.B.3.h	Graphic equalisers	2	2	
V.16.B.3.i	Power amplifier	1	2	
V.16.B.4	**Control and interfacing**			
V.16.B.4.a	LCD colour touch screen	6	2	
V.16.B.4.b	Universal computer interface	6	2	
V.16.B.5	**Other hardware 12 500**			
V.16.B.5.a	Equipment rack, audio and video patch panels, connection panels, cabling	1	2	
V.16.B.5.b	Installation and commissioning	1	2	
V.16.B.6	**Interpreter Unit**	1	2	
V.16.B.7	**Podium**	1	2	
V.16.B.8	**Auditorium Chair**	200	2	
V.16.B.9	**White board**	1	2	

VI. CENTER FOR INFORMATION TECHNOLOGY IN INDUSTRIAL ENGINEERING

VI.1. Computer and Multi Media Equipments

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
VI.1.1	Server Packet			
VI.1.1.a	HP ProLiant ML350G5 242	8	1	JICA
VI.1.1.b	FUJITSU MAW	8	1	JICA
VI.1.1.c	KINGSTON KTD-PE6950/4G	8	1	JICA
VI.1.1.d	APC BR1100CI-AS	8	1	JICA
VI.1.1.e	ACER AL1716	8	1	JICA
VI.1.1.f	LOGITECH Cordless Desktop EX 90	8	1	JICA
VI.1.2	Client PC Set			
VI.1.2.a	HP Pavilion Slimline 3481d	75	1	GOI
VI.1.2.b	ACER AL1716	75	1	GOI
VI.1.3	Projector			
VI.1.3.1	Projector Toshiba	11	1	GOI
VI.1.3.2	Projector Scress Draper	11	1	GOI
VI.1.4	Network devices			
VI.1.4.a	3COM 3C13613	1	1	GOI
VI.1.4.b	3COM 3CBLSG16	5	1	GOI
VI.1.4.c	BRAND-REX UTP Cable Cat. 6e	8	1	GOI
VI.1.4.d	D-LINK DWL-2700AP/E	14	1	GOI
VI.1.5	Notebook	16	1	JICA
VI.1.6	Printer			
VI.1.6.1	FUJI XEROX DocuPrint C2090 FS	3	1	GOI
VI.1.6.2	HP Color LaserJet 2605DN	2	1	GOI
VI.1.6.3	eBeam Whiteboard USB	1	1	GOI
VI.1.7	Barcode Printer	1	1	GOI
VI.1.8	Document Scanner	1	1	GOI
VI.1.9	Video Conference	1	1	JICA
VI.1.10	TV	1	1	GOI
VI.1.11	DVD	1	1	GOI
VI.1.12	Audio	1	1	GOI
VI.1.13	Barcode handheld scanner	2	1	JICA
VI.1.14	Physical Inventory and Cycle Counting	1	2	
VI.1.15	Electronic Proof of Delivery	1	2	

VI.2. Software

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
VI.2.1	Business Game Module LIPO	6	1	JICA
VI.2.2	ERP Software			
VI.2.2.a	SAP	5	1	JICA
VI.2.2.b	Oracle Business Suite	5	2	
VI.2.3	Statistic Software			
VI.2.3.a	SPSS Advanced Statistics™ 17	1	2	
VI.2.3.b	Minitab Latest Version	1	2	
VI.2.4	Data Mining Software	1	1	JICA
VI.2.5	Simulation Software	1		
VI.2.6	Simulation Software	2	1	JICA
VI.2.7	AHP Software	1	2	
VI.2.8	Data Analysis	1	2	
VI.2.9	Microsoft Software	1	2	
VI.2.10	Industrial Feasibility Study Software	1	2	
VI.2.11	Industrial Data	10	2	
VI.2.12	Optimization Software			

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
VI.2.12.a	Mathcad Latest Version	1	2	
VI.2.12.b	Matlab Latest Version (Currently 7.6)	1	2	
VI.2.13	Mathematical Programming Language	1	2	
VI.2.14	Transportation Simulaton Software	1	1	JICA
VI.2.15	Barcode designer	1	1	JICA
VI.2.16	Contract Management Software	1	1	JICA
VI.2.17	CPFR (collaborative planning, forecasting and replenishment)	1	2	
VI.2.18	Vehicle Routing	1	2	
VI.2.19	Supply Chain Simulation	1	1	JICA
VI.2.20	Spend Analysis	1	2	
VI.2.21	Inventory Visibility	1	1	JICA
VI.2.22	Transportation Flow Analysis	1		
VI.2.23	Work analysis software	1	1	JICA

VI.3. Ergonomics Devices

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
VI.3.1	Virtual Reality	1	1	JICA
VI.3.2	Eye Tracking System	1	1	JICA
VI.3.3	Motion Analysis System	1	1	JICA
VI.3.4	Human Modeling System	1	1	JICA

VI.4. Machining Shop Equipment

No.	Name	Volume	SEQUENCE	Financed by
			1st or 2nd	JICA or GOI
VI.4.1	Vertical Machining Center	1	1	JICA
VI.4.2	Linear motor drive Wire-cut EDM	1	1	JICA
VI.4.3	Linear-motor-drive, die-sinker EDM	1	1	JICA

Appendix 2.2-2 ITB's Answer to the JBIC Question I

Examination of environmental impacts (such as dust pollution, noises and vibration during the construction, as well as the drainage treatment methods of the laboratories).

With understanding that by Indonesia law, EIA is not required, this is to make sure that issues in the left parentheses will not occur. Therefore,

- Preparation of the documents that will show the proposed measures, or
- Preparation of the documents that will show the likeliness that such will not happen

The process of Environmental Impact Assessment (EIA) with regard to the six centers buildings in the Campus of ITB

Based on the government regulation of Environmental Impact Analysis (PP No. 27, 1999), any development activity, which has a certain level of environmental impact (or a certain type of project and magnitude), should pass a screening process involving the development of EIA document, Plan for Impact Management (RKL) and Impact Monitoring (RPL), as shown on Figure 1.

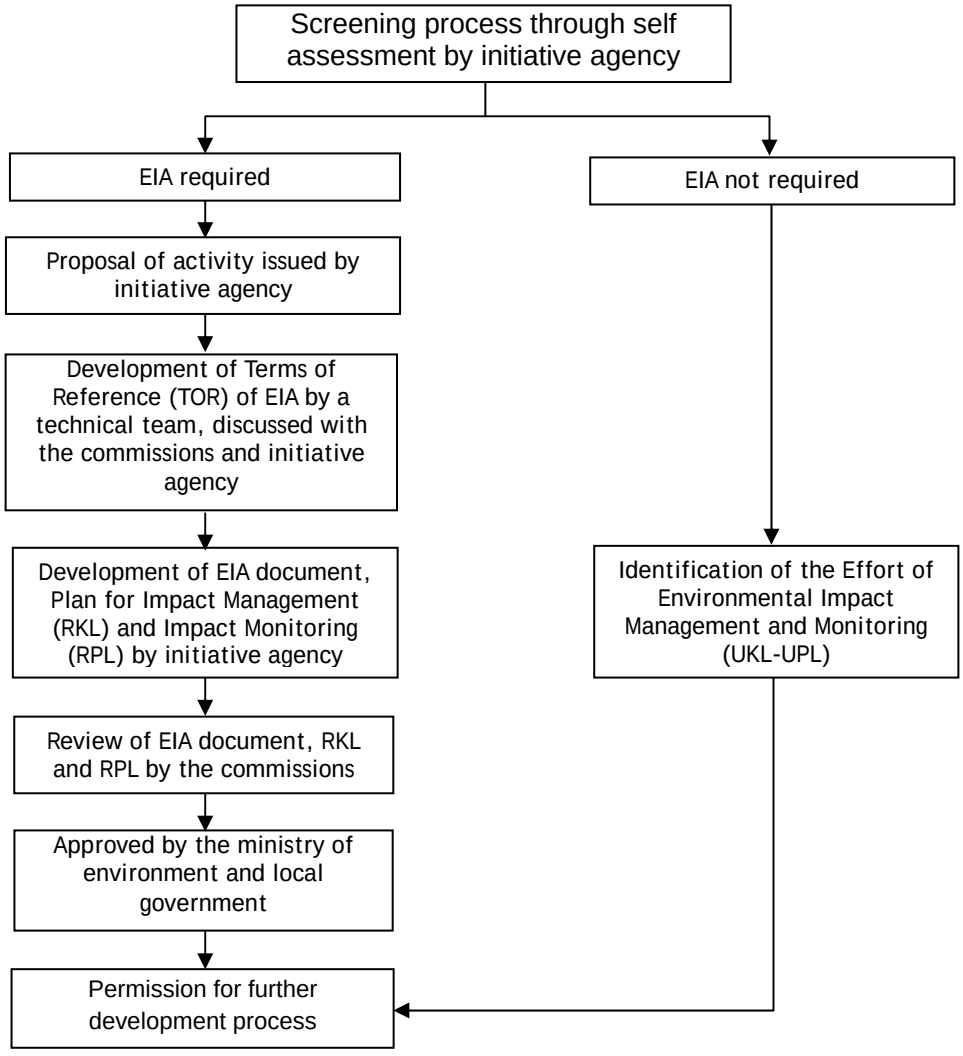


Figure 1. Environmental Impact Assessment Screening Process

It can be noted that the environmental impact assessment process for projects that do not require Environmental Impact Analysis (EIA) is simpler than those that require EIA. Furthermore, there are no strict guidelines for the development of environmental impact management and monitoring (UKL-UPL), since it only involves simple measures. However, to identify the environmental impact of the establishment of the six centers at ITB campus, the following Typical Assessment Matrix can be used.

Table 1. Environmental Impact Assessment Matrix for the Development Plan of the Six Centers Building in the Campus of ITB

No.	Environmental Component	Development Stage			Note
		Pre-Construction	During Construction	Operation	
1.	**Physical-Chemical**				
	1.1 Air Quality		**I - IS**		
	1.2 Noise		**I - IS**		
	1.3 Vibration		**I - IS**		
	1.4 Hydrology				
	1.4.1 Water Debit		**LI - IS**	**I -IS**	
	1.4.2 Water Quality		**LI - IS**		
	1.4.3 Flood				
	1.5 Hydro-oceanography				
	1.5.1 Sedimentation				
	1.5.2 Abrasion				
	1.6 Soil				
	1.6.1 Landslide				
	1.6.2 Sub-grade Strength				
	1.7 Waste (Solid and Liquid Waste)		**I - IS**	**I – IS**	
2.	**Vegetation – Animal**				
	2.1 Terrestrial Vegetation & Animals				
	2.2 Marine Vegetation & Animals				
3.	**Regional Development**				
	3.1 Land Use				
	3.2 Regional Development Plan				
4.	**Social-Economy-Culture**				
	4.1 Demography				
	4.2 Economy				
	4.2.1 Regional Economy				
	4.2.2 Household Economy				
	4.3 Social				
	4.3.1 Public Restless				
	4.3.2 Conflict of perception				
	4.3.3 Social Gap				
	4.3.4 Working Safety		**I - IS**		
	4.3.5 Security				
	4.4 Culture				
	4.4.1 Cultural conservation				
	4.4.2 Ecology Adaptation				
	4.4.3 Conflict by Migration				
5.	**Public Health**				
	5.1 Potential of Causing Disease				
	5.2 Health Service				
	5.3 Surrounding sanitation				
6.	**Others**				
	6.1 Quarry Pit		**I - IS**		
	6.2 Transportation of Const. Material		**I - IS**		

Note:

I : Important, if the project has major impact on the environmental component
LI : Less-important, if the project has minor impact on the environmental component
S : Significant, if the impact of the project influences large numbers of environmental components or wide areas
IS : Insignificant if the impact of the project influences only small numbers of environmental components or narrow areas
Blank : Negligible or no impact

Table 1 shows that most of the environmental impacts of the establishment of the six centers at ITB campus relate to the construction stages, and it is estimated that the impact will be only influencing the area around project sites inside the campus of ITB, except the impact of transporting construction materials.

Therefore, the environmental impact management and monitoring (UKL-UPL) will be embedded in the terms of reference of building design and the building construction specifications. Then, in the construction stage, the responsibility for the environmental impact management and monitoring will be on the contractors under the supervision of ITB. The obligations of the contractor for environmental management and protection will be included in the conditions of contract for construction.

For instance, to reduce the noise and vibration, the building foundation should be designed using bored piles. In the construction process, the building should be covered with nets, to contain the debris and dust inside the construction site, and the construction site is bordered by a sufficient enclosure to maintain working safety. While for the material transport, the carrier is required to prevent spill-off of materials in the way to construction site and the transporting should be conducted at the off-peak period of traffic. Detail impact and procedures of those measures are depending on the design of the buildings.

There are some environmental impacts in the operational stage of the six centers building; water debit of clean water and waste (liquid and solid). Those impacts will be managed by using the standard operating procedures established in ITB described as SOP of **Laboratory Waste Management with regard to the six centers buildings in the Campus of ITB,** as follows:

Laboratory activities use chemicals which, in most cases, produce hazardous waste. These wastes could be in the form of acid solution, organic solvent, and materials with heavy metals or containing sulfide and cyanide. The Center for Hazardous Wastes Management - ITB (CHWM-ITB or PPLB-3 ITB) in collaboration with laboratories as producers of hazardous wastes is responsible for the management of hazardous wastes in the campus of ITB correctly and in a good manner.

The main duty of laboratories in hazardous wastes management is to identify and characterize the waste, to handle the temporary storage and to label the wastes. Subsequently, those hazardous wastes will be taken over and managed by CHWM-ITB.

Laboratories in ITB are responsible for the hazardous wastes produced by their activities. Their responsibility covers the process of waste identification, waste classification by characteristics, waste handling in the temporary storage and waste labeling. The procedure of hazardous waste management is presented in **Figure 2**.

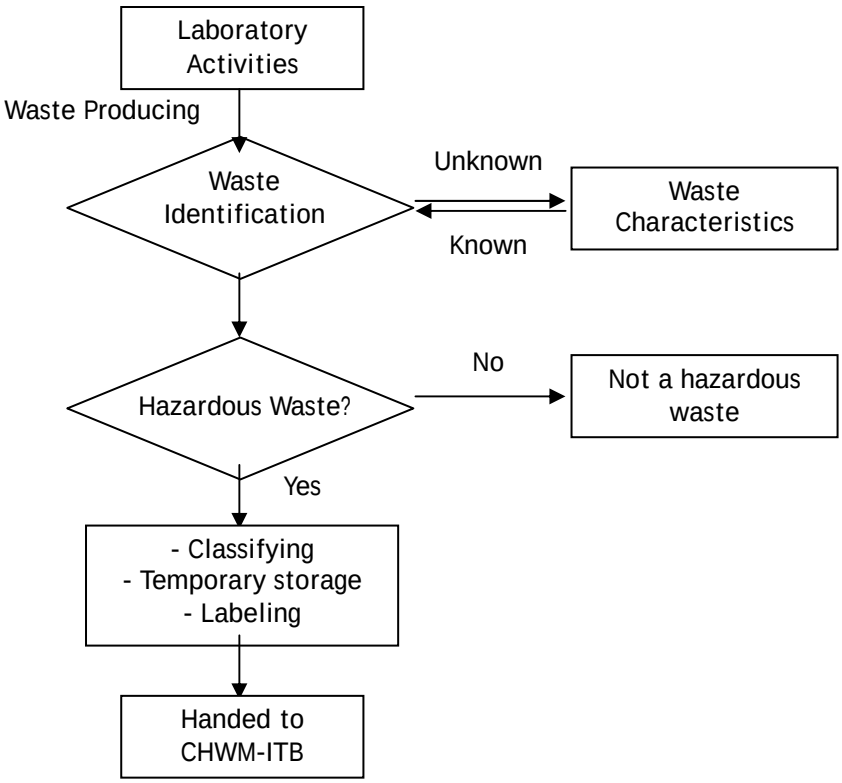


Figure 2 The role and responsibility of laboratories in managing hazardous waste.

The CHWM-ITB has the task of acquiring hazardous wastes from laboratories, handling the temporary storage, processing the wastes using techniques that are suitable to available tools and handing over the wastes that could not be processed by available tools to an authorized third party, according to the following flow chart:

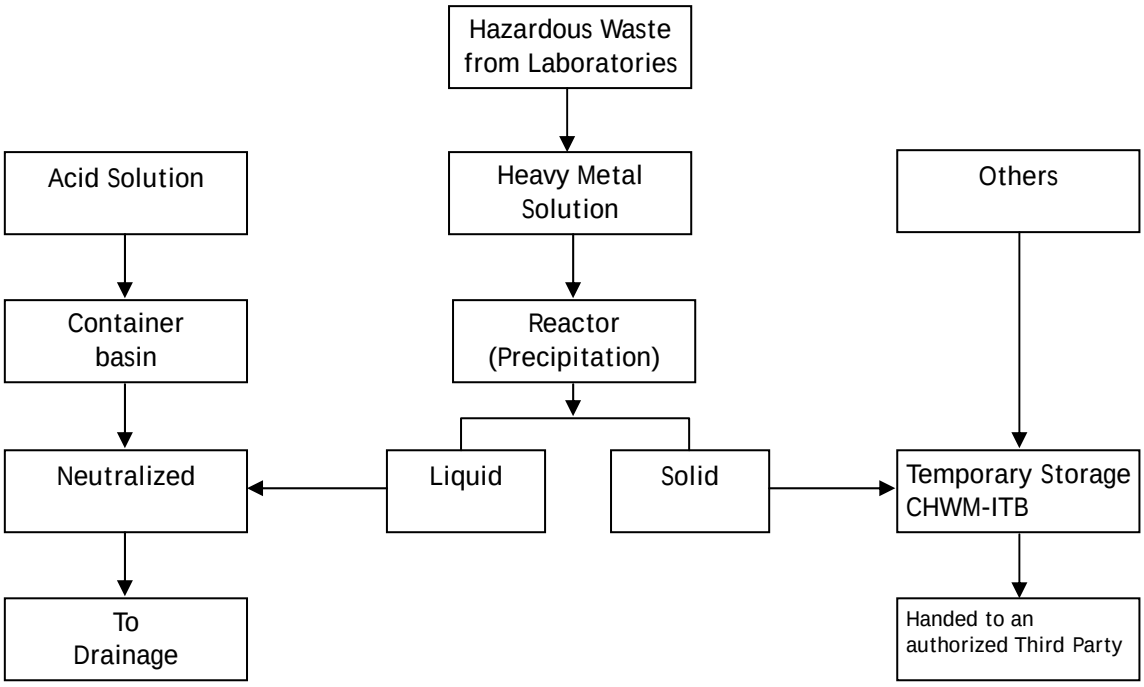


Figure 3 The role and responsibility of

Appendix 2.2-3 Cost Breakdown of Staff Development

1) Degree programs, Post-doctoral program, short term training, seminar/workshop

(Unit: US$)

	Master	**Doctor**		**Post-Dr.**	**S.Term.**	**Workshop/Seminar**	
	Overseas	**Domestic**	**Overseas**	**Overseas**	**Overseas**	**Domestic**	**Overseas**
Duration	2 years	3 years	5 years	1 year	2 months	7 days	7 days
Travel Fee per person (including international and domestic)	3,000	0	3,000	3,000	2,000	300	2,000
Entrance Fee per person (Admission, examination fee etc.)	3,500	0	3,500	1,500			
Tuition/Registration fee (*1)	10,000 (/year)	4,000 (/year)	10,000 (/ year)	5,000 (/ year)	3,000 (/course)	400 (/seminar)	1,000 (/seminar)
Arriving/Returning Allowance per person	3,000	0	3,000	3,000			
Living Allowance	1,800 (/month)	0	1,800 (/month)	1,800 (/month)	6,000 (/course)	350 (/week)	700 (/week)
Book, Thesis /Seminar Allowance per person	1,000 (/year)	1,000 (/year)	1,500 (/year)	1,500 (/year)	0	0	0
Health Insurance (per year)	500	0	500	500	200		200
Total (/person)	81,100	15,000	182,900	36,100	11,200	1,050	3,900

(*1) Tuition/Registration fee for Master and Doctoral degree programs overseas include Japanese language study for the first several months in Japan. Tuition/Registration for Post-Doctoral students is estimated about a half of that of master and doctoral programs because usually universities exempt all or part of tuitions for post doctoral students.

2) Support by appointed professors from Japanese universities on enhancing capacity and quality of nano-tech related research

Travel Fee	4,000 / time * 8 times (*2) =	32,000
Accommodation	2,500/month * 8 months =	20,000
Per diem allowance	3,600/month *8 months =	28,800
Remuneration	20,000/month * 8 months =	160,000
	Total	240,800

(*2) A few professors from Japanese universities will be appointed. Each will visit ITB several times during their appointment.

3) Fellowship agency
200,000 for all degree programs for masters and doctoral students, and post-doctoral program taken place in Japan

Appendix 2.2-4 Cost Breakdown of Consulting Services

	Position	Quantity	BillingRate		2010												2011												2012												2013												2014												2015	2016	Total M/M
			F/C USD	L/C USD	1	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	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12			
	PMS																																																																	
	Project Management Exp	1		4000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		1	1	1		1		1		1		1		1		1				51
	Construction Management Exp	1		3500											1		1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																											23
	Financial Management Exp	1		3500	1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			1			1			1			1			1			1			1					26
	Monitoring Evaluation Exp	1		3500	1				1				1				1		1		1		1		1		1		1		1		1		1		1		1		1				1				1				1		1		1		1		1		1				24
	Procurement Exp	1		3500															1	1	1				1	1	1				1	1	1																																9
	Supporting staff	10		400	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				1				1				1				1				1						420
	Total Remuneration of each Year for PMS															131000												194000												190500												72500												71000			659,000
	Grand total of PMS including direct cost															**183400**												**271600**												**266700**												**101500**												**99400**			**922,600**
	E/S																																																																	
	International	10																																																																
1	Team Leader	1	23400		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																								39
2	Architect	1	23000		1	1	1	1			1	1						1											1											1																											9
3	Structure Engineer	1	23000			1						1																																																							2
4	Electrical Engineer	1	23000			1						1																																																								2
5	Mechanical Engineer	1	23000			1	1				1	1						1																																																	5
6	Utility Engineer	1	23000			1						1																																																									2
7	Tender Doc. Specialist	1	23000									1	1		1	1		1																																																	5
8	Equipment Engineer 1	1	23000								1	1	1		1	1						1			1															1																											8
9	Equipment Engineer 2	1	23000								1	1	1		1	1						1			1															1																											8
10	Supervion allocation	1	23000																										1				1				1																														3
	Total Remuneration of each Year for E/S Intl															970800												441800												441800												70200												0			1,924,600
	Local	28																																																																
1	Co. Team Leader	1		4000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																								39
2	Architect Senior	2		3600	1	1	1	1	1	1	1	1	1	1	1	1		1			1			1				1				1				1				1																											38
3	Architect Junior	2		3400	1	1	1	1	1	1	1	1	1	1	1	1		1			1			1				1				1				1				1																											38
4	Resident Architect	2		3500																	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																								46
5	Structure Engineer Senior	1		3600	1			1			1							1				1				1																																									6
6	Structure Engineer Junior	2		3400	1			1			1			1								1				1																																									12
7	Electrical Engineer Senior	1		3600		1			1			1			1			1						1				1				1				1				1																											10
8	Electrical Engineer Junior	2		3400		1		1		1		1		1		1								1				1				1				1				1																											22
9	Mechanical / Sanitary Plumping Engineer Senior	1		3600		1			1			1			1			1						1				1				1				1				1																											10
10	Mechanical / Sanitary Plumping Engineer Junior	2		3400		1		1		1		1		1		1								1				1				1				1				1																											22
11	Utility Engineer	1		3500		1			1			1			1			1						1								1								1																											8
12	Civil Engineer	1		3500							1													1																																											2
13	Landscape Architect	1		3000							1																													1																											2
14	Tender Doc. Specialist	2		3000										1		1		1		1																																															8
15	Equipment Engineer Senior	2		3600							1	1	1	1	1	1			1	1		1	1									1				1			1																												26
16	Equipment Engineer Junior	2		3400							1	1	1	1	1	1			1	1		1	1									1				1			1																												26
17	Cost Estimation/Quantity surveyor	3		750								1		1		1		1		1		1			1			1			1			1			1			1																											36
18	Supervisor	15		500																	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																								345
19	Supporting Staff	15		400	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1			1			1			1			1			1			1			1																								360
	Total Remuneration of each Year for E/S Local															559650												424950												411400												61500												0			1,457,500
	L/C Remuneration total															559650												424950												411400												61500												0			1,457,500
	L/C Direct Cost total															223860												169980												164560												24600												0			583,000
	F/C Remuneration total															970800												441800												441800												70200												0			1,924,600
	F/C Direct Cost total															388320												176720												176720												28080												0			769,840
	Fellowship agency services				36,000												54,000												45,000												36,000												18,000												9000	2000	200,000
	L/C Total				783,510												594,930												575,960												86,100												0														2,040,500
	F/C Total				1,395,120												672,520												663,520												134,280												18,000												9,000	2,000	2,894,440
	Grand Total of E/S including direct cost				**2,178,630**												**1,267,450**												**1,239,480**												**220,380**												**18,000**												**9,000**	**2,000**	**4,934,940**

Appendix 3.1-1 ITB Rector Decree Concerning Fund Allocation for Institution Development within Institutional Cooperation Management

ITB RECTOR DECREE
NUMBER: 131/SK/K01/KU/2007
CONCERNING
FUND ALLOCATION FOR INSTITUTION DEVELOPMENT WITHIN INSTITUTIONAL COOPERATION MANAGEMENT

Considering:
a. whereas to realize more accountable, effective and efficient cooperation management so as to provide tangible contributions for academic quality improvement and funding capacity of ITB, Rector Decrees Number(s) 127/SK/K01/KU/2007, 128/SK/K01/KU/2007, 129/SK/K01/KU/2007 and 130/SK/K01/KU/2007 have been issued;
b. whereas to execute such ITB Rector Decrees Number(s) 127/SK/K01/KU/2007, 128/SK/K01/KU/2007, 129/SK/K01/KU/2007 and 130/SK/K01/KU/2007, it is necessary to issue decree on fund allocation for institution development within institutional cooperation management;
c. whereas in light of points (a) and (c), it is necessary to issue the corresponding decree

In view of:
1. Law Number 20 Year 2003 concerning National Education System;
2. Government Regulation (PP) Number 155 Year 2000 concerning the Appointment of ITB as a State Owned Legal Entity (ITB BHMN);
3. Articles of Association of ITB BHMN;
4. Decision of ITB Trustee Council Number 001/SK/K01-MWA/2005 concerning the appointment of ITB Rector for 2005-2010 term;
5. Decision of ITB Trustee Assembly Number 005/SK/K01-MWA/2005 concerning General Policy for ITB Development 2007 – 2011;
6. ITB Rector Decree Number 127/SK/K01/2007 concerning the Delegation of Authority to Enter and Manage Institutional Cooperation;
7. ITB Rector Decree Number 128/SK/K01/KU/2007 concerning Provisions on Institutional Cooperation Management
8. ITB Rector Decree Number 129/SK/K01/KU/2007 concerning Expenditure Allocation within Institutional Cooperation Management;
9. ITB Rector Decree Number 130/SK/K01/KU/2007 concerning Unit Price in Institutional Cooperation Management;

In perusal of:
1. Audit findings by BPK (Supreme Audit Body) against ITB Financial Management and Accountability Fiscal Year 2005 and 2006;
2. Comments and conclusions of Audit Council on the auditing process and finding of ITB Financial Statement Year 2006 by Independent Accountant;

Decides

To enact:

First : Fund Allocation for Institution Development within Institutional Cooperation Management shall be set out as follows:
a. Competition fund, maximum 10%
b. Transformation fund, as follows:
   1. Maintenance and capacity building for ITB resources, 20%
   2. For Implementing Management Unit
      a) Cooperation initiated by Management Unit
         - Contract Signer Unit, 35%

- Coordination Unit, 15%
- Implementation Incentives, 20%

b) Cooperation initiated by Implementing [Unit]
- Contract Signer Unit, 15%
- Coordination Unit, 5%
- Implementation incentive, 50%

Second : Competition fund can only be realized when an activity has been declared accomplished consisting of service expenditure and/or personnel expenditure and/or material expenditure according to the requests proposed by the rightful parties;

Third : Transformation fund can be realized by the rightful unit and implementers according to the needs consisting of material expenditure, service expenditure and personnel expenditure when an activity has been declared accomplished.

Fourth : Implementers can expend such transformation fund according to their needs and [its proceeds] can only be realized when an activity has been declared accomplished consisting of service expenditure and/or personnel expenditure and/or material expenditure.

Fifth : Management Unit can use the proceeds of transformation fund for the management of cooperation and/or for maintenance and capacity building of its resources according to the needs and can only be realized when an activity has been declared accomplished consisting of service expenditure and/or personnel expenditure and/or material expenditure.

Sixth : All tax liabilities arising from the use of Institutional Development Fund shall be charged to the users concerned.

Seventh : With the issuance of this Decree, all decisions previously issued of which their contents in contradiction with this Decision shall declare void and null.

Eight : As to the on-going cooperation and/or future cooperation to be executed and their agreements have been entered prior to the effective date of this Decree, they can follow such preceding provisions until the completion of their cooperation implementation.

Ninth : This Decision takes into effect on the date of its enactment, on condition that in case of any irregularity found later, it shall be revised accordingly.

Enacted in Bandung
On May 30th, 2007

Rector
Prof. Dr. Ir. Djoko Santoso, M.Sc
NIP 130 682 810

c.c.:
1. Chairperson of Trustee Assembly (MWA)
2. Chairperson of Academic Senate
3. Chairperson of Professorship Assembly
4. Rector Deputies
5. Chairperson of Quality Assurance Unit
6. Chairperson of Internal Supervisor Unit
7. Faculty Deans
8. Chiefs of Research Centers
9. Heads of Centers
10. Directors and Heads of Bureaus
11. Librarian Chief
12. Head of Information Resources Unit
13. UPT Chiefs
14. UUP Publisher Chief

ITB RECTOR DECREE
NUMBER: 129/SK/K01/KU/2007
CONCERNING
FUND ALLOCATION FOR INSTITUTION DEVELOPMENT WITHIN INSTITUTIONAL COOPERATION MANAGEMENT

Considering:

d. whereas to realize more accountable, effective and efficient cooperation management so as to provide tangible contributions for academic quality improvement and funding capacity of ITB, Rector Decrees Number(s) 127/SK/K01/KU/2007 and 128/SK/K01/KU/2007 have been issued;
e. whereas to execute such ITB Rector Decrees Number(s) 127/SK/K01/KU/2007 and 128/SK/K01/KU/2007, it is necessary to issue decree on fund allocation for institution development within institutional cooperation management;
f. whereas in light of points (a) and (c), it is necessary to issue the corresponding decree.

In view of:

1. Law Number 20 Year 2003 concerning National Education System
2. Government Regulation (PP) Number 155 Year 2000 concerning the Appointment of ITB as a State Owned Legal Entity (ITB BHMN);
3. Articles of Association of ITB BHMN;
4. Decision of ITB Trustee Council Number 001/SK/K01-MWA/2005 concerning the appointment of ITB Rector for 2005-2010 term;
5. Decision of ITB Trustee Assembly Number 005/SK/K01-MWA/2005 concerning General Policy for ITB Development 2007 – 2011;
6. ITB Rector Decree Number 127/SK/K01/2007 concerning the Delegation of Authority to Enter and Manage Institutional Cooperation;
7. ITB Rector Decree Number 128/SK/K01/KU/2007 concerning Provisions on Institutional Cooperation Management;

Decides

To enact

First : All fund allocations in institutional cooperation management must be expended in personnel expenditure, material expenditure and service expenditure in conformity with the provisions applicable in ITB. Expenditure allocation plan and realization shall be made under RKA mechanism prepared by the Implementers subject to consent of Management Unit.

Second : Expenditure allocation in Institutional Cooperation Management shall follow provisions set out in the annex of this Decision, thereto.

Third : With the issuance of this Decision, all decisions previously issued of which their contents in contradiction with this Decree shall declare void and null.

Fourth : As to the on-going cooperation and/or future cooperation to be executed and their agreements have been entered prior to the effective date of this Decision, they can follow such preceding provisions until the completion of their cooperation implementation.

Fifth : This Decision takes into effect on the date of its enactment, on condition that in case of any irregularity found later, it shall be revised accordingly.

Enacted in Bandung
On May 31st, 2007

Rector

Prof. Dr. Ir. Djoko Santoso, M.Sc
NIP 130 682 810

c.c.:
1. Chairperson of Trustee Assembly (MWA)
2. Chairperson of Academic Senate
3. Chairperson of Professorship Assembly
4. Rector Deputies
5. Chairperson of Quality Assurance Unit
6. Chairperson of Internal Supervisor Unit
7. Faculty Deans
8. Chiefs of Research Centers
9. Heads of Centers
10. Directors and Heads of Bureaus
11. Librarian Chief
12. Head of Information Resources Unit
13. UPT Chiefs
14. UUP Publisher Chief

Annex to Rector Decision Letter
Number: 129/SK/K01/KU/2007
Date: May 31st, 2007

EXPENDITURE ALLOCATION IN INSTITUTIONAL COOPERATION MANAGEMENT

Basically, expenditure allocation plan and realization of institutional cooperation must be able to be accommodated in ITB and Partner financial planning and administration system. In light of that, it will be very likely that some issues have yet to be regulated in the provisions applicable in ITB. If it is the case, the following provisions must be adhered to:

1. Expenditure Cost Component

All expenditure allocations of activities within institutional cooperation must be able to be expressed in Personnel Expenditure, Material Expenditure and Service Expenditure components pursuant to the provisions applicable in ITB. For example, RAB (Budget Plan) of an activity under institutional cooperation can be prepared in the following format as described in Table 1 that follows:

Table 1: Expenditure Cost Components

Project/Activity Name				
Activity Partner (Government/Private/Foreign)				
Type of Activity		Education/Research/social activities		
Implementer				
Implementer Staff				
Implementer Unit				
Contract Value (Rp/US)				
VAT (Rp./US)				
PPH 23 (Rp.US)				
Contract after tax (Rp/US)				
No.	Transaction	Total		Remarks
I	Personnel Expenditure			
	I.1. ITB Lecturer			
	I.2. ITB Staff			
II	Material Expenditure			
	II.1. Stationeries/Consumable goods			
	II.2. Equipment			
III	Service Expenditure			
	III.1. ITB Facilities			
	III.2. Third Party Services			
	III.3. Travel			
	III.4. OSA			

2. Personnel Expenditure

Personnel expenditure is fund allocation to be expended for honorarium of ITB employees. Fund allocated for personnel expenditure shall be determined based on full time equivalent computed in SKS (Credit Hours) value of activity concerned according to ITB Performance Management System. In this case the following provisions shall prevail:

a. SKS (Credit Hours)

The magnitude of SKS in institutional cooperation shall be differentiated based on types of teaching, training, research and project/social activities. Every one SKS value shall be equivalent to 3 hours of activity for preparation, face to face meeting/tutorial/research process/scientific writing/reporting/task evaluation/exam.

b. Total SKS
Total SKS of activity allowed to conduct by each staff in the same time period shall be limited according to Dean assignment.

3. Service Expenditure
Service expenditure is allocated to finance the consumed resources from the third parties. Such resources may consist of non-ITB staff, OSA, non-ITB facilities and ITB facilities. Falling in facility category shall include rooms, vehicles and other inventory equipment.

a) Non-ITB Staff
Service expenditure for non-ITB staff shall be decided in a manner that the qualifications will not exceed the maximum unit price applicable in ITB.

b) Travels
Costs expended for duty travels shall be *at cost* aiming to accomplish the related activity and must be attached with accountable evidence. Unless there are other protocol provisions, travel costs shall be regulated as follows:

b.1. Costs for duty travel outside Kota Bandung to the work site, for example to conduct survey, discussion, etc, shall be paid according to the [fares of] public transport (by air, train, rental car, etc.);

b.2. Local travel costs can be paid when the implementing team carries out activity beyond Kota Bandung, for example survey, discussion, etc.

b.3. Accommodation expenses can be paid when the implementing team carries out activity beyond Kota Bandung with maximum budget equal to 3-star hotel fees in local site.

b.4. Normally out travel expenses shall be given for economic class, unless for train, ship and bus/travel for which executive class may be given. Executive travel costs shall be paid if travel budget specified in cooperation contract is sufficient for it.

b.5. The paid travel expenses must take into account the difficulty of accessibility in work site, such as Papua, East Nusa Tenggara and other backward regions;

c) Meals
There is no discrimination in relation to meals either for experts, assistants or technicians/administration staff. In case of difference, it shall be the result of expensiveness /[difficult] accessibility to the work site. Expensiveness rate in the work site shall be reviewed from social-economic conditions in the site concerned. For example, [meals price in work site of] Papua must be differentiated from Java.

d) Equipment
Equipment shall be differentiated into general equipment and special equipment. General equipment shall include computers, vehicles, printers, etc. required to conduct an activity and can be operated by implementer with reasonable loads. Special equipment shall consist of laboratory devices and/or instruments requiring specific calculation since their operation shall consume utility with certain loads and requires ITB resources (operator, facility, etc.). The unit price of supporting equipment from external parties shall be determined according to unit price proposed by such external parties subject to prior consent of ITB UPT Logistics. Unit price of supporting equipment owned by ITB shall be established according to ITB transfer pricing provisions.

e) ITB Transfer Pricing
Transfer pricing is a policy to support capacity building for the maintenance and development of ITB facilities. ITB transfer pricing policy shall be as follows:

c.1. Transfer pricing cost for rooms shall be charged to the cooperation project requiring additional rooms other than regular working rooms;

c.2. Transfer pricing cost for utility shall be charged to cooperation project, which its implementation requires ITB utility;

c.3. The amount of transfer pricing unit price shall be set out in accordance with Rector Decree on Unit Price.

f) Out of Station Allowance (OSA)

OSA can only be allocated for activities implemented outside Kota Bandung, which its basic value shall refer to the provisions prevailing in ITB. The basic value of OSA can be increased according to Regional Qualification Coefficient, i.e. 1 for Java, 1.5 for Kalimantan, Sumatra, Sulawesi and West Nusa Tenggara, and 2 for Ambon, Halmahera, Papua and East Nusa Tenggara.

Total OSA may not exceed the maximum amount of monthly salary of ITB staff with the same qualifications. In addition, OSA shall follow regulations on project status (national, international).

Table 2: OSA Composition (Short)

No.	Qualifications	Qualification Coefficient	Java (Outside Bandung)	KaSuSuN (Kalimantan, Sumatra, Sulawesi and West Nusa Tenggara)	AMRiN (Ambon, Halmahera, Irian & East Nuta Tenggara)
1	Lower Expert	1.0	1.0	1.2	1.5
2	Junior Expert	1.2	1.3	1.5	1.8
3	Middle Expert	1.6	1.6	1.9	2.2
4	Senior Expert	2.0	2.0	2.4	2.8

4. Taxes

All activities performed must comply with their tax liabilities before they are declared accomplished. The settlement of tax liabilities arising from an activity shall be made by Finance Director at the first budget disbursement/use of activity concerned. Taxes that must be paid shall include VAT 10% and operational costs, PPH 23, i.e. 6-7% of contract after VAT and PPH 21 for honorarium component according to the applicable provisions.

Enacted in Bandung
On May 31st, 2007

Rector

Prof. Dr. Ir. Djoko Santoso, M.Sc
NIP: 130 682 810

Appendix 3.1-2 Cost Structure for Advance Science Centre

From proposed equipment list from advance science center, there are some equipments which need special attention because of high operation and maintenance cost, that are:

1. Electron Microscopy Equipment (TEM, SEM, FIB, Ion Slicer and SPM)
2. X-Ray radiation group (Nano viewer, XRF and XRD)
3. Composition Characterization Equipment (GC-MS, TG-DTA)

Operation costs are including energy consumption (electric power), cooling water, coating materials, and gases. Maintenance costs are usually spare part that must be replaced after some operation time.

Source of expenses to overcome this maintenance and operation cost planned will come from community services fee (measurement/characterization services fee for inner ITB, other University and Industry). The fee fee determined base on ongoing fee in Indonesia.

Cost For Operation and Maintenance

Equipment	**Operation Cost**	**Maintenance Cost**	**Estimation Annual Cost**
SEM	Elect., cooling wtr, coating material	Electron source filament	$ 5,000
FESEM	Elect., cooling wtr, coating material	Field emission source filament	$ 20,000
TEM	Elect., cooling wtr, coating material	Electron source filament	$ 5,000
HRTEM	Elect., cooling wtr, coating material	Electron source filament	$ 20,000
FIB	Elect., cooling wtr	Ion source	$ 3,000
Ion Slicer	Elect., cooling wtr	Ion source	$ 3,000
SPM	Elect.	AFM probe	$ 3,000
Nano viewer	Elect., cooling wtr	X-Ray bulb	$ 3,000
XRF	Elect., cooling wtr	X-Ray bulb	$ 5,000
XRD	Elect., cooling wtr	X-Ray bulb	$ 3,000
GS-MS	Elect., cooling wtr, gas	Column, detector	$ 4,000
TG-DTA	Elect., cooling wtr	Heater filament	$ 2,000
		TOTAL	$ 76,000

Services Fee

Equipment	**Average weekly number of sample**	**Services for ITB**		**Services for other Univ.**		**Services for Industry**		**Sub Total**
		number	**cost**	**number**	**cost**	**number**	**cost**	
SEM	10	5	$ 10	2	$ 15	3	$ 30	$ 170
FESEM	3	2	$ 20	1	$ 30	0	$ 60	$ 70
TEM	3	2	$ 50	0	$ 100	1	$ 300	$ 400
HRTEM	5	2	$ 100	1	$ 150	2	$ 500	$ 1,350
FIB	Included in SEM/TEM							
Ion Slicer	Included in SEM/TEM							
SPM	10	8	$ 10	2	$ 15	0	$ 30	$ 110
Nano viewer	10	6	$ 10	2	$ 15	2	$ 30	$ 150
XRF	15	6	$ 10	3	$ 15	6	$ 30	$ 285
XRD	15	8	$ 10	2	$ 15	5	$ 30	$ 260
GS-MS	15	8	$ 10	1	$ 15	6	$ 30	$ 275
TG-DTA	10	5	$ 20	1	$ 25	4	$ 40	$ 285
						TOTAL Weekly =		$ 3,125
			Annual Operation =	30	weeks	Total Annual =		$ 100,650

Balance US$ 24,650. This Balance will be used for others spare part replacement.

Appendix 3.3-1 環境配慮確認表

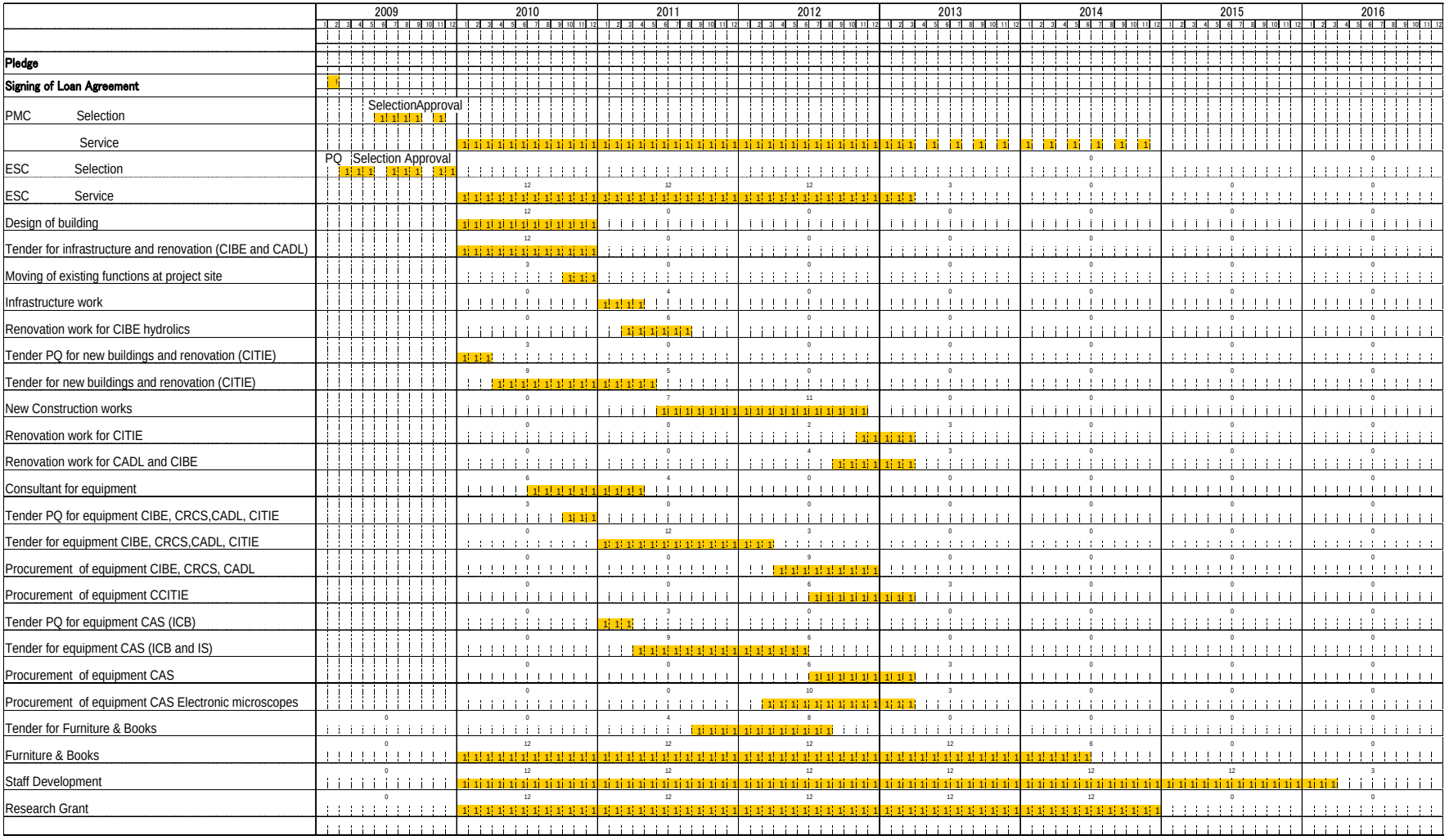
分類	環境項目	主なチェック事項	環境配慮確認結果
1 許認可・説明	(1)EIA および環境許認可	① 環境影響評価報告書（EIA レポート)等は作成済みか。 ② EIA レポート等は当該国政府により承認されているか。 ③ EIA レポート等の承認は無条件か。付帯条件がある場合は、その条件は満たされるか。 ④ 上記以外に、必要な場合には現地の所管官庁からの環境に関する許認可は取得済みか。	大学施設の建設は、インドネシアでは許可申請と同時に EIA を提出することになっている。
	(2)地域住民への説明	① プロジェクトの内容および影響について、情報公開を含めて地域住民に適切な説明を行い、理解を得るか。 ② 住民および所管官庁からのコメントに対して適切に対応されるか。	既存キャンパスの中の建設工事なので、特に地域住民への影響はない。今回はキャンパス整備の 3 期であるが、1 期、2 期において地域住民からのクレームなどはない。
2 汚染対策	(1)大気質	① 対象となるインフラ施設および付帯設備等から排出される大気汚染物質（硫黄酸化物（SOx）、窒素酸化物（NOx）、媒塵等）は当該国の排出基準、環境基準を満足するか。	燃焼施設などはないので、排出物は無い
	(2)水質	① インフラ施設および付帯設備等からの排水または浸出水は当該国の排出基準、環境基準を満足するか。	大学は都市下水道に接続している。都市下水に放流できない薬品等は各研究室にて個別回収し、大学内の中和施設で処理している。
	(3)廃棄物	① インフラ施設および付帯設備からの廃棄物は当該国の基準に従って適切に処理・処分されるか。	大学はバンドン市の廃棄規準に従って、廃棄処理している。
	(4)土壌汚染	① インフラ施設および付帯設備からの排水、浸出水等により、土壌・地下水を汚染しない対策がなされるか。	施設は一般的建物からの排水のみで、整備されている公共下水に放流されるので該当しない。
	(5)騒音・振動	① 騒音、振動は当該国の基準を満足するか。	現在までの整備計画と同様に建設工事は通常の工法で可能であり、インドネシアの基準を満足することが可能である。
	(6)地盤沈下	① 大量の地下水汲み上げを行う場合、地盤沈下は生じないか。	地下水くみ上げは無い
	(7)悪　臭	① 悪臭源はないか。悪臭防止の対策はとられるか。	悪臭はない。

分類	環境項目	主なチェック事項	環境配慮確認結果
3 自然環境	(1)保護区	① サイトは当該国の法律・国際条約等に定められた保護区内に立地していないか。プロジェクトが保護区に影響を与えないか。	保護区内に立地していない。
	(2)生態系	① サイトは原生林、熱帯の自然林、生態学的に重要な生息地（珊瑚礁、マングローブ湿地、干潟等）を含まないか。 ② サイトは当該国の法律･国際条約等で保護が必要とされる貴重種の生息地を含まないか。 ③ 生態系への重大な影響が懸念される場合､生態系への影響を減らす対策はなされるか。 ④ プロジェクトによる水利用（地表水、地下水）が、河川等の水域環境に影響を及ぼさないか。水生生物等への影響を減らす対策はなされるか。	該当する項目がプロジェクトに含まれていない。
	(3)水　象	① プロジェクトによる水系の変化に伴い、地表水・地下水の流れに悪影響を及ぼさないか。	既存キャンパス内の施設建設なので、水系に関与しない
	(4)地形・地質	① プロジェクトにより、サイトおよび周辺の地形・地質構造が大規模に改変されないか。	改変されない
4 社会環境	(1)住民移転	① プロジェクトの実施に伴い非自発的住民移転は生じないか。生じる場合は、移転による影響を最小限とする努力がなされるか。 ② 移転する住民に対し、移転前に移転・補償に関する適切な説明が行われるか。 ③ 住民移転のための調査がなされ、正当な補償、移転後の生活基盤の回復を含む移転計画が立てられるか。 ④ 移転住民のうち特に女性､子供､老人､貧困層､少数民族･先住民族等の社会的弱者に適切な配慮がなされた計画か。 ⑤ 移転住民について移転前の合意は得られるか。 ⑥ 住民移転を適切に実施するための体制は整えられるか｡十分な実施能力と予算措置が講じられるか。 ⑦ 移転による影響のモニタリングが計画されるか。	住民移転は無い
	(2)生活・生計	① プロジェクトによる住民の生活への悪影響はないか｡必要な場合は影響を緩和する配慮が行われるか。	住民移転は無い
	(3)文化遺産	① プロジェクトにより、考古学的、歴史的、文化的、宗教的に貴重な遺産、史跡等を損なわないか。また、当該国の国内法上定められた措置が考慮されるか。	キャンパス内には歴史的建造物に指定された建物がある。本計画の建設地はこれら建物から十分に距離が離れており､その景観を損ねることはない。
	(4)景　観	① 特に配慮すべき景観への悪影響はないか。必要な対策は取られるか。	キャンパス内の上記歴史的建造物の景観に配慮し、本計画の建設地をこれら施設から離した所としている。

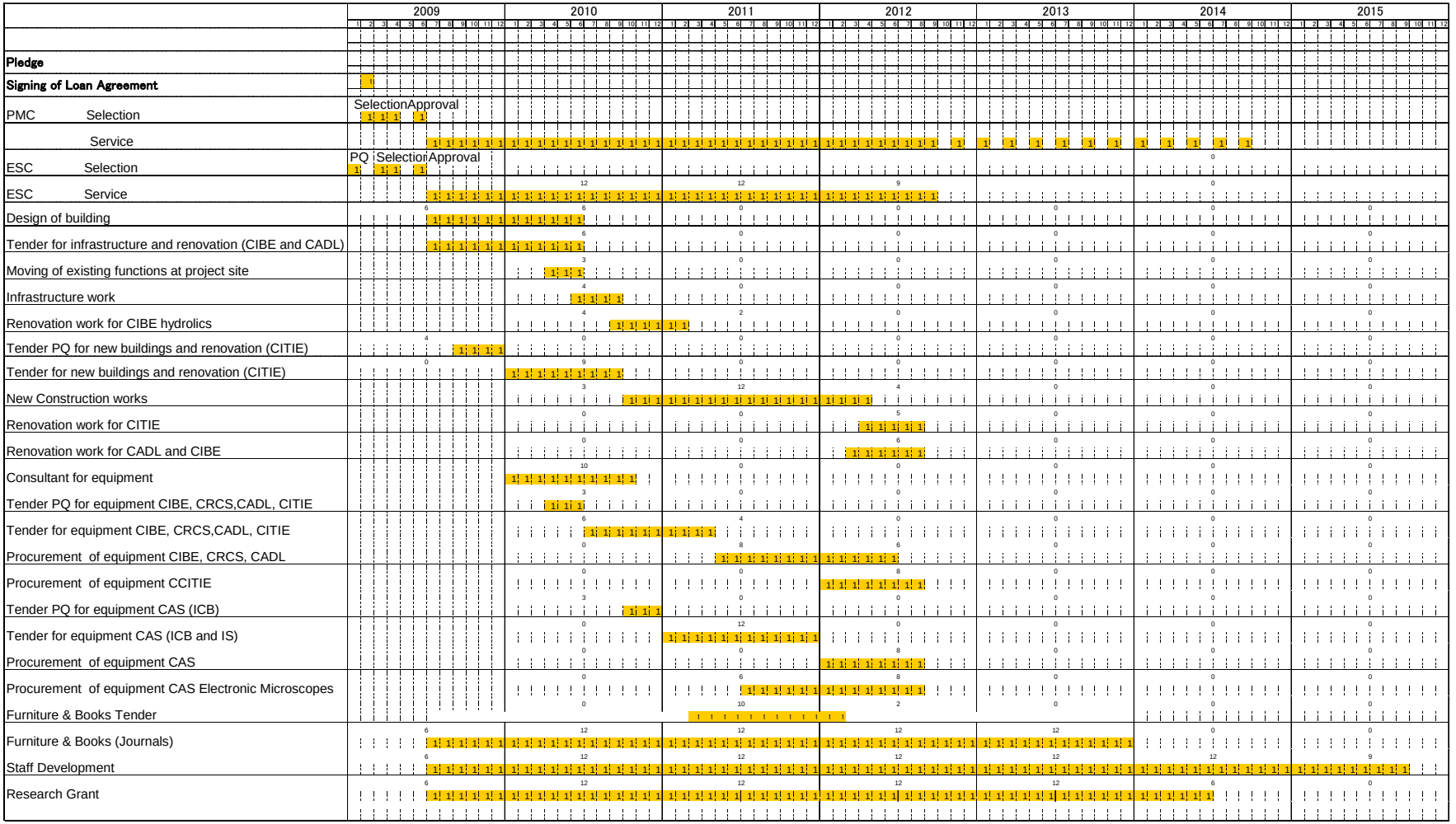
分類	環境項目	主なチェック事項	環境配慮確認結果
	(5)少数民族、先住民族	① 当該国の少数民族、先住民族の権利に関する法律が守られるか。 ② 少数民族、先住民族の文化、生活様式への影響を軽減する配慮がなされるか。	少数民族に関連する内容は無い。
5 その他	(1)工事中の影響	① 工事中の汚染（騒音、振動、濁水、粉塵、排ガス、廃棄物等）に対して緩和策が用意されるか。 ② 工事により自然環境（生態系）に悪影響を及ぼさないか。また、影響に対する緩和策が用意されるか。 ③ 工事により社会環境に悪影響を及ぼさないか。また、影響に対する緩和策が用意されるか。 ④ 必要に応じ、作業員等のプロジェクト関係者に対して安全教育（交通安全・公衆衛生等）を行うか。	現在までの整備計画と同様に建設工事は通常の工法で可能であり、インドネシアの基準を満足することが可能である。
	(2)モニタリング	① 上記の環境項目のうち、影響が考えられる項目に対して、事業者のモニタリングが計画・実施されるか。 ② 当該計画の項目、方法、頻度等は適切なものと判断されるか。 ③ 事業者のモニタリング体制（組織、人員、機材、予算等とそれらの継続性）は確立されるか。 ④ 事業者から所管官庁等への報告の方法、頻度等は規定されているか。	計画内容は環境影響評価に該当しないので、モニタリングは必要ない。 工事中の騒音・振動に対しては、建設許可時に作成提出する EIA に基づき、所管官庁がモニタリングする。
6 留意点	他の環境チェックリストの参照	① 必要な場合、道路・鉄道に係るチェックリストの該当チェック事項も追加して評価すること（インフラ施設に関連して、アクセス道路等が設置される場合等）。 ② 電話線敷設、鉄塔、海底ケーブル等については、必要に応じて、送変電・配電およびパイプラインに係るチェックリストの該当チェック事項も追加して評価すること。	該当する項目がプロジェクトに含まれていない。
	環境チェックリスト使用上の注意	① 必要な場合には、越境または地球規模の環境問題への影響も確認する。（廃棄物の越境処理、酸性雨、オゾン層破壊、地球温暖化の問題に係る要素が考えられる場合等）	市街地での建設であり、そのような地球規模の影響検討は必要ない。

＊通信インフラについては、1 (1) (2)、3 (1) (2)、4 (1)～(5)、5 (1) (2) のみのチェックとする。

Appendix 4.3-1 Implementation Schedule: STANDARD



Appendix 4.3-2 Expedited Implementation Schedule



Appendix 4.3-3 Implementation Schedule of Activities Funded by JICA and GOI

	2010	2011	2012	2013	2014	2015	2016
JICA							
Construction (New)	0	6	12	0	0	0	0
Construction (Renovation of CITIE)	0	0	7	3	0	0	0
Equipment (Covered by Loan)	0	0	12	5	0	0	0
Staff Development (Overseas)	12	12	12	12	12	12	3
Support on capacity development for Nano-tech	6	0	0	0	0	0	0
Consulting Services (E/S)	12	12	12	3	0	0	0
GOI							
Construction (Renovation of other than CITIE)	0	0	7	3	0	0	0
Construction (Infrastructure)	0	3	0	0	0	0	0
Equipment (Covered by GOI)	0	0	12	3	0	0	0
Furniture and books	12	12	12	12	6	0	0
Staff Development (Domestic)	12	12	12	12	0	0	0
Research Grant	12	12	12	12	12	0	0
Consulting Services (PMS)	12	12	12	12	12	0	0

Appendix 4.4-1 Annual Fund Requirement

1) In thousand USD

Annual Fund Requirement

Base Year for Cost Estimation: Aug, 2008 In thousand USD
Exchange Rates 1
Price Escalation: FC: 2.6% LC: 5.8%
Physical Contingency 5%
Physical Contingency for Consultant 5%

Item	Total			2010			2011			2012			2013			2014			2015			2016		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. Laon Portion																								
Ⅰ) Procurement / Construction	34,653	13,024	47,677	880	0	880	3,972	3,665	7,637	22,466	8,859	31,324	5,779	500	6,279	680	0	680	698	0	698	179	0	179
Construction (New)	8,842	8,842	17,685	0	0	0	2,947	2,947	5,895	5,895	5,895	11,790	0	0	0	0	0	0	0	0	0	0	0	0
Construction (Renovation of CITIE)	0	1,198	1,198	0	0	0	0	0	0	0	838	838	0	359	359	0	0	0	0	0	0	0	0	0
Equipment (Covered by Loan)	17,144	0	17,144	0	0	0	0	0	0	12,858	0	12,858	4,286	0	4,286	0	0	0	0	0	0	0	0	0
Staff Development (Overseas)	3,470	0	3,470	555	0	555	555	0	555	555	0	555	555	0	555	555	0	555	555	0	555	139	0	139
Support on capacity development for Nano-tech	241	0	241	241	0	241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost for JBIC financing	29,697	10,040	39,737	796	0	796	3,503	2,947	6,450	19,308	6,733	26,041	4,841	359	5,200	555	0	555	555	0	555	139	0	139
Price escalation	3,306	2,364	5,670	42	0	42	280	543	824	2,088	1,703	3,791	663	117	780	92	0	92	109	0	109	32	0	32
Physical contingency	1,650	620	2,270	42	0	42	189	175	364	1,070	422	1,492	275	24	299	32	0	32	33	0	33	9	0	9
Ⅱ) Consulting services (E/S)	3,273	2,538	5,811	1,542	921	2,463	763	740	1,502	772	758	1,530	160	120	280	22	0	22	11	0	11	3	0	3
Base cost	2,894	2,041	4,935	1,395	784	2,179	673	595	1,267	664	576	1,239	134	86	220	18	0	18	9	0	9	2	0	2
Price escalation	223	377	600	73	94	167	54	110	163	72	146	217	18	28	46	3	0	3	2	0	2	0	0	0
Physical contingency	156	121	277	73	44	117	36	35	72	37	36	73	8	6	13	1	0	1	1	0	1	0	0	0
Total (Ⅰ + Ⅱ)	37,926	15,562	53,489	2,422	921	3,343	4,735	4,405	9,140	23,238	9,616	32,854	5,940	620	6,560	702	0	702	709	0	709	182	0	182
B. GOI PORTION																								
a Procurement / Construction	0	11,600	11,600	0	1,192	1,192	0	3,460	3,460	0	3,824	3,824	0	2,341	2,341	0	784	784	0	0	0	0	0	0
Construction (Renovation of other than CITIE)	0	1,555	1,555	0	0	0	0	0	0	0	1,088	1,088	0	466	466	0	0	0	0	0	0	0	0	0
Construction (Infrastructure)	0	1,768	1,768	0	0	0	0	1,768	1,768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equipment (Covered by GOI)	0	1,005	1,005	0	0	0	0	0	0	0	804	804	0	201	201	0	0	0	0	0	0	0	0	0
Furniture and books	0	4,143	4,143	0	921	921	0	921	921	0	921	921	0	921	921	0	460	460	0	0	0	0	0	0
Research Grant	0	360	360	0	72	72	0	72	72	0	72	72	0	72	72	0	72	72	0	0	0	0	0	0
Staff Development (Domestic)	0	86	86	0	21	21	0	21	21	0	21	21	0	21	21	0	0	0	0	0	0	0	0	0
Base cost for GOI financing	0	8,917	8,917	0	1,014	1,014	0	2,783	2,783	0	2,906	2,906	0	1,682	1,682	0	532	532	0	0	0	0	0	0
Price escalation	0	2,131	2,131	0	121	121	0	513	513	0	735	735	0	548	548	0	214	214	0	0	0	0	0	0
Physical contingency	0	552	552	0	57	57	0	165	165	0	182	182	0	111	111	0	37	37	0	0	0	0	0	0
b Consulting services (PMC)	0	1,192	1,192	0	216	216	0	338	338	0	351	351	0	141	141	0	146	146	0	0	0	0	0	0
Base cost	0	923	923	0	183	183	0	272	272	0	267	267	0	102	102	0	99	99	0	0	0	0	0	0
Price escalation	0	212	212	0	22	22	0	50	50	0	67	67	0	33	33	0	40	40	0	0	0	0	0	0
Physical contingency	0	57	57	0	10	10	0	16	16	0	17	17	0	7	7	0	7	7	0	0	0	0	0	0
c Administration cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d VAT (10% of the total project cost)	0	6,628	6,628	0	475	475	0	1,294	1,294	0	3,703	3,703	0	904	904	0	163	163	0	71	71	0	18	18
e Import Tax (Exemption)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (a+b+c+d+e)	0	19,420	19,420	0	1,882	1,882	0	5,092	5,092	0	7,877	7,877	0	3,386	3,386	0	1,094	1,094	0	71	71	0	18	18
TOTAL (A+B)	37,926	34,983	72,909	2,422	2,803	5,225	4,735	9,497	14,232	23,238	17,494	40,731	5,940	4,006	9,946	702	1,094	1,796	709	71	780	182	18	200
C. Interest during Construction	3,326	0	3,326	13	0	13	120	0	120	558	0	558	646	0	646	656	0	656	666	0	666	668	0	668
Interest during Construction(Const.)	3,323	0	3,323	12	0	12	119	0	119	558	0	558	646	0	646	655	0	655	665	0	665	667	0	667
Interest during Construction (Consul.)	4	0	4	0	0	0	0	0	0	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1
D. Commitment Charge	374	0	374	53	0	53	53	0	53	53	0	53	53	0	53	53	0	53	53	0	53	53	0	53
GRAND TOTAL (A+B+C+D)	41,627	34,983	76,610	2,488	2,803	5,291	4,908	9,497	14,405	23,849	17,494	41,343	6,639	4,006	10,645	1,411	1,094	2,505	1,428	71	1,499	903	18	921
E. JBIC finance portion	37,926	15,562	53,489	2,422	921	3,343	4,735	4,405	9,140	23,238	9,616	32,854	5,940	620	6,560	702	0	702	709	0	709	182	0	182

2) In thousand Yen (FC and Total) and thousand Rp (LC)

Annual Fund Requirement

Base Year for Cost Estimation: Aug, 2008 — In thousand Yen and Rp
Exchange Rates 0.0115 107 9291
Price Escalation: FC: 2.6% LC: 5.8%
Physical Contingency 5%
Physical Contingency for 5%

Item	Total			2010			2011			2012			2013			2014			2015			2016		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. Laon Portion																								
Ⅰ) Procurement / Construction	3,707,919	121,005,091	5,099,478	94,136	0	94,136	425,021	34,053,372	816,635	2,403,824	82,304,968	3,350,331	618,385	4,646,751	671,823	72,757	0	72,757	74,648	0	74,648	19,147	0	19,147
Construction (New)	946,142	82,155,203	1,890,927	0	0	0	315,381	27,385,068	630,309	630,761	54,770,135	1,260,618	0	0	0	0	0	0	0	0	0	0	0	0
Construction (Renovation of	0	11,127,831	127,970	0	0	0	0	0	0	0	7,789,481	89,579	0	3,338,349	38,391	0	0	0	0	0	0	0	0	0
Equipment (Covered by Loan)	1,834,409	0	1,834,409	0	0	0	0	0	0	1,375,807	0	1,375,807	458,602	0	458,602	0	0	0	0	0	0	0	0	0
Staff Development (Overseas)	371,261	0	371,261	59,402	0	59,402	59,402	0	59,402	59,402	0	59,402	59,402	0	59,402	59,402	0	59,402	59,402	0	59,402	14,850	0	14,850
Support on capacity development for Nano-tech	25,766	0	25,766	25,766	0	25,766	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost for JBIC financing	3,177,577	93,283,034	4,250,332	85,167	0	85,167	374,782	27,385,068	689,711	2,065,970	62,559,617	2,785,405	518,004	3,338,349	556,395	59,402	0	59,402	59,402	0	59,402	14,850	0	14,850
Price escalation	353,774	21,959,910	606,313	4,486	0	4,486	30,000	5,046,715	88,037	223,387	15,826,067	405,386	70,934	1,087,128	83,436	9,890	0	9,890	11,692	0	11,692	3,385	0	3,385
Physical contingency	176,568	5,762,147	242,832	4,483	0	4,483	20,239	1,621,589	38,887	114,468	3,919,284	159,540	29,447	221,274	31,992	3,465	0	3,465	3,555	0	3,555	912	0	912
Ⅱ) Consulting services (E/S)	348,722	23,583,096	619,928	164,998	8,555,938	263,392	81,606	6,873,448	160,650	82,607	7,040,228	163,570	17,152	1,113,482	29,957	2,359	0	2,359	0	0	0	0	0	0
Base cost	308,528	18,958,286	526,548	149,278	7,279,591	232,993	71,960	5,527,495	135,526	70,997	5,351,244	132,536	14,368	799,955	23,567	1,926	0	1,926	0	0	0	0	0	0
Price escalation	23,588	3,501,806	63,859	7,863	868,921	17,856	5,760	1,018,646	17,474	7,677	1,353,735	23,245	1,968	260,504	4,963	321	0	321	0	0	0	0	0	0
Physical contingency	16,606	1,123,005	29,520	7,857	407,426	12,542	3,886	327,307	7,650	3,934	335,249	7,789	817	53,023	1,427	112	0	112	0	0	0	0	0	0
Total (Ⅰ + Ⅱ)	4,056,641	144,588,187	5,719,405	259,135	8,555,938	357,528	506,627	40,926,819	977,285	2,486,431	89,345,196	3,513,901	635,538	5,760,233	701,780	75,116	0	75,116	74,648	0	74,648	19,147	0	19,147
B. GOI PORTION																								
a Procurement / Construction	0	107,779,484	1,239,464	0	11,074,125	127,352	0	32,148,447	369,707	0	35,526,186	408,551	0	21,746,592	250,086	0	7,284,133	83,768	0	0	0	0	0	0
Construction (Renovation of other than CITIE)	0	14,447,319	166,144	0	0	0	0	0	0	0	10,113,123	116,301	0	4,334,196	49,843	0	0	0	0	0	0	0	0	0
Construction (Infrastructure)	0	16,431,041	188,957	0	0	0	0	16,431,041	188,957	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equipment (Covered by GOI)	0	9,335,049	107,353	0	0	0	0	0	0	0	7,468,039	85,882	0	1,867,010	21,471	0	0	0	0	0	0	0	0	0
Furniture and books	0	38,495,530	442,699	0	8,554,562	98,377	0	8,554,562	98,377	0	8,554,562	98,377	0	8,554,562	98,377	0	4,277,281	49,189	0	0	0	0	0	0
Research Grant	0	3,344,760	38,465	0	668,952	7,693	0	668,952	7,693	0	668,952	7,693	0	668,952	7,693	0	668,952	7,693	0	0	0	0	0	0
Staff Development (Domestic)	0	794,436	9,136	0	198,609	2,284	0	198,609	2,284	0	198,609	2,284	0	198,609	2,284	0	0	0	0	0	0	0	0	0
Base cost for GOI financing	0	82,848,135	952,754	0	9,422,123	108,354	0	25,853,164	297,311	0	27,003,286	310,538	0	15,623,329	179,668	0	4,946,233	56,882	0	0	0	0	0	0
Price escalation	0	19,798,992	227,688	0	1,124,662	12,934	0	4,764,405	54,791	0	6,831,177	78,559	0	5,087,711	58,509	0	1,991,037	22,897	0	0	0	0	0	0
Physical contingency	0	5,132,356	59,022	0	527,339	6,064	0	1,530,878	17,605	0	1,691,723	19,455	0	1,035,552	11,909	0	346,863	3,989	0	0	0	0	0	0
b Consulting services (PMC)	0	11,073,308	127,343	0	2,002,730	23,031	0	3,137,896	36,086	0	3,259,999	37,490	0	1,312,642	15,095	0	1,360,041	15,640	0	0	0	0	0	0
Base cost	0	8,571,877	98,577	0	1,703,969	19,596	0	2,523,436	29,020	0	2,477,910	28,496	0	943,037	10,845	0	923,525	10,621	0	0	0	0	0	0
Price escalation	0	1,974,131	22,703	0	203,393	2,339	0	465,037	5,348	0	626,851	7,209	0	307,098	3,532	0	371,752	4,275	0	0	0	0	0	0
Physical contingency	0	527,300	6,064	0	95,368	1,097	0	149,424	1,718	0	155,238	1,785	0	62,507	719	0	64,764	745	0	0	0	0	0	0
c Administration cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d VAT (10% of the total project cost)	0	61,619,238	708,621	0	4,416,623	50,791	0	12,026,767	138,308	0	34,434,278	395,994	0	8,408,360	96,696	0	1,517,597	17,452	0	649,115	7,465	0	166,498	1,915
e Import Tax (Exemption)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (a+b+c+d+e)	0	180,472,030	2,075,428	0	17,493,478	201,175	0	47,313,111	544,101	0	73,220,462	842,035	0	31,467,594	361,877	0	10,161,772	116,860	0	649,115	7,465	0	166,498	1,915
TOTAL (A+B)	4,056,641	325,060,217	7,794,834	259,135	26,049,416	558,703	506,627	88,239,930	1,521,386	2,486,431	162,565,659	4,355,936	635,538	37,227,827	1,063,658	75,116	10,161,772	191,976	74,648	649,115	82,113	19,147	166,498	21,062
C. Interest during Construction	355,757	0	355,757	1,344	0	1,344	12,793	0	12,793	59,714	0	59,714	69,123	0	69,123	70,142	0	70,142	71,187	0	71,187	71,455	0	71,455
Interest during Construction(Const.)	355,382	0	355,382	1,318	0	1,318	12,751	0	12,751	59,655	0	59,655	69,061	0	69,061	70,080	0	70,080	71,125	0	71,125	71,393	0	71,393
Interest during Construction (Consul.)	375	0	375	26	0	26	42	0	42	59	0	59	62	0	62	62	0	62	62	0	62	62	0	62
D. Commitment Charge	40,036	0	40,036	5,719	0	5,719	5,719	0	5,719	5,719	0	5,719	5,719	0	5,719	5,719	0	5,719	5,719	0	5,719	5,719	0	5,719
GRAND TOTAL (A+B+C+D)	4,452,434	325,060,217	8,190,627	266,198	26,049,416	565,766	525,139	88,239,930	1,539,899	2,551,865	162,565,659	4,421,370	710,380	37,227,827	1,138,500	150,977	10,161,772	267,837	151,554	649,115	159,019	96,321	166,498	98,236
E. JBIC finance portion	4,056,641	144,588,187	5,719,405	259,135	8,555,938	357,528	506,627	40,926,819	977,285	2,486,431	89,345,196	3,513,901	635,538	5,760,233	701,780	75,116	0	75,116	74,648	0	74,648	19,147	0	19,147

Appendix 5.3-1 Technical Note on IRR Estimation

Introduction

It is widely recognized that it is difficult to quantify the benefit of education project (e.g., better learning achievement of student, better promotion rate, more number of graduates, etc.). And the proposed project is not an exception.

As a practical solution, in many cases, IRR estimation of the education project takes salary increment of the student as the economic benefit of the project. This is based on an assumption that marginal salary gain equal to marginal value added. IRR estimation for the proposed project follows this ordinal way of estimating IRR.

It is also a shared opinion that financial rate of return is not calculated in an ordinal educational project. Dislike project in other field (that generate financial revenue e.g. power plant, irrigation, etc), most of the education project entity does not gain profit from the project activities. Proposed ITB project however is to strengthen the research and development function of proposed centers, which in turn would gain financial revenue to ITB through contracted R&D works. With such understanding, the SAPROF team attempted to estimate FIRR of the proposed Project

Overview

The SAPROF team attempted an initial estimation of the IRRs related to the proposed project. This preliminal estimation suggests that the project proposal would have positive IRR as follows.

- Private IRR (PIRR): 14.75% (S1), 26.02% (S2), and 12.23% (S3)
- Financial IRR at 14.13%
- Economic IRR at 7.04%

IRRs are very sensitive to (i) number of the graduates per year that are benefit by the proposed centers, and (ii) starting salary of the graduates (by S1, S2, and S3). Unfortunately, time and other resources allowed were not sufficient for the SAPROF team to synthesize a sound assumptions to above (i) and (ii). The estimation is based on general data and statistics only, and it includes many assumptions. Thus SAPROF team recommends that project appraisal team should NOT rationalize the proposed project using the estimated IRRs as a source of approval.

Private IRR (PIRR)

Preliminary estimation indicates that higher education could yield very high private IRR: 14.75% (S1)[1], 26.02% (S2), and 12.23% (S3)

- Salary scale for the civil servant was referred, to set out salary increment pattern by different level of education (age-income profile). With this model, annual growths of the salary (%) are estimated at 2.01% (S1), 1.67% (S2), and 1.78% (S3), respectively.
- Starting salary was adjusted by referring the latest wage statistics and information provided by the recruitment firm and ITB, at IDR 2,000,000 (S1), IDR 2,750,000 (S2), and IDR 3,500,000 (S3) respectively, while annual increment patterns are kept same as the assumption 1[2].
- Benefit includes salary increment, while costs include (i) income forgone and (ii) Tuition, while benefit includes (iii) income increment.

[1] Higher education in 2003 provides a private rate of return of 13.8% (Patrinos, Harry Anthonyu, and George Psacharopoulos, 2002, "Return to Investment in Education: A Further Update", Policy Research Working Paper Series: 2881, The World Bank).

[2] A recruitment firm in Indonesia, in an interview session, suggested that salaries offered to ITB graduates would range IDR, 1.5 – 3.5 million for S1, and 3 – 4 for S2/3. IRR is very sensitive to the starting salary; however, time and resources allowed to the SAPROF team was not sufficient to determine the starting salary. SAPROF team recommends JICA not to utilize IRRs as an approval resource for the proposed project.

- Tuition fee are assumed at IDR 5,500,000 / year (S1 for 4 years), IDR 11,300,000/year (S2 for 2 years), and IDR 19,200,000 (S3 for 3 years).
- ITB graduate enjoy increased wage until they're retired at 55 years old.

Financial IRR (FIRR)

Preliminary estimation indicates that the proposed project could yield pretty high financial IRR at 14.13%.

- Costs include (i) JBIC investment, (ii) GOI investment, (iii) maintenance (assumed at USD 111,090/Year), (iv) LPPM operation (IDR 10 Trillion/Year). Income forgone NOT included.
- Benefits include revenue from (i) the contracted activities (assumes 4/21 of the total revenue gained by the LPPM and PT LAPI), and (ii) Tuition. Salary increment of student is not counted here.
- Number of the graduates that benefit from the project is 27,850(S1), 12,406(S2), and 944 (S3). Total number of the beneficiaries (graduates during the 30 years after the project completion) is estimated at 41,200. Yearly number of the graduates are 1,039 (S1), 427 (S2) and 35 (S3).
- Project cost and benefit are calculated until 30 years after the project completion

Economic IRR

The proposed project could yield only 7.41 %, according to the preliminary estimation.

It seems that salary increment of the graduates in the market is not big enough to cover income forgone of student body.

Table: Costs and Benefit Considered in IRR Estimation

Considers	Private IRR A student Return to what a student pays	Financial IRR ITB Return to what JBIC and GOI invest	Economic IRR Economy Return to what JBIC and ITB pay
Cost			
Income forgone of student	✓		✓
Tuition Fee	✓		✓
Investment by JBIC loan and APBN		✓	✓
O&M cost paid by ITB		✓	✓
Benefit			
Salary Increment of student	✓		✓
Revenue to ITB through contracted R&D		✓	✓
Tuition Fee		✓	

APPENDICES (Construction)

Appendix C-1

Current Situation of the Project Site

1 Location

ITB Campus is located in the north-side of Bandung which is the Capital City of West Java Province. Distance between Bandung and Jakarta is approximately 155 km.

The campus is surrounded mostly by a middle and low density housing zone and partly by a commercial zone along Dago Street at the east side and south part of Taman Sari Street at west side of the campus. According to the existing and future town plan, the campus is surrounded by area which is intended as green area. Presently total area of ITB campus is approximately 39 hectares and total area of buildings is approximately 265.000 sqm.

The Boundary ITB site area:	North	: Jalan Taman Sari
	South	: Jalan Ganesha
	East	: Resident Housing

2 Access to the ITB Campus

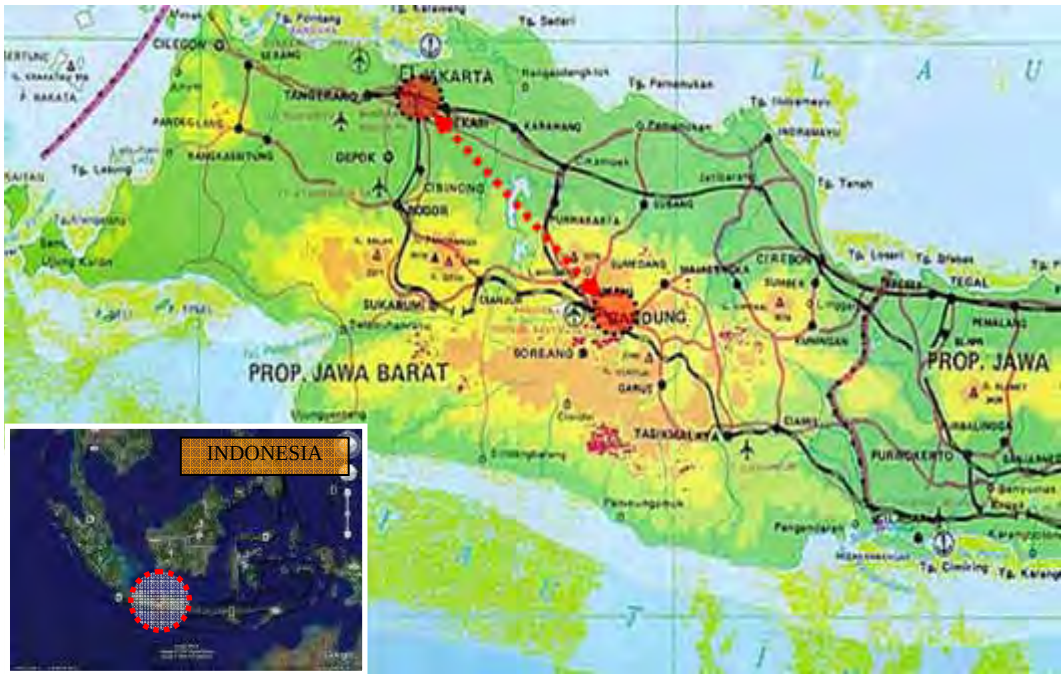
By Train. There is scheduled journey every two hour from station of Gambir (Jakarta), to and from station of Bandung. From station of Bandung to Campus ITB requires 20 to 30 minutes.

By Car. There are two alternative routes.

Alternative I; Jakarta – Bogor – Puncak – Bandung, using inter province road
4 to 5 hours.

Alternative 2: Jakarta – Bandung using Cipularang Highway (Tol Road)
2 to 2,5 hours

By Bus. The same alternative two routes as by car. Intercity Bus Station in Bandung is at Kalideres, it requires 30 to 45 minutes using city cab (“Angkot”) or Taxi



3 Transportation inside the ITB Campus

Inside the ITB Campus, access and circulation is exclusively for pedestrian only. Limited vehicular access and traffic are allowed for lecturers, invited guest, and high ranking administrator/management. Motor bikes and car parks are provided at front and rear area of the campus.

4 Land Use of the ITB Campus and Surrounding Area

According to the city plan of Bandung-years 2013 (Rencana Tata Ruang Detail Kawasan Kota Bandung Tahun 2013) the surrounding area of ITB campus is destined for educational facilities area. Intensity of building area are :

Building's ground coverage (Koefisien Dasar Bangunan- KDB) is 30 %,
Building's floor coefficient (Koefisien Luas Bangunan-KLB) is 60%
Maximum allowable buildings height is 12 metre.

ITB campus is in the sub-district of lebak siliwangi. The ITB Campus area is defined as water diffusion zone for north Bandung area.

The Destined land-use of ITB campus surrounding area are:

East of area : Destined for Commercial/Business area
North of area : Destined for greenery (Green-area)
South of area : Destined for greenery (Green-area)
West of area : Destined for greenery (Green-area)

5 Relevance of the Project to the Campus Master Plan

The Development and expansion of ITB campus could not be separated with the forming and the beginning of the ITB Campus in the year of 1920. The Campus plan, which was made at that time, becomes a pattern and a basic for further development in the years after. The first master plan was created in the year of 1920 then it was further developed and enhanced in 1973, where the campus was divided into 2 zones, the southern part becomes zone of historical buildings and the northern part becomes zone of modern buildings. With further development of the campus, the master plan has been reviewed and reevaluated.

In the new revised master plan, the campus was divided into 3 zones, which are historical transition zone in the middle part of the campus, act as a linkage of the interrelated zones. And the modern zone located in the northern part of the campus.

Land Condition

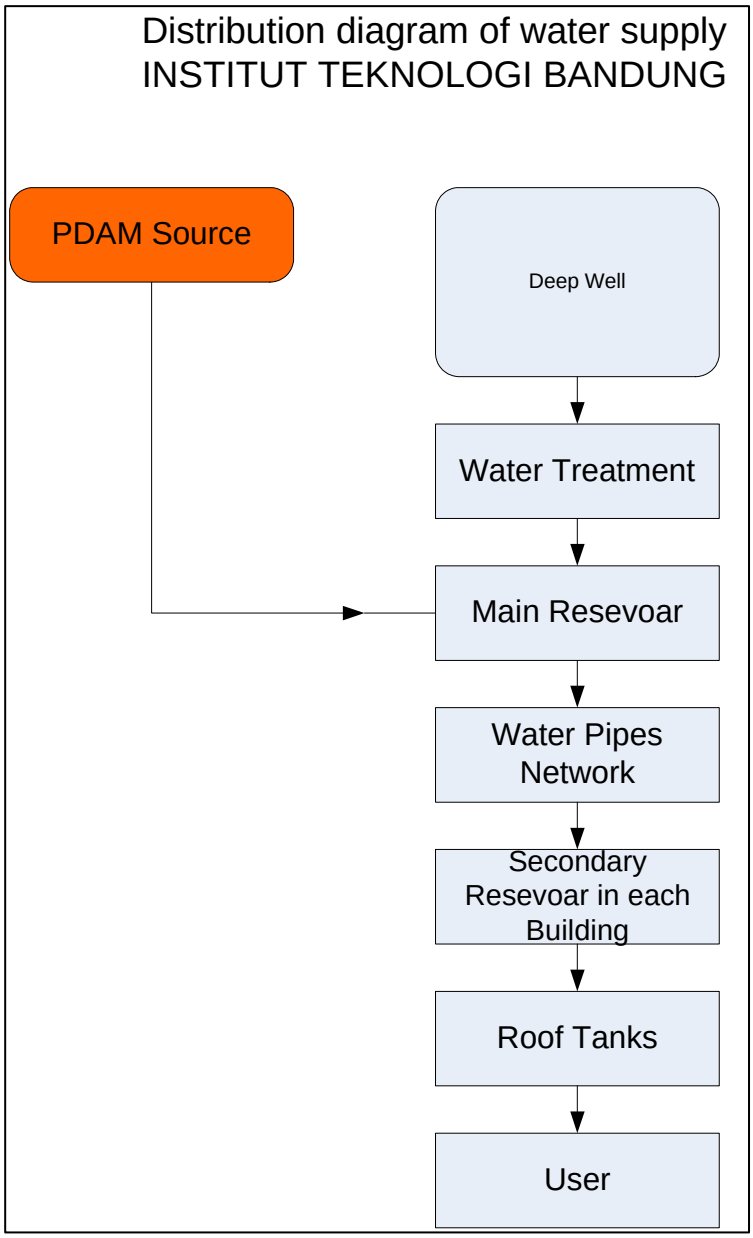
1 Land Level

Road surrounding the campus boundary is approximately 1,5 to 2 m below the campus land level. The campus located at the hill side, it is gradually sloped up to the north direction. The buildings elevation are split leveled accordingly to maintain the 'comfortable' height to the roads the campus around.

2 Set-back line

According to the area and spatial planning of the city of the Bandung (Rencana Tata Ruang Wilayah/ RTRW kota Bandun), there are following setback lines;

Width of Ganesha street :20 metre,
building setback line (Garis Sempadan Bangunan – GSB) 12 metre
Width of the Tamansari street:12 metre,
building setback line 6 metre.



3 Water Supply

The source of the main water supply comes from the city water supply (PDAM) and from the deep well. Water from PDAM directly come in to the main reservoir, while water from the deep well piped to water treatment plan before come in to the distributed to whole campus.

The deep well is served by 7,5 HP pump operated in 6 hours/days (see flow chart)

Intake point: from the main PDAM pipe at the south side of the campus site.

The ITB has two source of the water supply, the first is from deep well and PDAM for clear (clean) water supply. The second is for drinking water supply. The drinking water supply is managed and distributed by the Alumnus Body of ITB (the detailed data of drinking water supply system is not available)

The main water reservoir consisted of two ground water tanks (GWT) where each capacities is 1500 cubic metre and 600 cubic metre. The debit of water supply from PDAM is subscribed at 30.000 cubic metre a month.

4 Power Supply

ITB has 2 PLN power substations. Power capacity of the first One sub-station is 3465 KiloVolt Ampere (KVA) and the other is 1730 KVA. The first sub-station is located near PAU building (North side of the site), while the second located in the south side of the site near by the main entrance area. Presently the total capacity of the power supply is 5195 KVA

Present condition of city power supply

The present consumed power supply average is 2500 KVA, there is exceed capacity of power supply of approximately 2500KVA.

5 Telephone Line

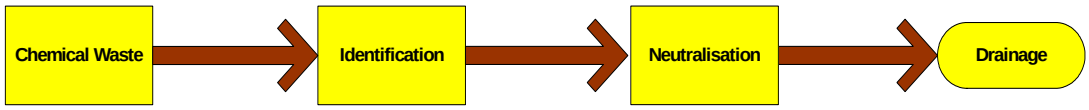
Telecommunication network comes from PT TELKOM BANDUNG UTARA with number of lines. For internal network the numbers is 750 lines (PABX system). For PABX network, ITB has idle capacity of 100 telephone channels. For network directly from PT Telkom, ITB has 3-reserved network.

6 Sewerage System

Domestic waste water/soiled water from toilets is discarded into conventional septic tank. Every building has one or more septic tank. The over flow water from septic tank flows into the absorption bed then its flows out into the closest drainage ditch.

7 Chemical Waste Water Treatment

Chemical effluent from laboratory, containing highly contagious element like heavy metal, vinegar, alkaline and dangerous organic resilient is temporarily stored in container bottles. These are labeled to identify its specific types of waste content, and then the waste is neutralized in a neutralization plant, before it is flowed into the city drainage ditch.



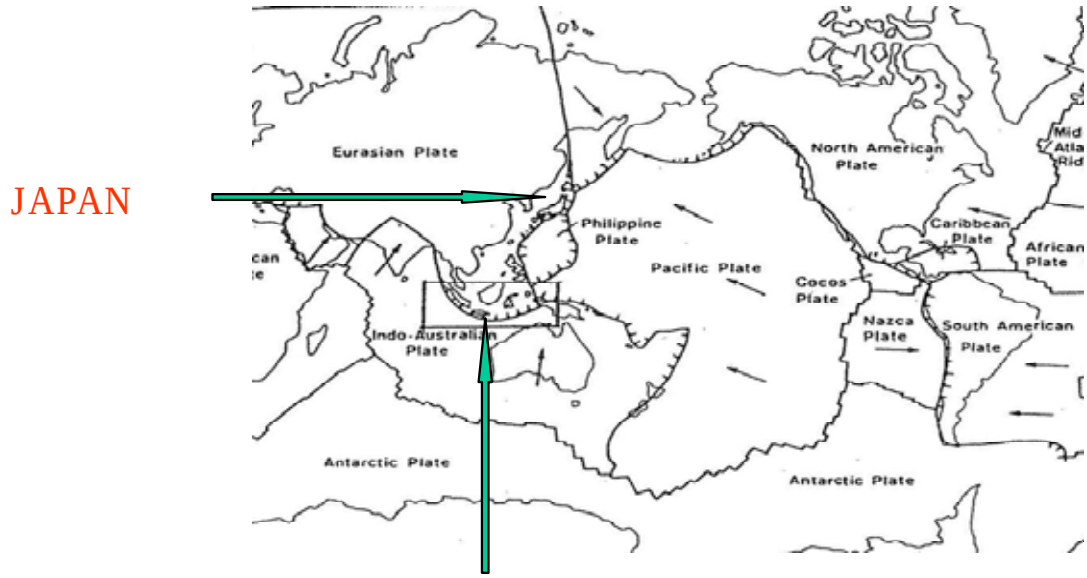
8 Parking Space

Number of car parking reserved for student is 219, number of motorbike parking is 582. While the amounts of car parking reserved for management, lecture, staff and guest is 749, some of the car park spaces is located inside the campus area.

9 Seismic Design

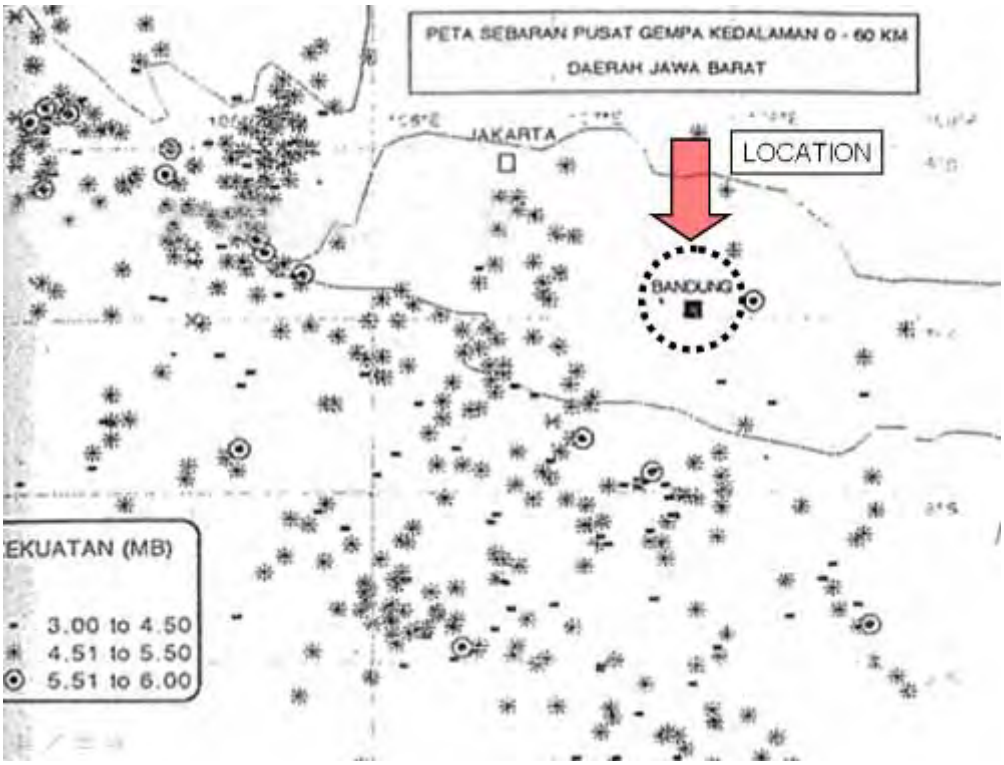
Bandung is in earthquake area.

Earthquake area and Plate boundaries



Source: RSHS basic design report 1996

Location of past epicenters around Bandung area

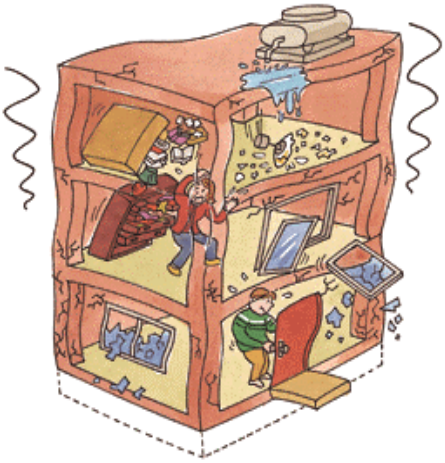


Source: RSHS basic design report 1996

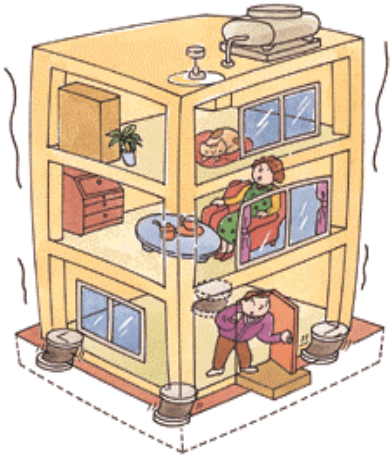
Conventional seismic design can save the building itself. Buildings can be made strong enough to withstand major earthquakes. However, the building will be shaken strongly and equipment and furniture inside the building will fall and shake.

Comparison of seismic design system

Conventional seismic design



Base isolation system



Source: JSSI (Japan Society of Seismic Isolation)

It is strongly recommended to use base isolation system for buildings where equipments are critical life sustaining items such as Hospital Buildings. However for laboratories, the most important thing is to fix the equipments to the building structure, so that they will not be broken during earthquakes. For very sensitive equipment, a partial base isolation system maybe considered during the design phase.

Appendix C-3

Outline of facility design

(1) Structure Design

1) Basic Policy

The structural plan for the project is to be formulated after a full review of the site condition, including soil investigation data. The structure design should also consider local construction and maintenance conditions.

2) Standard for structural Design

Structural design shall basically conform to relevant codes, regulations and standard of Indonesia. The standards are shown below.

Structure Standard in Indonesia

Load	Structural Standard in Indonesia
Loading	Pedoman Perencanaan Pembebanan untuk Rumah dan Gedung SKBI–1.3.53.1987 UDC : 699.841.
Seismic load	Pedoman Perencanaan Ketahanan Gempa untuk Rumah dan Gedung (SNI 03-1726-2002).
Concrete Design	Tata Cara Perhitungan Struktur Beton Untuk Bangunan Gedung SK SNI T – 15-1991-03 and Pedoman Mendirikan Bangunan Gedung (SKBI – 1.3.5.3-1987) ACI 318-83 Building Code Requirement For Reinforced Concrete. Pedoman Perencana Struktur untuk Beton Bertulang Biasa dan Struktur Tembok Bertulang untuk Gedung 1983.
Steel	Peraturan Perencanaan Bangunan Baja Indonesia (SKBI- .3.55xx- 1987). AISC.

Source: SKBI, SNI

According to ”Pedoman Perencanaan Pembebanan untuk Rumah dan Gedung SKBI–1.3.53.1987 UDC : 699.841.”, the loading should be as follows:

Dead Load and Live Load

Dead Load	Live Load
Concrete = 2400 kg/m³ Brick wall (half) = 250 kg/m² Brick wall (1 brick) = 450 kg/m² Ceramic floor tile = 24 kg/cm thickness Mortar = 21kg/cm thickness River stone = 1800 kg/m³ Ceramic roof tile (rafter include) = 60 kg/m² Gypsum = 970 kg/m³	Class room = 250 kg/m² Corridor = 300 kg/m² Meeting room = 400 kg/m² Laboratorium = 400 kg/m² Auditorium = 400 kg/m² Library = 500 kg/m² Concrete roof = 100 kg/m² Stair = 300 kg/m² Equipment room = 400 kg/m² Office room = 250 kg/m² Wind load = 40 kg/m²

Source: Pedoman Perencanaan Pembebanan untuk Rumah dan Gedung SKBI–1.3.53.1987 UDC : 699.841.

3) Analysis and Design Structure

1 Foundation Design

The soil condition of the ITB area is generally firm soil, and foundation layer is around 10 metre depth

2Upper Design

Rigid frame structure will be used.

3Model of Structure

- Model of structure is *Open Frame* R = 5.6.
- Important Factor (I) = 1.4 (university Building)
- Important factor: Public Facilities such as university, etc.
- Specific gravity for concrete = 2400 kg/m^3
- Ductility factor (K) is 1.0 (portal ducktail with reinforcement concrete)
- Coefficient for reduction factor for main girder = 0.9 and for earthquake = 0.5

4Structural Analysis

Structural analysis will be done with *design codes* in Indonesia & international code. (Example: AISC, ASTM, ACI &JASS),

- Vertical load analysis (Gravity load)
- Horizontal load analysis (wind & earthquake)
- Static equivalent & 3-dimensional dynamic analysis
- Reinforcement analysis

Horizontal load from earthquake will be calculated for each floor regarding:

- Calculate mass for each floor (mass = dead load + 30% live load).
- With this mass, do *Eigen Value analysis* for each building used SANS PRO V.4.77 program to get first mode Time Period (T)
- With T and picture 2. Spectrum responds from SNI. 03-1726-2002 at zone 3 Jakarta, to get Coefficient basic shear = C (depend on soil condition)
- Important factor (I) for this project is 1,4 (university building) and ductility factor (K) is 1.0 (portal ducktail with reinforcement concrete)
- Calculate V = Basic shear force for each floor.
- Calculate Fi for each floor with formula:

$$Fi = \frac{Wi.hi}{\Sigma\, Wi.hi} \times V$$

- Calculate centre of mass for each floor.
- Give eccentricity as shown in section 5.4.3. SNI 03-1726-2002
- Do-3 dimension analysis with vertical & horizontal Load

(2) Mechanic and Electricity Design

1) Plumbing Work

1 Water Supply System

A water receiver tank which is an elevated tank and with lift pumps, will be provided to serve constant water supply to the new building facilities.

2 Sewerage System

Standard quality of sewage allowed to be discharged to public drain should have a minimum content of Bio Chemical Oxygen Demand (biochemical oxygen demand BOD) Suspended Solid (SS) as below.

Biological data for Septic Tank input:

- BOD : 250 mg/ltr
- COD : 300 mg/ltr
- SS : 300 mg/ltr

Biological data for Septic Tank output:

- BOD : 50-60 mg/ltr
- COD : 120 mg/ltr
- SS : 100 mg/ltr

The design flow-rate for the STP is calculated based on the return rate of 100% for consumed potable water.

3 Chemical Waste Water Treatment

As for treatment of chemical waste water from the laboratory, waste water containing hazardous substance such as heavy metal, acid and alkaline, and organic solvent containing harmful are temporarily stocked in large bottles. These bottles are to be collected and treated by a collection company.

4 Plumbing Fixtures

Western type water closets will be provided. Urinals with water tap will be wall-hung type.

5 Fire Fighting Facility

Fire fighting facility should be equipped in accordance with the Fire Code of Indonesia, Dinas Pemadam Kebakaran. The new buildings will be fully provided with outdoor fire hydrant system, indoor hydrant system, and fire extinguishers.

2) Air conditioning and Ventilation Work

1 Air conditioning system

According to the air conditioning design standard of ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc.), the outdoor design condition is Dry Bulb 30ºC, Wet Bulb 24ºC, Daily Range 10 degrees.

Air conditioning system (A/C system) is to be installed in laboratory with equipment sensitive to heat, humidity, dust etc. For classrooms, general meeting rooms and administration area will be natural ventilation.

2 Ventilation System

It is planned to provide lavatory, pantry, electrical rooms and mechanical rooms with mechanical ventilation system so as to discharge odor, heat and humidity to outside. According to the Indonesian standard and the ASHRAE standard, the standard of mechanical ventilation is shown in the following table.

Design Standard of Mechanical Ventilation

Room	Method of Ventilation	Unit Air Flow Rate	Remarks
Lavatory	Exhaust only	10 Round/min	To eliminate odor
Storage	Exhaust only	5 Round/min.	
Pantry	Exhaust only	10 Round/min.	To eliminate combustion gas
Pump room,	Exhaust only	5 Round/min.	
Electrical room	Supply and Exhaust	10 Round/min.	To eliminate heat
Generator room	Supply and Exhaust	25 ~30 Round/min	To intake fresh air and eliminate heat

Source: SNI

3) Electrical Works

1 Power Supply System

In ITB Campus facilities, low voltage power supply of PLN is to be led-in through aerial wiring to all the facilities. Uninterrupted Power Supply units (UPS) and /or Automatic Voltage Regulator (AVR) is necessary according to equipment requirements.

2 Standby Generator

A standby generator is to be equipped to maintain power supply for the minimum activity of ITB Campus in the case of power outage. These generators will also backup emergency power supply to the hydrant pumps in accordance with requirement of the Fire Code of Indonesia. It will be prepared with changeover circuits, from duty to emergency drive, for the generator to effectively utilize standby power.

- The capacity of the generator is estimated to be equivalent to 10% of peak demand.
- Type: Mobile Generator
  Low noise and radiator cooling type
- Capacity: 3 phase, 4 wires, 380V, 50Hz
  total 250 kVA
- Operational Time: 10 hours

3 Main Feeder Wiring System

- Wiring Method: Cable ladder, Conduit piping
- Power Distribution: Main Feeder; 3ph, 4w, 220/380V
  For lighting and small appliance 1ph, 2w, 220V
  For power 3ph, 3w, 380V

4 Lighting System

Sustainable lighting system is to be considered for the new buildings. For example, corridors are to have only way finding lighting using LED system. This will reduce the lighting cost substantially.

The lighting intensity level to be adopted is based on the National Indonesian Standard (SNI). JIS (Japanese Industrial Standards) shall not be used since it is too bright.

Standard of Lighting Intensity Level

Room	Lighting Intensity (Lux)
Laboratory	750
Class room, Thesis project room	300
Library, Computer lab	500-750
Administration office	300
Toilet	100
Storage	50

Source: SNI

5 Telephone System

Limitation for external communication for certain numbers and possibility of incoming external call to certain numbers shall be facilitated by the PABX systems, including facilities as group Hunting, Night Services, Abbreviated Dialing, Data Transmission,

Charger Recorder.

Specification of distribution cables has to meet PT Telkom recommendation.

Currently ITB's PABX networks has redundant capacity of 100 telephone lines. For direct PT Telkom lines , ITB has reserved 3 lines.

6 LAN (Local Area Network) System

LAN system is to be provided to fully equip the new building facilities with scalable network system as IT infrastructure. The backbone switch and fiber backbone is to be duplicated to secure LAN system redundancy.

Adopted LAN Standard:	100 BASE-FXT
Data Transfer Speed	100 Mbps

7 Fire Alarm System

Automatic fire alarm system is to be provided in accordance with the fire code of Indonesia. A combination panel that consists of an alarm bell, an indicator lamp and a push button should be provided in each alarm area. Fire control panel is to be installed in the central administration office.

Fire alarm is to have sound and rhythm that can be easily recognized as the fire emergency alert. Alarm sound is to have work frequencies of 500 to 1000 KHz with minimum audibility of 65 decibel

8 Lighting Protection System

Lightning protection system is to be provided for all buildings, to prevent damage to computers and sophisticated equipments.

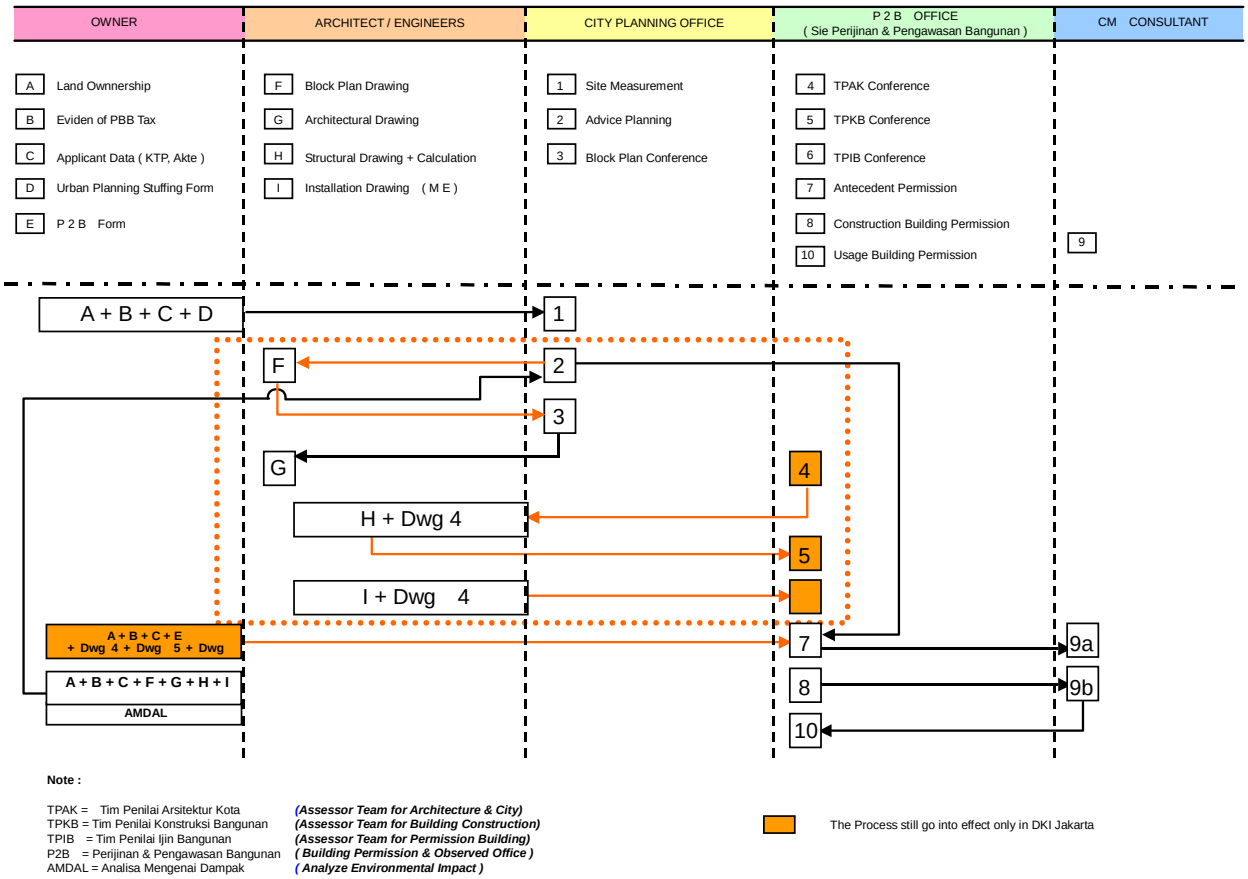
Appendix C-4

Building Construction Permits

Before building Construction, the following permissions are needed:

- Provincial Government's permission
- Building permission application procedures can be seen at flow chart below

Building Permission Application Procedure



Note :

TPAK = Tim Penilai Arsitektur Kota *(Assessor Team for Architecture & City)*
TPKB = Tim Penilai Konstruksi Bangunan *(Assessor Team for Building Construction)*
TPIB = Tim Penilai Ijin Bangunan *(Assessor Team for Permission Building)*
P2B = Perijinan & Pengawasan Bangunan *(Building Permission & Observed Office)*
AMDAL = Analisa Mengenai Dampak *(Analyze Environmental Impact)*

The Process still go into effect only in DKI Jakarta

Source: SAPROF Team

Appendix C-5

Sewage treatment plant regulations

According to sewage treatment regulations (Keputusan Gubernur Kepala Daerah Tingkat I Jawa Barat tentang Baku Mutu Limbah Cair Nomer 6 Than 1999). sewage treatment plant is to have specification with following effluent quality.

Effluent quality (Lampiran III no 6 Tahun 1999)

Item	Maximum allowance	Item	Maximum allowance
Fisika			
Temperature	30 degrees	Se	0.05 mg/L
Zat Padat Terlarut	2000 mg/L	Ni	0.2 mg/L
Zat Padat Tersuspensi	200 mg/L	Co	0.4 mg/L
Kimia		CN	0.05 mg/L
PH	6-9	H2S	0.05 mg/L
Fe	5 mg/L	F	2 mg/L
Mn	2 mg/L	Cl2	1 mg/L
Ba	2 mg/L	NH3_N	1 mg/L
Cu	2 mg/L	NO3-N	20 mg/L
Zn	5 mg/L	BOD5	50 mg/L
Cr+6	0.1 mg/L	COD	100 mg/L
Cr	0.5 mg/L	Senyawa aktif biru	5 mg/L
Cd	0.05 mg/L	Fenol	0.5 mg/L
Hg	0.002 mg/L	Minyak Nabati	5 mg/L
Pb	0.1 mg/L	Minyak Mineral	10 mg/L
Sn	2 mg/L	Radioaktif	
As	0.1 mg/L		

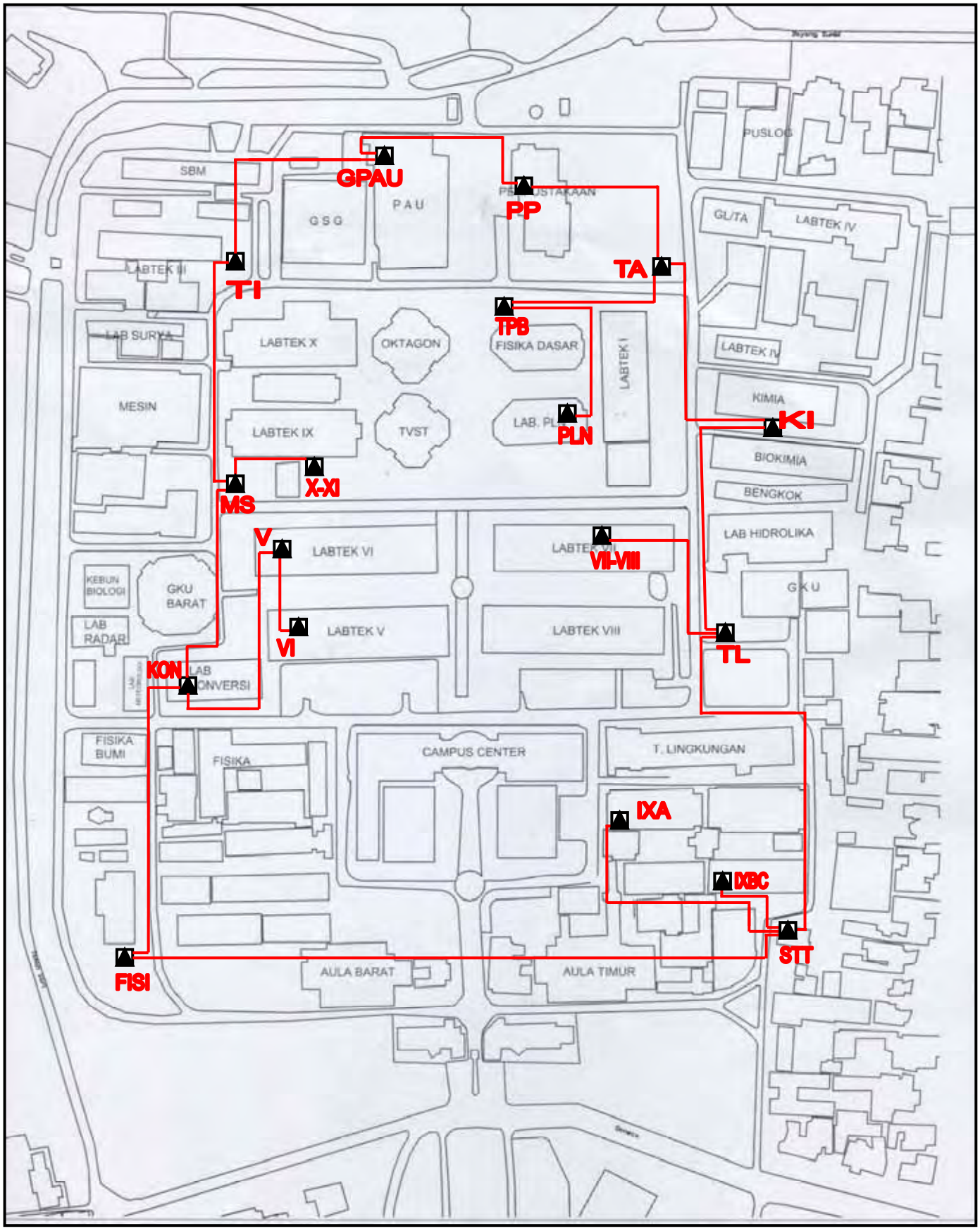
The sewage coverage area of Bandung city is roughly 30%. ITB is within the covered area, and there is now need for such sewage treatment plan.

ITB CAMPUS SITE PLAN

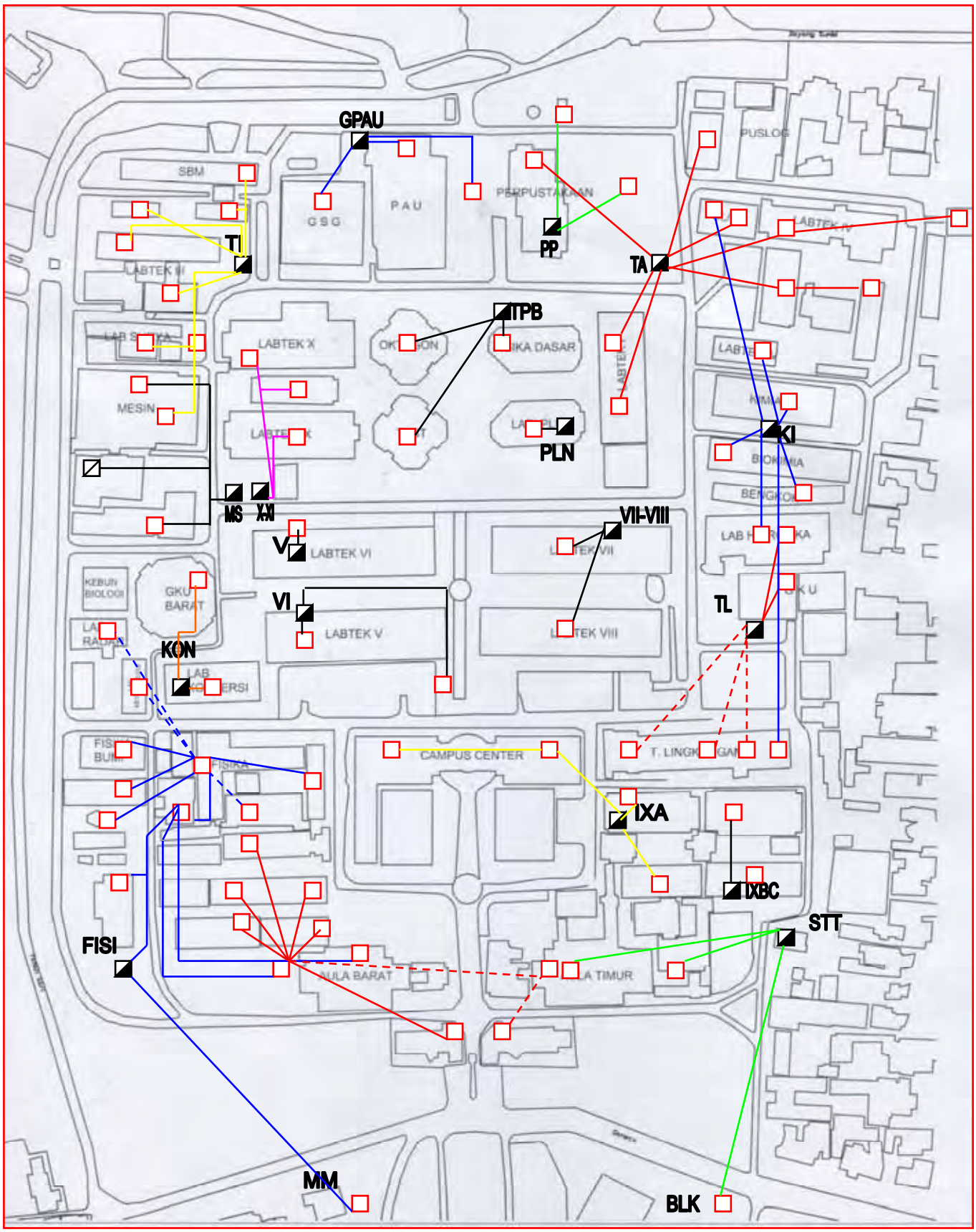
LIST OF EXISTING BUILDING and Floor Area

1	Bengkel Fisika	186m2	42	Es Saig Pendayagunaan dan Perawatan Aset Dit SP	765m2
2	Kantor Permanen LAPI dan BRI	1,060m2	43	Sutdio SP-1 Teknik Sipil	565m2
3	Kantou Semi Permanen Pool Kendaraan, PSADA dna R Rapat	960m2	44	TVST	2,640m2
4	Garasi Pool Kendaraan	101m2	45	Oktagon	3,115m2
5	Bengkel Teknik Lingkungan (Gd Kria)	68m2	46	LOKM (PPFK)	1,101m2
6	Menwa-ITB (Ruand Bengkel Ex	108m2	47	Lan PLN	2,870m2
7	Pertemuan (GSG Kanpus)	3,834m2	48	Lab Surya	1,405m2
8	FTSL	338m2	49	Lab Teknologi I	8,896m2
9	FSRD	355m2	50	Kimita II	3,637m2
10	Kantor Permanen PPLH	479m2	51	Lab TPB (Fisika Dasar Comlabs)	1,486m2
11	Aula Barat	2,169m2	52	Lab Teknoloti II	9,400m2
12	Aula Timur	2,124m2	53	Lab Mesin Estendion (Baru)	5,320m2
13	Penunjang LFM (slasar LFM)	639m2	54	Lab Teknoloti III	8,530m2
14	Kuiah No.9009 (LFM)	271m2	55	Lab Teknologi IV	8,448m2
15	Kuliah dan Ruand Dosen Teknik Sipil (Bangunan Lt 1 dan ALSo Lt 2)	691m2	56	Perputakaan Pusat	9,817m2
16	Runad kuliah dan Runda Dosen Teknik Sipil (Sebelah timur)	630m2	57	Kuliah Umum Barat	4,250m2
17	Lab ex. Hidoilika dan Mezanine	1,462m2	58	Kelompok Pusat Penelitian (KPP	13,450m2
18	Bangunan Teknik Spil dan Mezanine	1,677m2	59	Kuliah Umum timur	4,316m2
19	kabinet Irgasi dan Hidolika	656m2	60	FSRD (PS Seni Rupa & PS Desain)	7,903m2
20	UTama Teknik Lingkungan	2,425m2	61	Lab Teknolgi V	12,627m2
21	Lab Uji Hidolika Program Sudi Teknik	2,608m2	62	Lab Teknologi VI	12,672m2
22	Kelder Mesin	555m2	63	Gedung Campus Center	5,697m2
23	Lab Geologi / Tambang	2,318m2	64	Lab Teknologi IX A	6,229m2
24	Lab Mesin	1,928m2	65	Lab Teknoli VII (SF)	16,450m2
25	Utama Sekolah Bisnis dan Manajemen (SBM)	3,063m2	66	Lab Teknologi VIII (FMIPA, EL, UPT Bahasa)	15,921m2
26	Lab Fisika (dulu Lab Fisika dan Lab Fisika Teknik Bengkel RT Gudang	585m2	67	Lab Teknologi X (TK)	8,410m2
27	Prefab VII (Gd. Kimia Lama)	3,542m2	68	Lab Teknologi (SITH)	9,324m2
28	Penunjang Sekolah Bisnis dan Manajemen ITB (Gd. Depan)	1,190m2	69	Lab Teknologi IX B	6,181m2
29	Gedung Ex Biologi (R. Adm PS Kria)	280m2	70	Lab Teknologi IX C	6,240m2
30	Ex Ruadn Dosen dan Studio Teknik Lingkungan (kantor SP)	285m2	71	WC Toilet Aula Barat	36m2
31	Ex Ruand Kuliah Teknik Lingkungan (R Kuliah PS Kria)	110m2	72	WC Toilet Aula Timur	30m2
32	Fisika (Gd Lama)	5,190m2	73	Sunken Court	7,780m2
33	Lab Konversi Energi Listrik	2,157m2	74	Lab Material	983m2
34	Teknik Perminyakana (FITB)	1,248m2	75	Mizanine Lab Mesin	233m2
35	Ruang Pmpa Kimia	71m2	76	Lab Fisika Lanjut I	409m2
36	MBA Teknologi & OECF ex DPMB (studi Pembangunan & Ti)	433m2	77	Basic Science A	3,908m2
37	UPT logistik (Ex Studio LAPI dan Gedung LAPI)	332m2	78	Basic Science B	4,252m2
38	Ex UPT Olah Raba (Tokema dan Unit Keg Mahasiswa)	450m2	79	Fisika Koputasi (F.I. Lanjut II)	850m2
39	Kelder Kimia	60m2	80	Timur Laut (Belankang Teknik Pertambangan)	340m2
40	Lab Radar	1,087m2	81	Bart Laut (Belankang Sekola Bisnis dan Manajemen ITB)	385m2
41	Lab Asiwiyogo	85m2	82	Gedung Bengkok	197m2
	sub total	47,810m2		sub total	217,068m2
				TOTAL	**264,878m2**

ELECTRICAL HIGH VOLTAGE POWER SYSTEM of ITB



ELECTRICAL POWER SYSTEM of ITB



Tegangan 220 Volt

Tegangan 110 Volt

Power distribution chart

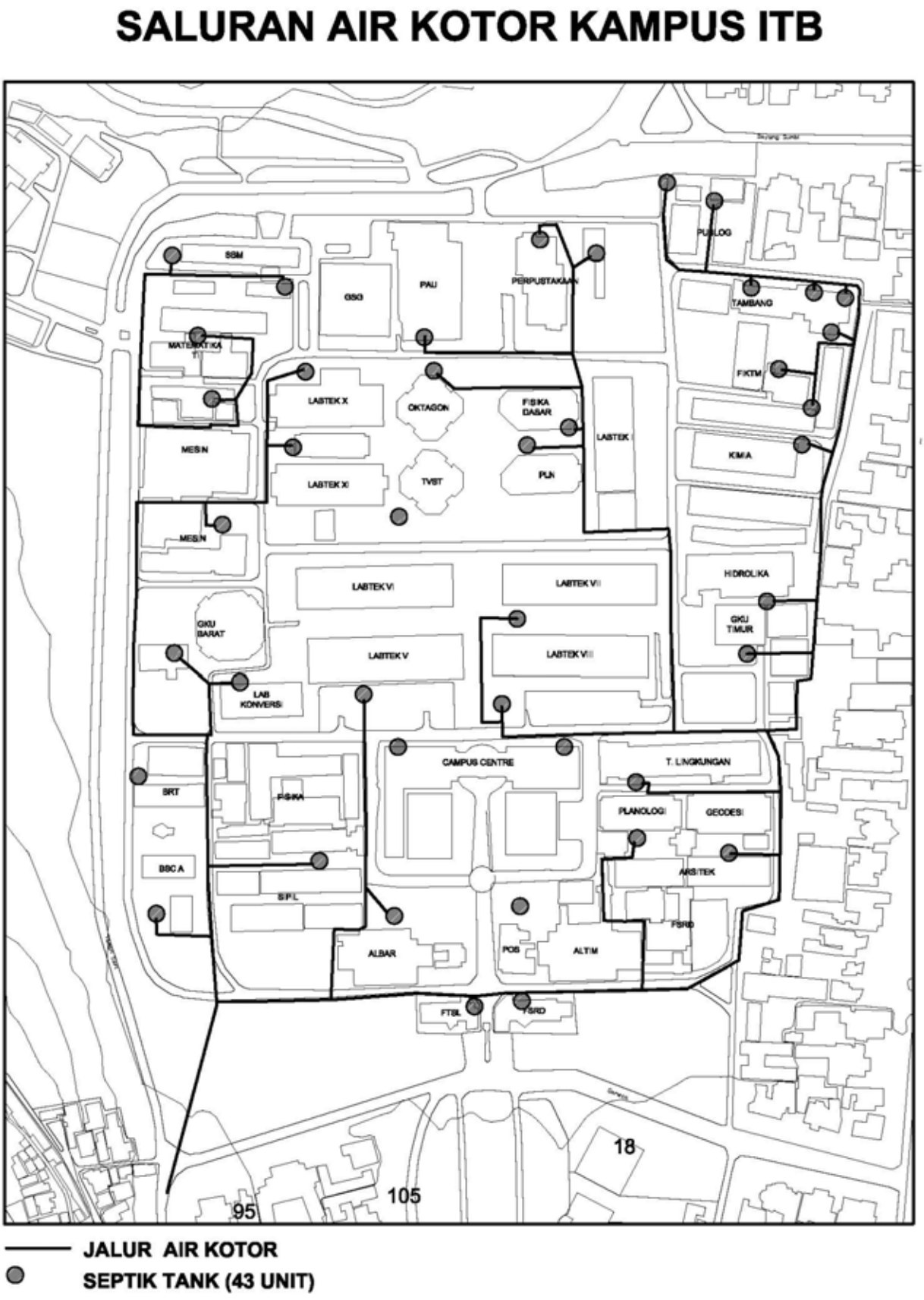
DAYA MAKSIMAL YANG DIGUNAKAN
PENGUKURAN

TANGGAL : 29 April 2008
TANGGAL : 12 Agustus 2008
TANGGAL : 13 Agustus 2008
TANGGAL : 26 Agustus 2008
TANGGAL : 27 Agustus 2008

Pelaksana Pengukuran
1. Mamat Sutisna
2. Komarudin A
3. Undang Usman

NO.	NAMA GARDU JAM Pengukuran	CUBICLE MERK	TRAFO MERK	KAPASITAS TRAFO (KVA)	PENGUKURAN ARUS (Amper) R	S	T	N	STANDAR TEGANGAN (VOLT)	PERHITUNGAN DAYA (VA) R	S	T	N	DAYA TERPAKAI (KVA)	UTILISASI TRAFO (%)	KETERANGAN
1	FISI	ABB BC 5 (1985)	TRAFINDO (1)	630 (220/ 380 V)	195	186	171	90	220	42900	40920	37620	19800	121.44	19.28	**Trafo I :**
			TRAFINDO (2)	400 (110/220 V)	109	103.3	112	20.1	110	11990	11363	12320	2211	35.673	8.92	**Trafo II :** Fisika, MM/MBA, Aula Barat BSC A, Lab.
2	KONVERSI	ABB BC 5 LBS Fuse (2) LBS (3)	TRAFINDO 1 Trafo tidak diaktifkan	630 (220/380 V)	46.8	78.8	43.2	52.8	220	10296	17336	9504	11616	37.136	5.89	Trafo I : Istirahat
3	LABTEK V	UNINDO FLOUKIT C.10 (1) FLOUKIT C.12 (2)	UNINDO (1)	630	170	146	102	125	220	37400	32120	22440	27500	91.96	14.60	FTI, Kantin, IF, Ruang Kuliah Umum
4	LABTEK VI		UNINDO (2)	400	115	120.1	98.9	68.5	220	25322	26422	21758	15070	73.502	18.38	TF, Kelautan, Ruang kuliah umum
5	MS	CEM KIT.25 (5) LBS Fuse (2) LBS (3)	BBC	1250	155	175	105		220	34100	38500	23100		95.7	7.66	Labtek II, Lab. Mesin, Lab. Penerbangan Lab. Gas Enginee.
6	Labtek X - XI	ALSTOOM LBS Fuse (2)	UNINDO (1)	1250	96	105	99	10	220	21120	23100	21780	2200	66	5.28	BI, GM,
		LBS (1)	UNINDO (2)	630	161	138	170	50	220	35420	30360	37400	11000	103.18	16.38	Teknik Kimia, MTS
7	TI 08.40	CEM KIT. 25 (6) LBS Fuse (2) LBS (3)	TRAFINDO ('94)	250 (110/220 V)	18	28.8	34.5	2	110	1980	3168	3795	220	8.943	3.58	Trafo I : Lab. Mesin, Lab. Surya, Studi
		LBS Tegangan (1)	UNINDO ('85)	630	361	271	262	126	220	79508	59620	57530	27720	196.658	31.22	
8	LS	UNINDO FLOUKIT C.10 (1) CEM. KIT 27.2 (1)	TRAFINDO	630	86.5	110.9	81.7	32.6	220	19030	24398	17974	7172	61.402	9.75 0.00 0.00	Sarana Olah raga, Kolam renang, Deep well
9	SBG 09.00	FLOUKIT C.10 (2) FLOUKIT C.12 (1) ARESTER (1)	UNINDO(1)('96) TR. Kering	800	465	413.1	439	14	220	102278	90882	96580	3080	289.74	36.22	SBG Acara mahasiswa baru
		LBS Fuse (2) LBS (3)	UNINDO(1)('96)	800	80.6	85.8	55.8	19.1	220	17732	18876	12276	4202	48.884	6.11	
10	PAU 09.15	CEM. KIT 27(4)	UNINDO (1)	1250	120	90	105	30	220	26400	19800	23100	6600	69.3	5.54	PAU, Sunken Court, Pos Satpam Utara, GSG, PJU, Terowongan.
		KIT 25 (2)	UNINDO (2)	1250	230	259.1	228	40	220	50534	57002	50050	8800	157.586	12.61	
11	TA	ABB BC 5 LBS Fuse (2)	UNINDO (1)('85)	630	150	155	180	67	220	33000	34100	39600	14740	106.7	16.94	Trafo I : Labtek I, Lab. Struktur, Oktagon, Comlab,
		LBS (3) MCCB (1)	UNINDO (2)	400	127	131.8	165	70	220	27874	28996	36300	15400	93.17	23.29	TVST, Pool kendaraan, Proyek ITB, Puslog, PJU Dinas Rektor, Kantin Timur, PJU
12	TPB	ABB BC 5	TRAFINDO	400 (110/220 V)	**ISTIRAHAT**				110							
13	KI	ABB BC 5 LBS Fuse (2)	TRAFINDO (1)	630	199	207.8	149	94	220	43868	45716	32736	20680	122.32	19.42	Trafo I : Kimia, Tambang lama, Rumah pompa
		LBS (2)		250	137	172	162	55.4	110	15081	18920	17776	6094	51.777	20.71	
14	TP (TL)	ABB BC 5 LBS Fuse (2)	TRAFINDO (1)	630 (220/380 V)	72.9	206	55	66	220	16038	45320	12100	14520	73.458	11.66	Trafo I : Hydrolika, TL, PPFK, Dit SP, Kriya
		LBS (3)	TRAFINDO (2)	400 (110/220 V)	26	54	52	7.7	110	2860	5940	5720	847	14.52	3.63	Trafo II :
15	STT	ALSTOOM LBS Fuse (1) LBS (7) MCCB (1)	UNINDO	400	65.9	94.3	95.8	29	220	14498	20746	21076	6380	56.32	14.08	SR, Balai Kesehatan, Aula Timur, PJU
16	LABTEK IX B,C	ALSTOOM LBS Fuse (1) LBS (1)	UNINDO	630	150	159.6	146	62	220	32956	35112	32010	13640	100.078	15.89	Arsitek, Geodesi, Kantin Barrac
17	LABTEK IX A	ALSTOOM LBS Fuse (1) LBS (1) ARESTER (1)	TRAFINDO	400	101	121	107	43.7	220	22220	26620	23474	9614	72.314	18.08	Planologi, Campus Centre, PJU
18	LABTEK VII-VIII	ALSTOOM LBS Fuse (2)	UNINDO	630	139	177	142	50	220	30580	38940	31240	11000	100.76	15.99	Trafo I : Farmasi, Sostek, PJU
		LBS (1)		630	134	108.1	145	57	220	29436	23782	31988	12540	85.206	13.52	
19	LAB. PLN	ABB BC 5 LBS Fuse (1) LBS (1)	TRAFINDO	630	36.6	48.8	26.8	18.5	220	8052	10736	5896	4070	24.684	3.92	Lab. PLN
20	PP	CEM KIT.25 (3) LBS Fuse (2)	UNINDO	630	228	204.1	201	38.4	220	50182	44902	44264	8448	139.348	22.12	Perpustakaan pusat, Penerbit, Rumah pompa, Garasi Pool Kendaraan
		Cyler (AC)		630	126	133.3	115	0.2	220	27808	29326	25256	44	82.39	13.08	
	TOTAL													**2580.149**		

Drainage System of ITB



Comparison of Unit cost per floor area

Loan No		Building	Floor area	Start	Completion	Duration	Total cost	contractor	Unit cost
IP-401 89%	1	Lab TeK V Lab TeK VI	8,740m2 8,740m2	1994/3/12	1995/3/18	12.4months	JPY 534,227,729	Pt Summa Surya Perkasa	30,562 JPY/m2
	2	Lab TeK X	8,118m2	1994/1/7	1995/12/17	23.6months	JPY 318,454,144	Tokai Wijaya Kusuma	39,228 JPY/m2
IP-434 87%	3	Lab TeK VII Lab TeK VIII	10,660m2 12,590m2	1995/11/6	1996/12/26	13.9months	JPY 996,670,622	PT Wijaya Kusuma	42,868 JPY/m2
	4	Lab TeK IX-A	5,828m2	1995/5/11	1996/5/10	12.2months	JPY 252,683,872	PT Pembangunan	43,357 JPY/m2
	5	Lab TeK IX-B Lab TeK IX-C	6,128m2 5,973m2	1996/11/24	1998/11/24	24.3months	JPY 474,507,137	PT Waskita	39,212 JPY/m2
	6	Lab TeK XI	9,343m2	1995/11/13	1996/11/30	12.8months	JPY 616,066,570	Tokai PT Wijaya Kusuma	65,939 JPY/m2
	7	Science Technology and Art Center	21,922m2	1995/6/13	1997/1/11	19.3months	JPY 1,161,379,795	PT Satyamitra Surya Perkasa	52,978 JPY/m2
	8	Computer Center and Academic	7,240m2	1999/11/16	2001/1/31	14.7months	JPY 288,203,610	PT Pembangunan Perumahan	39,807 JPY/m2
	9	Basic science center A & B	7,772m2	2001/6/22	2002/7/2	12.5months	JPY 311,490,666	PT Hutama Karya	40,079 JPY/m2

APPENDIX C-13
Summary of Facility area

			ITB proposal		SAPROF Final				
A	CAS	Center for Advanced	8F	3,500 m2	8F	3,900 m2	**AB**	CAS & M & A & CRCS	Center for Advanced Sciences
						3,200 m2			Mathmatics
						1,200 m2			Astrology
B	CRCS	Center for Research & Community Service	8F	8,000 m2		7,000 m2			Center for Research & Community Service
						15,300 m2		total	
C	CIBE	Center for Infrastructure & Built Environment Engineering	10F	10,000 m2	10F	11,000 m2	**C**	CIBE	Center for Infrastructure & Built Environment Engineering
		Hydraulic and Ocean engineering laboratories	4F	3,500 m2					
		Infrastructure & Engineering			**reno**	2,460 m2			InfrastructureEngineering Hydraulic and Ocean engineering laboratories
D	CITIE	Center for IT in Industrial Engineering	**4F**	3,500 m2	**reno**	5,900 m2	**D**	CITIE	Center for IT in Industrial Engineering
			reno	1,500 m2					
E	CADL	Center for Arts, Design & Languages	8F	8,000 m2	8F	8,000 m2	**E**	CADL	Center for Arts, Design & Languages
			reno	5,800 m2	**reno**	5,200 m2			

new	36,500 m2	new	34,300 m2
reno	7,300 m2	**reno**	11,100 m2

Appendix C-14 BUILDING AB CAS&M&A Building Floor Area List

No	Rooms	capacity specs (student number, staff number, etc)			special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
									JBIC		
									new construction	renovation	existing
		Students	Staff	Equipments/ rooms							
BUILDING AB CAS &M&A&CRCS NET TOTAL									**9,970m2**		
	common facility rooms				ratio to gross total		10%		1,523m2		
	circulation				ratio to gross total		25%		3,807m2		
	Gross total								**15,300m2**		
	CAS NET total								2,520m2		
	Mathmatics NET total								2,105m2		
	Astronomy NET total								810m2		
	CAS NET TOTAL								**2,520m2**		
I	**Equipment Rooms**									0	0
1	Microscopy	0	0	FE-SEM space	non vibration	1	60m2	60m2	60m2	0	0
				TEM space	magnetic shield	1	30m2	20m2	20m2		
				SEM + EDS space	sound proof	1	30m2	20m2	20m2		
				SPM space	N2	1	30m2	20m2	20m2		
				Optical Microscope space	Constant temperature water	1	20m2	20m2	20m2		
2	X-ray	0	0	low angle X-Ray space	non vibration	1	30m2	30m2	30m2	0	0
				Nano Viewer	Constant temperature long and heavy						
3	SEM-TEM Preparation	0	0	Ion Slicer	A/C	2	25m2	50m2	50m2	0	0
				Precision Etching/coating system							
				Carbon evaporator							
4	Composition Characterization Laboratory	0	0	XRF	A/C	1	50m2	50m2	50m2	0	0
				ICP	Argon gas						
				FT-IR	ICP:non vibrating floor						
				GC/MS System							
				UV-Visible Spectrophotometer							
5	Computing Facility	0	2	CLUSTER SERVER ROOM	strong A/C	1	15m2	15m2	15m2	0	0
		0	2	CLUSTER NODE ROOM	strong A/C	1	60m2	60m2	60m2	0	0
		50	2	CLIENT COMPUTER ROOM	A/C	2	60m2	120m2	120m2	0	0
6	Particle Analyzer Laboratory	0	0	Nanoparticle Analyzer	A/C	1	30m2	30m2	30m2	0	0
				Surface Area & Pore Size Analyzer	A/C						
7	Optical Properties Laboratory	0	0	Double Monochromator	non vibration	1	35m2	35m2	35m2	0	0
	2nd sequence			Optical System Measurement (vibration isolation table, lense with lense stage, laser stage)	A/C						
8	Electrical Properties	0	0	Solar Cell Characterization Station	A/C	1	60m2	60m2	60m2	0	0
				Electromagnet for Hall Measurement							
				Impedance Analyzer							
				cryostsat							
				Electrical properties measurement system							
9	Thermal Properties	0	0	TG-DTA	A/C	1	15m2	15m2	15m2	0	0
				Differential Scanning Calorimeter							
10	Sol Gel Process	0	0	Sol-Gel Evaporation	A/C	1	50m2	50m2	50m2	0	0
				Automatik Titrator	water						
				Magnetic Stirring Hot Plates							
				Spin coating apparatus							
				Spinner							
11	Magnetic Properties 2nd sequence	0	0	Vibrational Sample Magnetometer	Heavy weight A/C	1	30m2	30m2	30m2	0	0

No	Rooms	capacity specs (student number, staff number, etc)			special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
									JBIC		existing
									new construction	renovation	
		Students	Staff	Equipments/ rooms							
12	High Temperature Process	0	0	Heat Treatment Furnace		1	50m2	50m2	50m2	0	0
				Vacuum Box							
				Furnace with 120 cu-in chamber							
				Constant Temperatur Dryer							
				Crucible Furnace							
				Force Convection Oven							
13	Vacuum Process	0	0	Plasma Process System	A/C	1	40m2	40m2	40m2	0	0
	2nd sequence			Vacuum Process system							
14	Wet Process Laboratory	0	0	Draft Chamber with scrubber (4)	A/C	1	100m2	100m2	100m2	0	0
				Experiment Table	water						
				Electro Dialysis Water Purifier Type 1,2, and 3)							
				Laboratory Glass Ware Dryer							
				Laboratory Glass Ware							
				Electrodeposisition Growth Apparatus							
15	Dry Process Laboratory			Ball mill	A/C	1	50m2	50m2	50m2	0	0
				autoclave (50 sets)	water						
				Low Speed Cutter							
				Lapping and Polishing Machine							
				Pressing Machine							
16	Nano Medicine Laboratory			Listed in equipment file	-						
	Registration room		6			1	10m2	10m2	10m2	0	0
	Administration room	-	2			1	10m2	10m2	10m2	0	0
	Archive and reference room	-				1	10m2	10m2	10m2	0	0
	Sample storage room	-				1	5m2	5m2	5m2	0	0
	Biological sample storage room	-			A/C	1	10m2	10m2	10m2	0	0
	Waste room	-			water	1	5m2	5m2	5m2	0	0
	Weighing room	-			no vibration	1	10m2	10m2	10m2	0	0
	Instrumentation room	-			Temperature control	1	40m2	40m2	40m2	0	0
	Sample preparation room	-	2		with fume hood	1	20m2	20m2	20m2	0	0
	Analytical data room	-	2			1	10m2	10m2	10m2	0	0
	Blood sampling room	-	2		A/C	1	20m2	20m2	20m2	0	0
	Medical Check Up room	-	2		Clean	2	10m2	20m2	20m2	0	0
	Bed room for male volunteer					1	40m2	40m2	40m2	0	0
	Bed room for female volunteer					1	40m2	40m2	40m2	0	0
	Bed room for male staff					1	10m2	10m2	10m2	0	0
	Bed room for female staff					1	10m2	10m2	10m2	0	0
	Bed room for nurse and analyst				-	1	10m2	10m2	10m2	0	0
	Rest room for volunteer				-	1	30m2	30m2	30m2	0	0
	Rest room for analyst/nurse				-	1	10m2	10m2	10m2	0	0
	Storage				-	calculated as common facility room					
	Director room				-	1	10m2	10m2	10m2	0	0
	Room for technical manager					1	10m2	10m2	10m2	0	0
	Room for quality manager				-	1	10m2	10m2	10m2	0	0
	Room for general manager				-	1	10m2	10m2	10m2	0	0
	Room for administration manager				-	1	10m2	10m2	10m2	0	0
	Room for financial manager				-	1	10m2	10m2	10m2	0	0
	Genset room				-	1	100m2	100m2	100m2	0	0
					-						
17	Nano Bio Laboratory			Lab water purification system (Type I)	A/C	2	75m2	150m2	150m2	0	0
	including storage area			Lab water purification system (Type II)	water						
				Lab water purification system (Type III)							
				Freezer							
				Freeze Drying							
				Automatic Autoclave							
				Manual Autoclave							
				Sonicator							
				Magnetic stirrer/hot plates							
				pH meter							
				PCR							
				RT-PCR							
				DNA Synthesizer							
				DNA Sequencer							
				Microcentrifuge							
				Centrifuge							
				Spectrophotometer							
				Incubator							

No	Rooms	capacity specs (student number, staff number, etc)			special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
									JBIC		existing
		Students	Staff	Equipments/ rooms					new construction	renovation	
				Shake and Stack							
				Static Waterbath							
				Recilculating Waterbath							
				Vacuum pump							
				Nitrogen tank							
				Vortek							
				Membrane Filter							
				Electrophoresis Set:Power Supply							
				Electrophoresis Set:Pulsed Field							
				Electrophoresis Set:Gel Casting Tray							
				Microwave							
				Gene Gun (Particle Bombardment)							
				UV Transilluminator							
				Laminar airflow							
				Laminar airflow							
				Shaker							
				Fermenter 1L							
				Fermentor 15 L							
				Magnetic stirrer/hot plates							
				Precision Balance							
				Shaker Incubator							
				Fermenter 150 L							
				Freeze Drying							
				Centrifuge							
				HPLC							
18	Clean Process Laboratory			Acrylic Desiccators with Gas Ports 12"x12"x12"	clean A/C	1	30m2	30m2	30m2	0	0
				Digital Precision Balance	-						
				Digital Analytical Balance	-						
19	Liquid Nitrogen Facility			Liquid N2 Supply Devices	-	1	30m2	30m2	30m2	0	0
				Nitrogen Tank and N2 cold traps	-	1	20m2	20m2	20m2	0	0
II	**Supporting Room**										
1	Head of Nano office	0	3			3	10m2	30m2	30m2	0	0
2	Researcher Room	0	10			5	10m2	50m2	50m2	0	0
3	Student Room	50	0			3	50m2	150m2	150m2	0	0
4	Administration Room	0	2			1	15m2	15m2	15m2	0	0
5	Small Meeting Room	0	0			2	15m2	30m2	30m2	0	0
6	Meeting Room	0	0			1	70m2	70m2	70m2	0	0
7	Library	0	0			1	30m2	30m2	30m2	0	0
8	Warehouse	0	0			calculated as common facility rooms				0	0
9	Chemical Waste Treatmen	0	0			1	50m2	50m2	50m2	0	0
10	Electrical & Maechanical	0	0			1	100m2	100m2	100m2	0	0
11	Glass Blowing Production Equipment and Tools	0	0			1	40m2	40m2	40m2	0	0
12	Metal workshop Equipment	0	0			1	50m2	50m2	50m2	0	0
13	Small Class Room	0	0			3	40m2	120m2	120m2	0	0
14	Culture room	20	0			1	50m2	50m2	50m2	0	0
15	Exibition room	0	0			calculated as common facility rooms				0	0
16	Convention	100	0			1	100m2	100m2	100m2	0	0

	Mathmatics										
1	Academic Staf	1			Prof.	15	10m2	150m2	150m2		
		1			Assoc.Prof	25	10m2	250m2	250m2		
		1			Asist.Prof	25	10m2	250m2	250m2		
		1			Lecture	5	10m2	50m2	50m2		
2	Chair Prodi	1			Undergraduate	1	15m2	15m2	15m2		
		1			Graduate(S2 & S3)	1	15m2	15m2	15m2		
		1			S2 Actuarial	1	15m2	15m2	15m2		
3	Admin Staf	12			Academic	1	40m2	40m2	40m2		
		4			Supporting	1	15m2	15m2	15m2		
4	Research Laboratory	12				5	25m2	125m2	125m2		
5	Seminar room	20				3	40m2	120m2	120m2		
		100				1	120m2	120m2	120m2		
		100			share with CAS	1	120m2				
6	Library	6500 title				1	200m2	200m2	200m2		
7	Meeting room	20				2	40m2	80m2	80m2		
		60				1	120m2	120m2	120m2		
8	Laboratory for Educ.	150			Student (S1)	1	300m2	300m2	300m2		
		60			Student (S2/S3)	1	120m2	120m2	120m2		
9	Lounge	20			Ac. Staf	calculated as common facility rooms					
10	Study/Discuss room	5				calculated as common facility rooms					
11	Workspace	60			S3	60	2m2	120m2	120m2		
12	Storage(supply room)					calculated as common facility rooms					
13	Archive room					calculated as common facility rooms					
14	Production room					calculated as common facility rooms					
15	Guest room	1			Prodi	calculated as common facility rooms					
		1			Research Group(KK)	calculated as common facility rooms					
17	Himpunan room				Himatika	calculated as common facility rooms					

No	Rooms	capacity specs (student number, staff number, etc)			special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
									JBIC		existing
		Students	Staff	Equipments/ rooms					new construction	renovation	
	Astronomy										
I.	Offices										
1	Administration										
	General Adm.	5 staff				1	20m2	20m2	20m2		31m2
	Head of Dept.	1 staff				1	10m2	10m2	10m2		17m2
	Secretary of Dept.	1 staff				1	5m2	5m2	5m2		17m2
2	Meeting Room								0m2		
	Plenary	20 persons				1	40m2	40m2	40m2		0m2
	Small meeting	10 persons				1	20m2	20m2	20m2		17m2
3	Faculty Member								0m2		233m2
	Professor	1 staff				5	10m2	50m2	50m2		
	Assoc. Prof.	1 staff				8	10m2	80m2	80m2		
	Assist. Prof.	1 staff				7	10m2	70m2	70m2		
	Lecturer/PhD Student	2 staff				3	10m2	30m2	30m2		
4	Visiting Scientist	1 staff				1	10m2	10m2	10m2		0m2
II.	Academic Facilities										
5	Class Room										
	Large Class	50 persons			multimedia; soundproof	1	70m2	70m2	70m2		58m2
	Medium Class	20 persons			multimedia; soundproof	2	30m2	60m2	60m2		34m2
	Small Class	10 persons			multimedia; soundproof	2	20m2	40m2	40m2		42m2
6	Library/reading room/photocopy										72m2
	Book area					1	60m2	60m2	60m2		
	Reading area					1	40m2	40m2	40m2		
7	Laboratory										
	Computer A	15			Networking; air conditioned	1	30m2	30m2	30m2		20m2
	Computer B	10			Networking; air conditioned	1	20m2	20m2	20m2		0m2
	Instrumentation				Workbench	1	15m2	15m2	15m2		0m2
	Language				Soundproof	1	10m2	10m2	10m2		6m2
8	Server/printing				Air conditioned; network access point from Bosscha	1	20m2	20m2	20m2		21m2
9	Reproduction					1	10m2	10m2	10m2		0m2
10	Working Group										
	Graduate	10				1	20m2	20m2	20m2		21m2
	Undergraduate	20				1	30m2	30m2	30m2		0m2
	Discussion	5				2	15m2	30m2	30m2		0m2
III.	Supporting Facilities										
	Lounge					calculated as common facility rooms					11m2
	Storage					calculated as common facility rooms					
	Telescope					1	20m2	20m2	20m2		

Appendix C-14 BUILDING AB CRCS Floor Area list

	no	rooms		capacity specs (student number, staff number, etc)	special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution JBIC new construction	JBIC renovation	existing
BUILDING AB CAS &M&A&CRCS NET TOTAL									**9,970m2**		
common facility rooms					ratio to gross total		10%		1,523m2		
circulation					ratio to gross total		25%		3,807m2		
Gross total									**15,300m2**		
CRCS NET TOTAL									**4,535m2**	**0m2**	**0m2**
LPPM											
Executive Office	1	Director of LPPM		1		1	20m2	20m2	20m2		
	2	Deputy Director		1		1	15m2	15m2	15m2		
	3	Head of Res-Centers		1		1	10m2	10m2	10m2		
	4	Visitors'		3		1	10m2	10m2	10m2		
	5	Exe. Meeting room		12		1	40m2	40m2	40m2		
	1	Head	Intellectual property right	1							
			Knowledge management	1							
			Continuing education program	1							
			International Affair	1							
			Head of Res-Comm	1							
			Head of CS-Comm	1							
			total	6		6	10m2	60m2	60m2		
	2	office	Exe-Secretary	1							
			Intellectual property right								
			deputy	1							
			Administrative Supp	2							
			Secretary	1							
			Visitors'	2							
			Knowledge management								
			Secretary	1							
			Journal	1							
			Continuing education program								
			Secretary	1							
			staff	4							
			International Affair								
			Secretary	1							
			PR Officer	1							
			Legal/Immigration	2							
			Visitors'	2							
			Administration office								
			Karo	1							
			Kabag	1							
			Finance	1							
			Account Rep	1							
			Administration	2							
			committee secretary	1							
			total	27		1	110m2	110m2	110m2		
	4	Meeting room				4	15m2	60m2	60m2		
	5	Intellectual property right	Data base res.			1	20m2	20m2	20m2		
			Intellectual property right								
			International Affair								
	6	Class room	Continuing Education Program	20		6	40m2	240m2	240m2		
	7	Centers (rent-based)				10	40m2	400m2	400m2		
	8	Exhibition room		15		1	100m2	100m2	100m2		
	9	Workshop		20		5	40m2	200m2	200m2		
	10	Archives/ Storage		-		calculated as common facility rooms					
Total								1,285m2			
LAPI											
Executive Office	1	Director of LAPI		1		1	20m2	20m2	20m2		
	2	Deputy Director		1		1	15m2	15m2	15m2		
	3	Visitors'		3		1	20m2	20m2	20m2		
	4	Exe. Meeting room		12		1	40m2	40m2	40m2		
	1	Head	Industrial Aff. Div	1							
			Comm. Services Div	1							
			total	**2**		2	10m2	20m2	20m2		
	2	office									
			Exe-Secretary	1							
			Industrial Aff. Div								
			Secretary	1							
			PR Officer	1							
			Comm. Services Div								
			Secretary	1							
			Field Staff	2							
			Administration office								
			Karo	1							
			Kabag	1							
			Finance	1							
			Account Rep	1							
			Administration	2							
			total	**12**		1	50m2	50m2	50m2		
	3	Archives/storage				2	50m2	100m2	100m2		
	4	Visitors'		2		2	20m2	40m2	40m2		
	5	Meeting room A		20		1	60m2	60m2	60m2		
	6	Meeting room		15		2	30m2	60m2	60m2		
	7	Exhibition room		15		1	50m2	50m2	50m2		
	8	Workshop		20		5	40m2	200m2	200m2		
Total								675m2			

	no	rooms		capacity specs (student number, staff number, etc)	special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
									JBIC		
									new construction	renovation	existing
SUK											
Executive Office	1	Director of SUK		1		1	20m2	20m2	20m2		
	2	Deputy Director		1		5	15m2	75m2	75m2		
	3	Visitors'		2		1	15m2	15m2	15m2		
	4	Exe. Meeting room		20		1	40m2	40m2	40m2		
		office	Administration Office								
			Exe-Secretary	1							
			Reception	2							
			Karo	1							
			Kabag	1							
			Account Rep	1							
			Administration	2							
			total	**8**		1	30m2	30m2	30m2		
	5	Archives		-		calculated as common facility rooms					
Total								180m2			
Distance (e-)learning Unit											
Executive Office	1	Director of DLO		1		1	20m2	20m2	20m2		
	2	Deputy Director		1		4	15m2	60m2	60m2		
	3	Exe Meeting Room		20		1	40m2	40m2	40m2		
	4	Visitors'		2		1	15m2	15m2	15m2		
Administration Office	1	office	Exe Secretary	1		6	10m2	60m2	60m2		
			Program Coordinator	1							
			Account Rep	1							
			Administration	1							
			total	**4**		1	20m2	20m2	20m2		
	2	Archives/storage		-		calculated as common facility rooms					
Unit	1	Studio		100		1	130m2	130m2	130m2		
	2	Multimedia Room	studio divide into two rooms	40			60m2	0m2	0m2		
	3	Small Class room		20		2	40m2	80m2	80m2		
	4	Master Control Room		2		1	30m2	30m2	30m2		
	5	Voice Over Room		2		2	10m2	20m2	20m2		
	6	Editing Room		10		1	50m2	50m2	50m2		
	7	Changing Room		6		1	10m2	10m2	10m2		
	8	Meeting Room/VIP waiting room		4		1	20m2	20m2	20m2		
	9	Data Center Room		2		1	15m2	15m2	15m2		
Total								570m2			
Logistics and Procurement Office											
Executive Office	1	General Manager		1		1	20m2	20m2	20m2		
	2	Deputy of GM		1		1	15m2	15m2	15m2		
	3	Exe Meeting Room		12		1	40m2	40m2	40m2		
	4	Visitors'		3		1	20m2	20m2	20m2		
Offices		Head	Project Manager	1							
			Program Div.	1							
			Operation Div.	1							
			Finance Div.	1							
			total	**4**		4	10m2	40m2	40m2		
		Office	Exe Secretary	1							
			Administration Front Office	4							
			Program Div.	4							
			Operation Div.	4							
			Finance Div.	4							
			total	**17**		1	70m2	70m2	70m2		
		Visitors'		2		2	15m2	30m2	30m2		
		Meeting Room		20		1	40m2	40m2	40m2		
		Archieve/storage		-		calculated as common facility rooms					
		Server		3		calculated as common facility rooms					
		Management Project									
			Logistic and Procurement Services	3		1	80m2	80m2	80m2		
			Distribution and Storage	3		1	80m2	80m2	80m2		
			Project meeting room 1	-		1	40m2	40m2	40m2		
			Project meeting room 2	-		1	40m2	40m2	40m2		
Total								515m2			
CRCS Mangement											
Common facilities	1	General conference room		300		1	360m2	360m2	360m2		
	2	Meeting room		20		4	40m2	160m2	160m2		
	3	General offices		9		3	20m2	60m2	60m2		
	4	General offices		4		6	10m2	60m2	60m2		
	5	Banking space		8		1	50m2	50m2	50m2		
	6	Travel agent		4		1	30m2	30m2	30m2		
	7	Business center		4		1	30m2	30m2	30m2		
	8	Digital interactive library		10		1	60m2	60m2	60m2		
CRCS Management	1	CRCS GM		1		1	15m2	15m2	15m2		
	2	Deputy Man.		1		3	10m2	30m2	30m2		
	3	Secretary		1		3	5m2	15m2	15m2		
	4	Visitors'		2		1	15m2	15m2	15m2		
	5	Meeting room		12		1	20m2	20m2	20m2		
	6	Kabag		1		1	15m2	15m2	15m2		
	7	Staff		2		18	5m2	90m2	90m2		
	8	General storage		-		calculated as common facility rooms					
Total								1,010m2			
Common Room	1	Lobby				1	200m2	200m2	200m2		
	2	Promotion space				1	100m2	100m2	100m2		
	3	Reception/Information			included in circulation area						
	4	Lounge			included in circulation area						
	5	Musholla			included in circulation area						
	6	Pantry			included in circulation area						
	7	Janitor room			included in circulation area						
	8	Toilets			included in circulation area						

Appendix C-14 BUILDING C Floor Area list CIBE

No.	Rooms	Capacity specs (student number, staff number, etc)		special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
								JBIC		existing
		Student	Staff					new construction	renovation	
	BUILDING C CIBE NET TOTAL							**7,140m2**	**2,460m2**	**2,380m2**
	common facility rooms			ratio to gross total		10%		1,103m2		
	circulation			ratio to gross total		25%		2,757m2		
	Gross total							**11,000m2**		
1	**Classroom**									
1.1	**Small Classroom (50 students)**									
1.1.1.	Undergraduate Civil Eng.	50	1		12	70m2	840m2	280m2		560m2
1.1.2.	Undergraduate Environmental Eng.	50	1		6	70m2	420m2			420m2
1.1.3.	Undergraduate Ocean Eng.	50	1		4	70m2	280m2			280m2
1.1.4.	Master Program Civil Eng.	50	1		4	70m2	280m2	280m2		
1.1.5.	Master Program Environemntal Eng.	50	1		2	70m2	140m2		140m2	
1.1.6.	Master Program Ocean Eng.	50	1		2	70m2	140m2		140m2	
1.1.7.	Master Program Highway and Development	50	1		2	70m2	140m2	140m2		
1.1.8.	Magister Professional Water Resource Management	50	1		2	70m2	140m2	140m2		
1.1.9.	Other Magister Professionals	50	1		4	70m2	280m2	280m2		
1.2	**Medium Classroom (100 students)**	100	1		6	100m2	600m2	600m2		
1.3	**Large Classroom (200 students)**	200	1		2	180m2	360m2	360m2		
2	**Studio**	60	6		1	180m2	180m2	180m2		
3	**Computer Laboratory**	100	10	A/C	1	250m2	250m2	250m2		
4	**Laboratory**									
4.1	**Structures and Materials Laboratory**									
4.1.1.	Loading Frame and Actuator Room	8	2	high clearence (up to 12-15 m), strong floor, stroong wall, direct access to road	1	600m2	600m2	600m2		
4.1.2.	Equipment and Experimental Room (Structural Testing)	12	4	strong floor, vibrating, noisy	1	100m2	100m2	100m2		
4.1.3.	Equipment and Experimental Room (UTM)	4	1	strong floor, vibrating, noisy	1	20m2	20m2	20m2		
4.1.4.	Engineering Mechanics and Modelling Laboratory Room	16	4		1	90m2	90m2	90m2		
4.1.5.	Material Storage Room			dusty	1	30m2	30m2	30m2		
4.1.6.	Field Equipment Storage Room		0		1	50m2	50m2	50m2		
4.1.7.	Tutorial Room	30	2		1	40m2	40m2	40m2		
4.1.8.	Head of Laboratory Room	0	1		1	10m2	10m2	10m2		
4.1.9.	Technician Room	0	8		1	30m2	30m2	30m2		
4.1.10.	Administration Room	0	1		1	10m2	10m2	10m2		
4.2	**Soil Mechanics Laboratory**									
4.2.1.	Equipment and Experimental Room	40	6		1	380m2	380m2	380m2		
4.2.2.	Material Storage Room	0	0	dusty	1	30m2	30m2	30m2		
4.2.3.	Field Equipment Storage Room	0	0	direct access to road, some long items	1	50m2	50m2	50m2		
4.2.4.	Tutorial Room	30	2		1	40m2	40m2	40m2		
4.2.5.	Head of Laboratory Room	0	1		1	10m2	10m2	10m2		
4.2.6.	Technician Room	0	8		1	30m2	30m2	30m2		
4.2.7.	Administration Room	0	1		1	10m2	10m2	10m2		
4.3	**Construction Engineering and Management Laboratory**									
4.3.1.	Simulation Room	20	0		1	100m2	100m2	100m2		
4.3.2.	Multimedia Room	20	10		1	150m2	150m2	150m2		
4.3.3.	Research Laboratory Room	20	10		1	150m2	150m2	150m2		
4.3.4.	Head of Laboratory Room	0	1		1	10m2	10m2	10m2		
4.3.5.	Technician Room	0	2		1	10m2	10m2	10m2		
4.3.6.	Administration Room	0	1		1	10m2	10m2	10m2		
4.4	**Highway and Traffic Laboratory**									
4.4.1.	Vehicle Emision, Noise and Energy Testing Chamber	0	0	sealed room, require sound proof, air conditioned, direct access to road	1	35m2	35m2	35m2		
4.4.2.	Control Room	8	1	A/C	1	15m2	15m2	15m2		
4.4.3.	Simulation Room	16	2		1	80m2	80m2	80m2		
4.4.4.	Equipment and Experimental Room 1 (Heavy Testing)	8	2	strong floor, vibrating, noisy	1	120m2	120m2	120m2		
4.4.5.	Equipment and Experimental Room 2 (Aphalt Testing)	8	1	require cooker hood, fire protection, air conditioned	1	40m2	40m2	40m2		
4.4.6.	Equipment and Experimental Room (Aggregate Testing)	8	1	strong floor, vibrating, noisy, dusty	1	40m2	40m2	40m2		
4.4.7.	Equipment and Experimental Room 4 (Marshall Test room	8	1	require cooker hood, fire protection, vibrating, noisy and dusty	1	40m2	40m2	40m2		
4.4.8.	Equipment and Experimental Room 5 (Fixed Table room)	24	1	fixed table	1	40m2	40m2	40m2		
4.4.9.	Tutorial Room	30	2		1	40m2	40m2	40m2		
4.4.10.	Field Equipment Storage Room	0	0	direct access to road	1	50m2	50m2	50m2		
4.4.11.	Head of Laboratory Room	0	1		1	10m2	10m2	10m2		
4.4.12.	Technician Room	0	8		1	30m2	30m2	30m2		
4.4.13.	Administration Room	0	1		1	10m2	10m2	10m2		

No.	Rooms	Capacity specs (student number, staff number, etc)		special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
								JBIC		existing
		Student	Staff					new construction	renovation	
4.5	**Laboratory of Fluid Mechanics and Hydraulic Physical Model Testing**									
4.5.1.	Pump and water supply control room	0	0	equiped with crane, require 8-12 m clearence	1	50m2	50m2		50m2	
4.5.2.	Open channel 2D Flume Area	8	1		1	60m2	60m2		60m2	
4.5.3.	Scale Model Test Area	24	4	equiped with crane, require 8-12 m clearence	1	480m2	480m2		480m2	
4.5.4.	Experimental Research Space	16	2		1	60m2	60m2		60m2	
4.5.6.	Workshop Room	8	1		1	50m2	50m2		50m2	
4.5.7.	Tutorial Room	30	1		1	45m2	45m2		45m2	
4.5.8.	Head of Laboratory Room	0	1		1	10m2	10m2		10m2	
4.5.9.	Technician Room	0	4		1	20m2	20m2		20m2	
4.5.10.	Administration Room	0	1		1	10m2	10m2		10m2	
4.6	**Laboratory of Ocean engineering**									
4.6.1.	Ocean Numerical Simulation Lab. Room	8	2		1	40m2	40m2		40m2	
4.6.2.	Display Laboratorium Room	30	1		1	90m2	90m2		90m2	
4.6.3.	Multimedia Room	24	2		1	50m2	50m2		50m2	
4.6.4.	Field Equipment Storage Room				1	50m2	50m2		50m2	
	2D Wave Area	8	1		1	120m2	120m2		120m2	
4.6.5.	Experimental Space	12	2	equiped with crane, require 8-12 m clearence	1	180m2	180m2		180m2	
	3D Wave Maker Area	24	1		1	300m2	300m2		300m2	
4.5.12.	Head of Laboratory Room	8	1		1	10m2	10m2		10m2	
4.5.13.	Technician Room	8	1		1	10m2	10m2		10m2	
4.5.14.	Administration Room	8	2		1	10m2	10m2		10m2	
4.7	**Laboratory of Water Quality Monitoring**									
4.7.1.	Equipment and Experimental Room	30	4	air conditioned, direct access to road, contain smelly and biohazard materials can be on upper floor but need direct separate access and escape	1	300m2	300m2		300m2	
4.7.2.	Tutorial Room	30	2		1	40m2	40m2		40m2	
4.7.3.	Head of Laboratory Room	0	1		1	10m2	10m2		10m2	
4.7.4.	Technician Room	0	5		1	15m2	15m2		15m2	
4.7.5.	Administration Room	0	1		1	10m2	10m2		10m2	
5	**Library**									
5.1.	**Book Store Room**	70000			1	400m2	400m2	400m2		
5.2.	**Reading Room**	120			1	150m2	150m2	150m2		
6	**Office**									
6.1	**Dean Room**	0	1		**1**	15m2	15m2			15m2
6.2	**Vice Dean Room**	0	1		**2**	15m2	30m2			30m2
6.3	**Head of Department Room**	0	1		**1**	15m2	15m2			15m2
6.4	**Lecturer/Staff Room**	0	1		**125**	10m2	1,250m2	600m2		570m2
6.5	**Lecturer Assistant Room**	0	4		**8**	15m2	120m2	120m2		
6.6	**Professor Room**	0	1		**28**	15m2	420m2	345m2		75m2
6.7	**Head of Faculty Administration Staff Room**	0	1		**1**	15m2	15m2			15m2
6.8	**Faculty Administration Staff Room**	0	10		**1**	45m2	45m2			45m2
6.9	**Department Administration Staff Room**	0	4		**7**	15m2	105m2			105m2
6.10.	**Research Group Administration Staff Room**	0	1		**9**	5m2	45m2	45m2		
7	**Meeting Room**									
7.1	**Faculty Guess Room**		6		**1**	50m2	50m2	100m2		50m2
7.2	**Department Guess Room**		4		**3**	40m2	120m2			120m2
7.3	**Small Meeting Room**	0	20		**3**	80m2	240m2	160m2		80m2
7.4	**Large Meeting Room**	0	50		**1**	200m2	200m2	200m2		
8	**Graduate Student Room**	6	0		**8**	20m2	160m2		160m2	

Appendix C-14 BUILDING D Floor Area list for CITIE

No	rooms	capacity specs (student number, staff number, etc)	special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
							JBIC		
							new construction	renovation	existing
BUILDING D CITIE NET TOTAL							**0m2**	**3,837m2**	**2,291m2**
	common facility rooms		ratio to gross total		10%		0m2	589m2	
	circulation		ratio to gross total		25%		0m2	1,474m2	
	Gross total						**0m2**	**5,900m2**	
1	E-Learning Room	200	no	2	200m2	400m2		400m2	
2	Filling and digital document room	2	no	1	100m2	100m2		100m2	
3	Group Decision Workshop	10	no	1	100m2	100m2		100m2	
4	Enterprise Integration Workshop	40	no	1	100m2	100m2		100m2	
5	Guest room	6	no	2	50m2	100m2		100m2	
6	Human modeling and usability room	8	no	1	80m2	80m2		80m2	
7	Industrial Systems Planning & Optimization Workshop	40	no	1	100m2	100m2		100m2	
8	Lounge	5	no	1	30m2	30m2		30m2	
9	MAC workshop	10	no	1	50m2	50m2		50m2	
10	Machining center workshop	20	Foundation for machines maybe new construction for this room only	1	200m2	200m2		200m2	
11	Market Research & Innovatif Design Workshop	40	no	1	100m2	100m2		100m2	
12	Motion analysis room	8	no	1	80m2	80m2		80m2	
13	Organization Design & Management System	40	no	1	100m2	100m2		100m2	
14	Reading & Discussion room	40	no	2	40m2	80m2		80m2	
15	Group discussion room	40		4	40m2	160m2		160m2	
16	Research room	20	no	5	50m2	250m2		250m2	
17	Robotic & Automation lab	10	no	1	80m2	80m2		80m2	
18	Server room	5	no	1	40m2	40m2		40m2	
19	Virtual reality room	10	no	1	100m2	100m2		100m2	
20	Administration	17	no	1	467m2	467m2			467m2
21	Class room	30	no	6	64m2	382m2			382m2
22	Lecturer Room	1	no	55	14m2	796m2			796m2
23	Library	20	no	1	268m2	268m2			268m2
24	Practice Laboratories	30	no	5	317m2	1,587m2		1,587m2	
25	Seminar/Meeting	30	no	2	126m2	252m2			252m2
26	Student Activity	20	no	1	126m2	126m2			126m2

Appendix C-14 BUILDING E Floor Area list CADL

No	Rooms	capacity specs				special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
		Student	Researcher/ Lecturer	Technician	Administrative staff					JBIC new construction	JBIC renovation	existing
	BUILDING E CADL NET TOTAL									**5,209m2**	**5,181m2**	**5,758m2**
	common facility rooms					ratio to gross total		10%		797m2		
	circulation					ratio to gross total		25%		1,994m2		
	Gross total									**8,000m2**		
	Language NET TOTAL									**1,260m2**	**0m2**	**1,009m2**
	ART & DESIGN NET TOTAL									**3,949m2**	**5,181m2**	**4,749m2**
1	Art & Design Foundation Studio 1	56	2			heavy duty room	1	168.0	168.0m2		168	168.0m2
	Art & Design Foundation Studio 2	56	2			heavy duty room	1	168.0	168.0m2		168	168.0m2
	Art & Design Foundation Studio 3	56	2	1		heavy duty room	1	168.0	168.0m2		168	168.0m2
	Art & Design Foundation Studio 4	56	2			heavy duty room	1	168.0	168.0m2		168	168.0m2
	Art & Design Foundation Studio 5	56	2			heavy duty room	1	168.0	168.0m2		168	168.0m2
2	Painting Studio 1	14	2			heavy duty room	1	56.0	56.0m2		56	56.0m2
	Painting Studio 2	14	2	1		heavy duty room	1	56.0	56.0m2		56	56.0m2
	Painting Studio 3 (Final Project)	12				heavy duty room	1	48.0	48.0m2		48	48.0m2
3	Sculpture Studio I	13	2			heavy duty room	1	78.0	78.0m2		78	78.0m2
	Sculpture Studio 2	13	2	1		heavy duty room	1	78.0	78.0m2		78	78.0m2
	Sculpture Studio 3(Final Project)	12				heavy duty room	1	72.0	72.0m2		72	72.0m2
4	Ceramic Art Studio 1	18	2			heavy duty room	1	108.0	108.0m2		108	108.0m2
	Ceramic Art Studio 2	18	2			heavy duty room	1	108.0	108.0m2		108	108.0m2
	Ceramic Art Studio 3 (Final Project)	20				heavy duty room	1	120.0	120.0m2		120	120.0m2
5	Graphic Art Studio 1	18	2			heavy duty room	1	72.0	72.0m2		98	98.0m2
	Graphic Art Studio 2	18	2			heavy duty room	1	72.0	72.0m2		98	98.0m2
	Graphic Art Studio 3 (Final Project)	20				heavy duty room	1	80.0	80.0m2		171.5	171.5m2
6	Craft Studio (Ceramic) 1	25	2			heavy duty room	1	**75.0**	**75.0m2**	**75m2**		
	Craft Studio (Ceramic) 2	25	2			heavy duty room	1	**75.0**	**75.0m2**	**75m2**		
	Craft Studio (Ceramic) 3 (Final Project)	25				heavy duty room	1	**75.0**	**75.0m2**	**75m2**		
	Craft Studio (Textile) 1	40	2			heavy duty room	1	**120.0**	**120.0m2**	**120m2**		
	Craft Studio (Textile) 2	40	2			heavy duty room	1	**120.0**	**120.0m2**	**120m2**		
	Craft Studio (Textile) 3 (Final Project)	40				heavy duty room	1	**120.0**	**120.0m2**	**120m2**		
8	Research Studio for Visual Art Master Program 1	20	1			heavy duty room	1	80.0	80.0m2		80	80.0m2
	Research Studio for Visual Art Master Program 2	20	1			heavy duty room	1	80.0	80.0m2		80	80.0m2
	Research Studio for Design Master Program 1	20	1			heavy duty room	1	80.0	80.0m2		80	80.0m2
	Research Studio for Design Master Program 2	20	1			heavy duty room	1	80.0	80.0m2		80	80.0m2
	Research Studio for Design Master Program 3	20	1			heavy duty room	1	80.0	80.0m2		80	80.0m2
	Research Studio for Design Master Program 4	20	1			heavy duty room	1	80.0	80.0m2		80	80.0m2
	Research Studio for Art & Design Doctoral Program 1	15	1			heavy duty room	1	60.0	60.0m2		60	60.0m2
	Research Studio for Art & Design Doctoral Program 2	15	1			heavy duty room	1	60.0	60.0m2		60	60.0m2
9	Administrative Office for Visual Art Study Program		1	2	2		1	40.0	40.0m2		40	40.0m2
	Meeting room		12				1	18.0	18.0m2		18.0	
10	Administrative Office for Craft Study Program Office		1	2	2		1	40.0	40.0m2		40	
	Meeting room		12				1	18.0	18.0m2		18.0	
11	Administrative Office for Visual Art Master Program		1	2	2		1	40.0	40.0m2		40	40.0m2
	Meeting room		12				1	18.0	18.0m2		18.0	
12	Administrative Office for Design Master Program		1	2	2		1	40.0	40.0m2		40	40.0m2
	Meeting room		12				1	18.0	18.0m2		18.0	
13	Administrative Office for Art & Design Doctoral Program		1	2	2		1	40.0	40.0m2		40	40.0m2
	Meeting room		12				1	18.0	18.0m2		18.0	
14	Art & Design Library	190		2	1	common space, high security	1	220.5	220.5m2		220.5	220.5m2
15	Seminar & Visual Presentation Room	190		2	1	acoustical (AV) room, high security	1	470.2	470.2m2		470.2	470.2m2
16	Exhibition Hall	190		2	1	acoustical, high security, heavy duty	1	360.0	360.0m2		360	360.0m2
17	Material (Wood, Metal & Plastic) Workshop	190	122.5	1	1	heavy duty room	1	490.0	490.0m2		490	294.0m2
18	Sculpture & Small Foundry Workshop	60		1	1	heavy duty room	1	171.0	171.0m2		171	98.0m2
19	Ceramic Workshop (Kiln room, moulding & glazing)	40		1	1	heavy duty room	1	120.0	120.0m2		392	392.0m2
20	Textile Workshop (Weaving & Dyeing)	40		1	1	heavy duty room	1	120.0	120.0m2	120m2		
21	3D Modelling Workshop	40		1	1	heavy duty room	1	120.0	120.0m2	120m2		
22	Aesthetic R&D Office											
	Head of Aesthetic R&D Unit		1				1	9.0	9.0m2		9	9.0m2
	Discussion room		10				1	25.0	25.0m2		25	25.0m2
	Staff		15				1	90.0	90.0m2		50	50.0m2
	Service & Storage			1	1		1	included common facility calculation			2	2.0m2
23	Visual Art R&D Office											
	Head of Visual Art R&D Unit		1				1	9.0	9.0m2		9	9.0m2
	Discussion room		10				1	25.0	25.0m2		25	25.0m2
	Staff		15				1	90.0	90.0m2		50	50.0m2
	Service & Storage			1	1		1	included common facility calculation			2	2.0m2
24	Craft & Tradition R&D Office											
	Head of Craft & tradition R&D Unit		1				1	10.0	10.0m2	10m2	-	
	Discussion room		21				1	50.0	50.0m2	50m2	-	
	Staff		20				1	60.0	60.0m2	60m2	-	
	Service & Storage			1	1		1	included common facility calculation			-	
25	Human and Interior Space R&D Office											
	Head of Human and Interior Space R&D Unit		1				1	10.0	10.0m2	10m2	-	
	Discussion room		23				1	50.0	50.0m2	50m2	-	
	Staff		22				1	70.0	70.0m2	70m2	-	
	Service & Storage			1	1		1	included common facility calculation			-	
26	Human and Industrial Product R&D Office											
	Head of Human and Industrial Product R&D Unit		1				1	10.0	10.0m2	10m2	-	
	Discussion room		23				1	50.0	50.0m2	50m2	-	
	Staff		22				1	70.0	70.0m2	70m2	-	
	Service & Storage			1	1		1	included common facility calculation			-	
27	Visual Communication Design R&D Office											
	Head of Visual Communication Design R&D Unit		1				1	10.0	10.0m2	10m2	-	
	Discussion room		23				1	50.0	50.0m2	50m2	-	
	Staff		22				1	70.0	70.0m2	70m2	-	
	Service & Storage			1	1		1	included common facility calculation			-	
28	Design Science & Visual Culture R&D Office											
	Head of Visual Culture R&D Unit		1				1	10.0	10.0m2	10m2	-	
	Discussion room		23				1	50.0	50.0m2	50m2	-	-
	Staff		22				1	70.0	70.0m2	70m2	-	-
	Service & Storage			1	1		1	included common facility calculation			-	-
29	Humanity Sciences R&D Office											
	Head of Visual Culture R&D Unit		1				1	10.0	10.0m2	10m2	-	
	Discussion room		23				1	50.0	50.0m2	50m2	-	-
	Staff		22				1	70.0	70.0m2	70m2	-	-
	Service & Storage			1	1		1	included common facility calculation			-	-

No	Rooms	capacity specs				special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
		Student	Researcher/ Lecturer	Technician	Administrative staff					JBIC new construction	JBIC renovation	existing
30	Administrative Office for Interior Design Study Program		1	2	2		1	40.0	40.0m2	40m2	-	-
	Meeting room		12				1	20.0	18.0m2	18m2		
31	Administrative Office for Product Design Study Program		1	2	2		1	40.0	40.0m2	40m2	-	-
	Meeting room		12				1	20.0	18.0m2	18m2		
32	Administrative Office for Visual Communication Design Study Program		1	2	2		1	40.0	40.0m2	40m2	-	-
	Meeting room		12				1	20.0	18.0m2	18m2		
33	Digital Modeling and Rapid Prototyping Lab	20	2	1	1	Heavy duty room, security, high wattage	1	80.0	80.0m2	80m2	-	-
34	Digital Samplings of Textile Lab	20	2	1	1	Heavy duty room, security, high wattage	1	80.0	80.0m2	80m2	-	-
35	Digital Animation (+ Multimedia) Lab	20	2	1	1	Heavy duty room, security, high wattage	1	80.0	80.0m2	80m2	-	-
36	Etching and Lithography Lab	20	2	1	1	Heavy duty room, acid waste	1	80.0	80.0m2		84	51.0m2
37	Spatial Perception + Lighting Simulation lab	20	2	1	1	acoustical room, high wattage, high security	1	100.0	100.0m2	100m2	-	-
38	Visual Perception and Product Ergonomics (Humanomics) Lab.	20	2	1	1	acoustical&dark room, high wattage, high security	1	80.0	80.0m2	80m2	-	-
39	Photography Lab	20	2	1	1	acoustical&dark room, high wattage, high security	1	80.0	80.0m2	80m2	-	-
40	Interior Design Studio I	65	2			heavy duty room	1	180.0	180.0m2	180m2	-	-
	Interior Design Studio II	65	2			heavy duty room	1	180.0	180.0m2	180m2	-	-
	Interior Design Studio III (Final Project)	65				heavy duty room	1	180.0	180.0m2	180m2	-	-
41	Product Design Studio I	65	2			heavy duty room	1	180.0	180.0m2	180m2	-	-
	Product Design Studio II	65	2			heavy duty room	1	180.0	180.0m2	180m2	-	-
	Product Design Studio III (Final Project)	65				heavy duty room	1	180.0	180.0m2	180m2	-	-
42	Visual Communication (Graphic) Design Studio I	30	2			heavy duty room	1	80.0	80.0m2	80m2	-	-
	Visual Communication (Graphic) Design Studio II	30	2			heavy duty room	1	80.0	80.0m2	80m2	-	-
	Visual Communication (Graphic) Design Studio III (Final Project)	30				heavy duty room	1	80.0	80.0m2	80m2	-	-
	Visual Communication (Advertising) Design Studio I	25	2			heavy duty room	1	60.0	60.0m2	60m2	-	-
	Visual Communication (Advertising) Design Studio II	25	2			heavy duty room	1	60.0	60.0m2	60m2	-	-
	Visual Communication (Advertising) Design Studio III (Final Project)	25				heavy duty room	1	60.0	60.0m2	60m2	-	-
	Visual Communication Design (Multimedia) Studio I	25	2			heavy duty room	1	60.0	60.0m2	60m2	-	-
	Visual Communication Design (Multimedia) Studio II	25	2			heavy duty room	1	60.0	60.0m2	60m2	-	-
	Visual Communication Design (Multimedia) Studio III (Final Project)	25				heavy duty room	1	60.0	60.0m2	60m2	-	-

	Language NET TOTAL									1,260m2	0m2	1,009m2
1	Pre-departure English Program	31				Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	2	50m2	100m2	100m2		1,009m2
2	Conversation	21				Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	2	35m2	70m2	70m2		
3	General English	21				Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	2	35m2	70m2	70m2		
4	English for Academic Purpose	21				Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	2	35m2	70m2	70m2		
5	TOEFL Training (Preparation)	21				Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	2	35m2	70m2	70m2		
6	Other foreign languages (Italian, German, French, Japanese, Arabic, Indonesia	20				Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	35m2	35m2	35m2		
7	Spanish, Russian, Sundanese	21				Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	35m2	35m2	35m2		
8	Integrated English Course related with Industry's, Region's, and research project	26				Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	35m2	35m2	35m2		
9	Test Center for Any Language Proficiency Test	12				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	35m2	35m2	35m2		
10	Self Access Centre (Independent Learning Library)	43				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	100m2	100m2	100m2		
11	Manual (Old) Laboratory	66				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	150m2	150m2	150m2		
12	Digital Language Laboratory	60				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	100m2	100m2	100m2		
13	Exhibit and announcement room	20				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	10m2	10m2	10m2		
14	Reception (fully facilitated and furnished)	10				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	10m2	10m2	10m2		
15	Receptionist room (fully facilitated and furnished)	10				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	10m2	10m2	10m2		
17	Director room (fully facilitate d and furnished)	6				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	10m2	10m2	10m2		

No	Rooms	capacity specs				special requirements (clean room, special foundation, etc)	number of rooms	room area	total floor area	floor area distribution		
		Student	Researcher/ Lecturer	Technician	Administrative staff					JBIC		existing
										new construction	renovation	
19	Meeting room for director	20				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	20m2	20m2	20m2		
20	Teachers' room (fully facilitated and furnished)	30				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	90m2	90m2	90m2		
21	Room for academic manager	6				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	15m2	15m2	15m2		
22	Room for resource manager	6				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	15m2	15m2	15m2		
23	Common room for teachers and staff (fully facilitated and furnished)	10				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	15m2	15m2	15m2		
24	Room for paper-based material development (fully facilitated and furnished)	4				Stop contact, power source, Hot spot	1	20m2	20m2	20m2		
25	Room for internet-based material development (fully facilitated and furnished)	4				Stop contact, power source, Hot spot	1	20m2	20m2	20m2		
26	Room for electronic based teaching aid development (fully facilitated and furnished)	4				Stop contact, power source, Hot spot	1	20m2	20m2	20m2		
27	Multimedia teleconference room technician (fully facilitated and furnished)	2				Stop contact, power source, Hot spot	1	10m2	10m2	10m2		
28	Warehouse for brand new goods (fully facilitated and furnished)	4				Stop contact , power source, Fan,	1	included common facility calculation				
29	Warehouse for exhausted goods (fully facilitated and furnished)	4				Stop contact , power source, Fan,	1	included common facility calculation				
30	Room for laboratory technician (fully facilitated and furnished)	2				Stop contact, power soruce, AC	1	10m2	10m2	10m2		
31	Room for keeping audio-visual (fully facilitated and furnished)	2				Stop contact, power soruce, AC	1	included common facility calculation				
32	Room for keeping teacher's teaching resource s(fully facilitated and furnished)	4				Stop contact, power soruce, AC	1	included common facility calculation				
33	Room for teleconference technician (fully facilitated and furnished)	2				Stop contact, power soruce, AC	1	10m2	10m2	10m2		
34	Room for self-access centre (library) technician / administration (fully facilitated and furnished)	2				Stop contact, power soruce, AC	1	10m2	10m2	10m2		
35	Room for electronic, non-electronic, internet technician (fully facilitated and furnished)	2				Stop contact, power soruce, AC	1	10m2	10m2	10m2		
37	Room for administrative staff (fully facilitated and furnished)	6				Stop contact, power soruce, AC	1	30m2	30m2	30m2		
38	Room for paper, electronic, digital data storage	2				Stop contact, power soruce, AC	1	included common facility calculation				
39	Room for internet server (fully facilitated and furnished)	2				Stop contact, power soruce, AC	1	5m2	5m2	5m2		
40.5	Room for partnership/collaboration representative (fully facilitated and furnished)	2				Stop contact, power soruce, AC	10	5m2	50m2	50m2		
41.8	Waiting room for director visitors (fully facilitated and furnished)	4				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	included in circulation area				
40	Waiting room for non-director visitors (fully facilitated and furnished)	6				AC, Data Cable,LCD, LCD screen, PC, Stop contact, power source, Hot spot	1	included in circulation area				
18	Room for first aids (fully facilitated and furnished)						1	included common facility calculation				

APPENDIX C-15 Unit Price for Building Construction

ITB initial Proposal

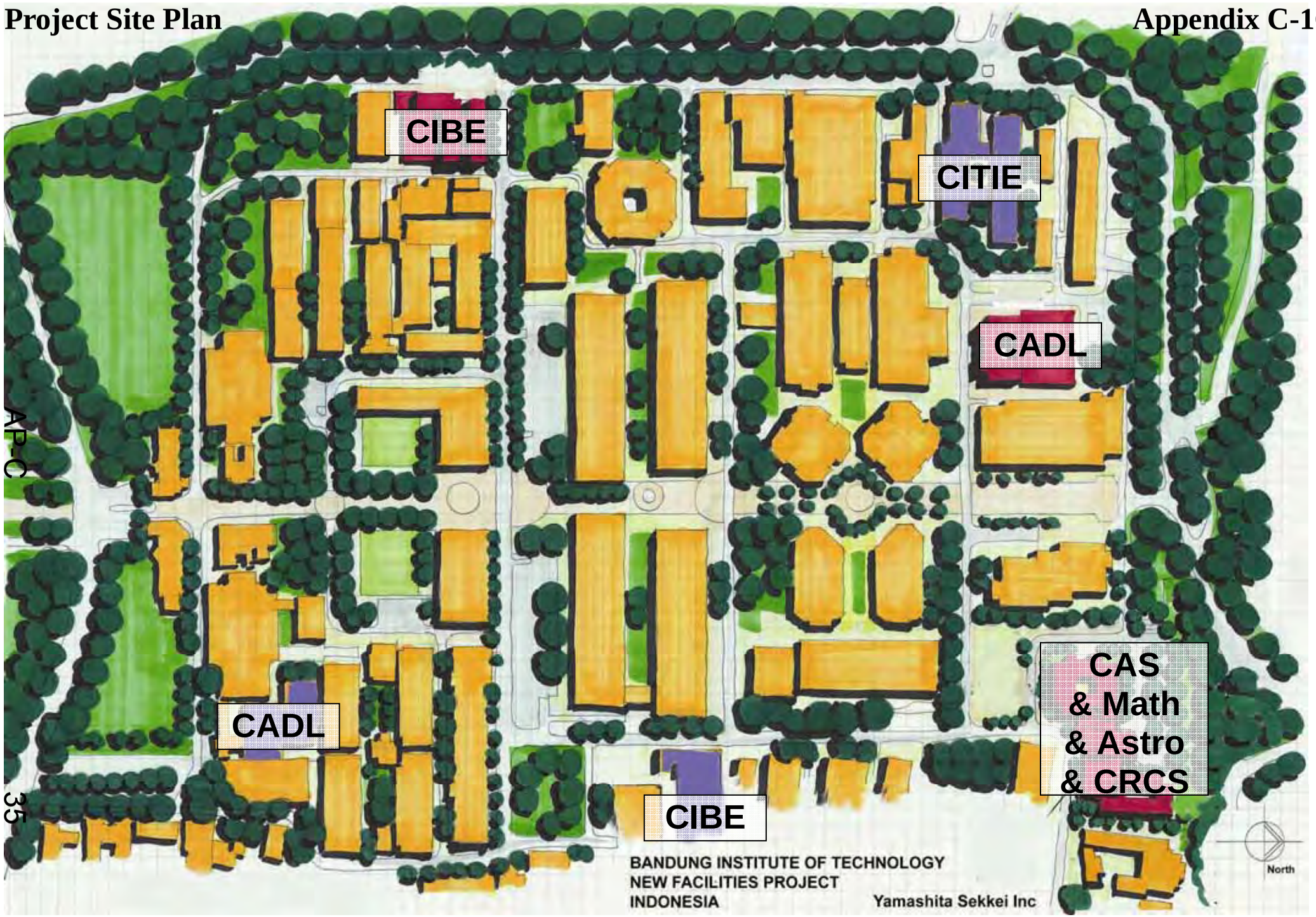
				Standard	Price escalation (10% for 3 years)	New Price	multi storey factor	lab factor	standard	Non standard		total	exchange rate	US$	New	Renovation	site development	
				2005														
A	Center for Advanced Sciences	4F	3,500 m2	IDR 2,269	33.1%	IDR 3,020	1.135	1.25	IDR 4,285	0%	IDR 0	IDR 4,285	9,500	**US$451**	US$1,578,500		15%	US$236,775
B	Center for Research & Community Service	8F	8,000 m2	IDR 2,269	33.1%	IDR 3,020	1.265	1.25	IDR 4,775	0%	IDR 0	IDR 4,775	9,500	**US$503**	US$4,024,000		15%	US$603,600
C 1	Center for Infrastructure & Built Environment Engineering	10F	10,000 m2	IDR 2,269	33.1%	IDR 3,020	1.330	1.25	IDR 5,021	0%	IDR 0	IDR 5,021	9,500	**US$529**	US$5,290,000		15%	US$793,500
C 2	Hydraulic and Ocean engineering laboratories	4F	3,500 m2	IDR 2,269	33.1%	IDR 3,020	1.135	1.25	IDR 4,285	0%	IDR 0	IDR 4,285	9,500	**US$451**	US$1,578,500		15%	US$236,775
D	Center for IT in Industrial Engineering	4F	3,500 m2	IDR 2,269	33.1%	IDR 3,020	1.135	1.25	IDR 4,285	0%	IDR 0	IDR 4,285	9,500	**US$451**	US$1,578,500		15%	US$236,775
		reno	1,500 m2									IDR 2,613	9,500	**US$275**		US$412,500		
E	Center for Arts, Design & Languages	8F	8,000 m2	IDR 2,269	33.1%	IDR 3,020	1.265	1.25	IDR 4,775	0%	IDR 0	IDR 4,775	9,500	**US$503**	US$4,024,000		15%	US$603,600
		reno	5,800 m2									IDR 2,593	9,500	**US$273**		US$1,582,900		
		new	36,500 m2															
		reno	7,300 m2												US$18,073,500	US$1,995,400		US$2,711,025

Grand total US$22,779,925

SAPROF final figures

				Standard	Price escalation	New Price	multi storey factor	lab factor	standard	Non standard		total	exchange rate	US$	New	Renovation	site development	
				2008/2/1														US$22,779,925
A B	Center for Advanced Sciences Mathmatics Astrology	8F	3,900 m2	IDR 2,514	0.0%	IDR 2,514	1.265	1.25	IDR 3,975	40%	IDR 1,590	IDR 5,565	9,291	**US$599**	US$2,336,100		10%	US$233,610
	Center for Research & Community Service		11,400 m2	IDR 2,514	0.0%	IDR 2,514	1.265	1.00	IDR 3,180	30%	IDR 954	IDR 4,134	9,291	**US$445**	US$5,073,000		10%	US$507,300
C	Center for Infrastructure & Built Environment Engineering	10F	11,000 m2	IDR 2,514	0.0%	IDR 2,514	1.330	1.25	IDR 4,180	30%	IDR 1,254	IDR 5,433	9,291	**US$585**	US$6,435,000		10%	US$643,500
			addition for void space 480 m2	IDR 2,514	0.0%	IDR 2,514	1.330	1.25	IDR 4,180	30%	IDR 1,254	IDR 5,433	9,291	**US$585**	US$280,800		10%	US$28,080
	Infrastructur Engineering, Hydraulic and Ocean engineering laboratories	reno	2,460 m2	IDR 2,514	75% of standard price							IDR 1,886	9,291	**US$203**		US$499,380		
D	Center for IT in Industrial Engineering	reno	5,900 m2	IDR 2,514	75% of standard price							IDR 1,886	9,291	**US$203**		US$1,197,700		
E	Center for Arts, Design & Languages	8F	8,000 m2	IDR 2,514	0.0%	IDR 2,514	1.265	1.00	IDR 3,180	30%	IDR 954	IDR 4,134	9,291	**US$445**	US$3,560,000		10%	US$356,000
		reno	5,200 m2	IDR 2,514	75% of standard price							IDR 1,886	9,291	**US$203**		US$1,055,600		
		new	33,820 m2															
		reno	11,100 m2												US$17,684,900	US$2,752,680		US$1,768,490

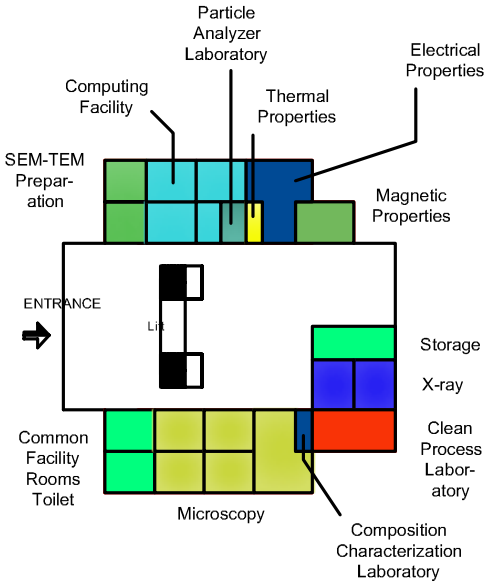
Grand total US$22,206,070


CIBE
CITIE
CADL
CADL
CAS
& Math
& Astro
& CRCS
CIBE
BANDUNG INSTITUTE OF TECHNOLOGY
NEW FACILITIES PROJECT
INDONESIA
Yamashita Sekkei Inc
North

APPENDIX C-17

LAYOUT AND MASS IMAGE of the buildings

The following drawings are for physical space reference only.
It is not to be used as basic design or as conceptual design for the Project.
These were made to understand the physical space and
mass of the required facilities in this Project.
It is not intended as image reference or design reference.
The building design is to be developed during the actual implementation of the Project.
It may have classic design with roof,
or it may have modern design with flat roof,
or it may have radical design with slanting surfaces.



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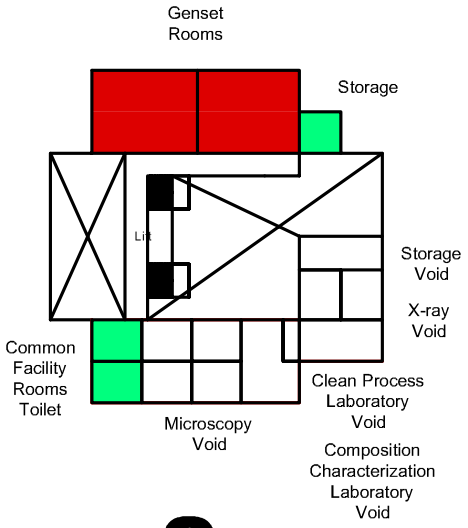

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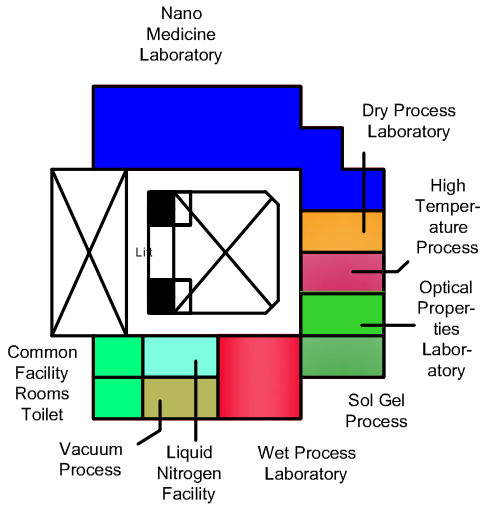

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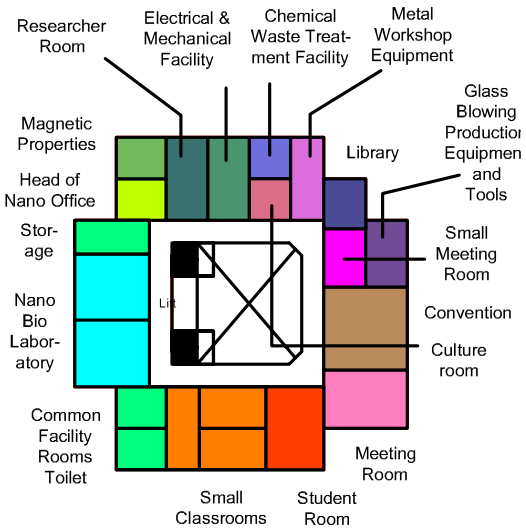

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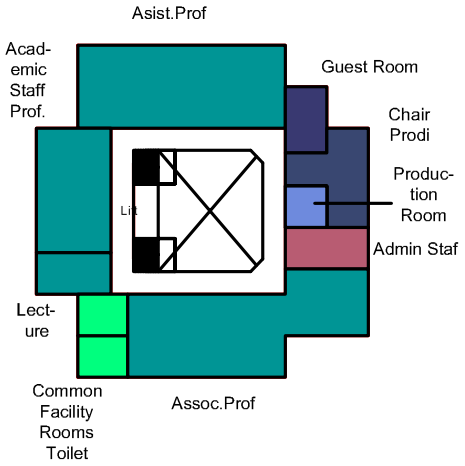

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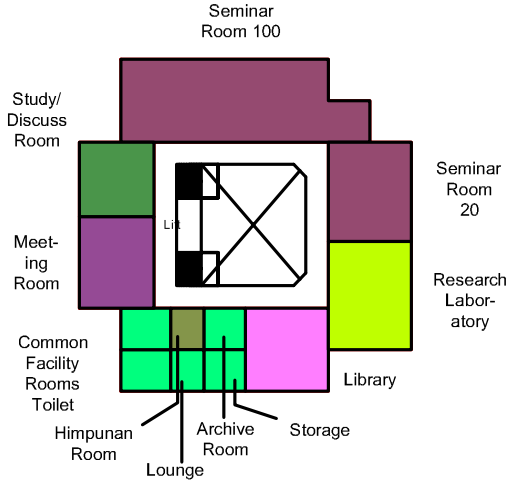

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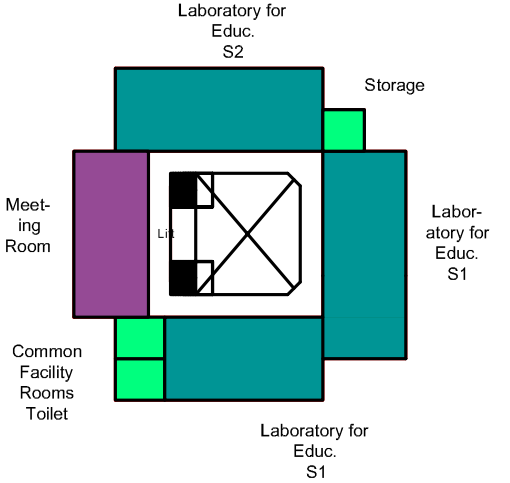

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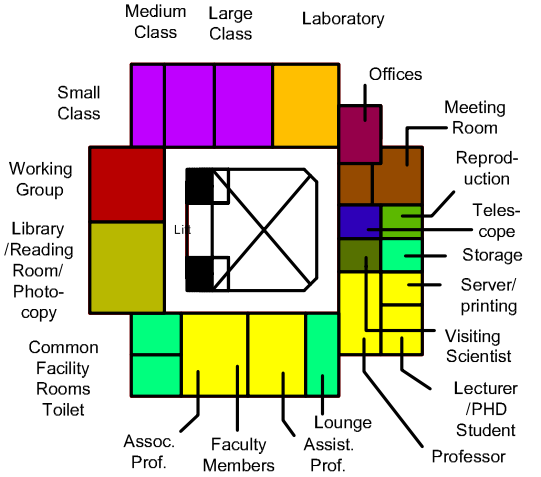

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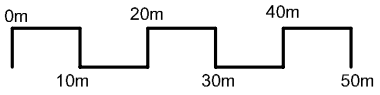
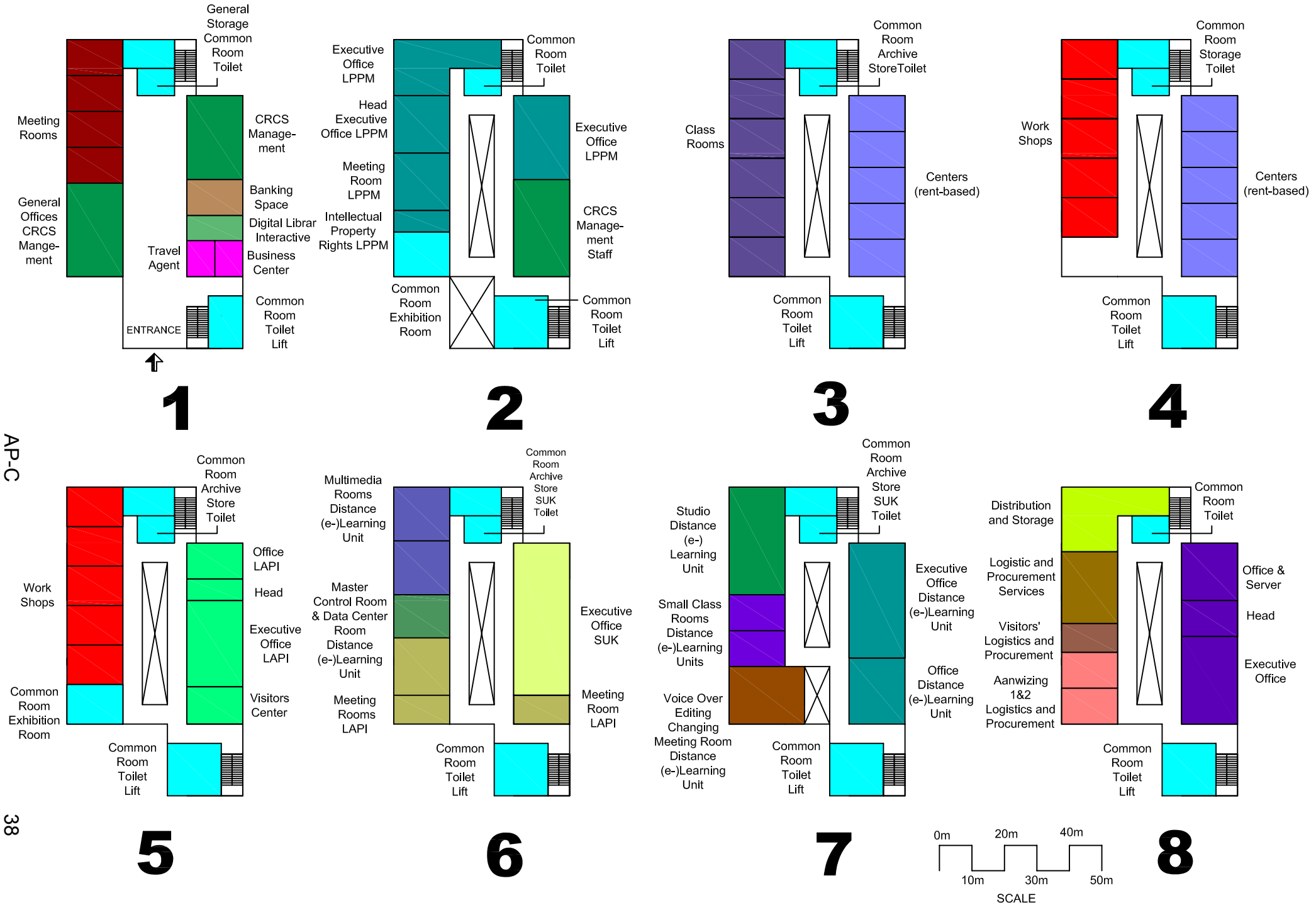


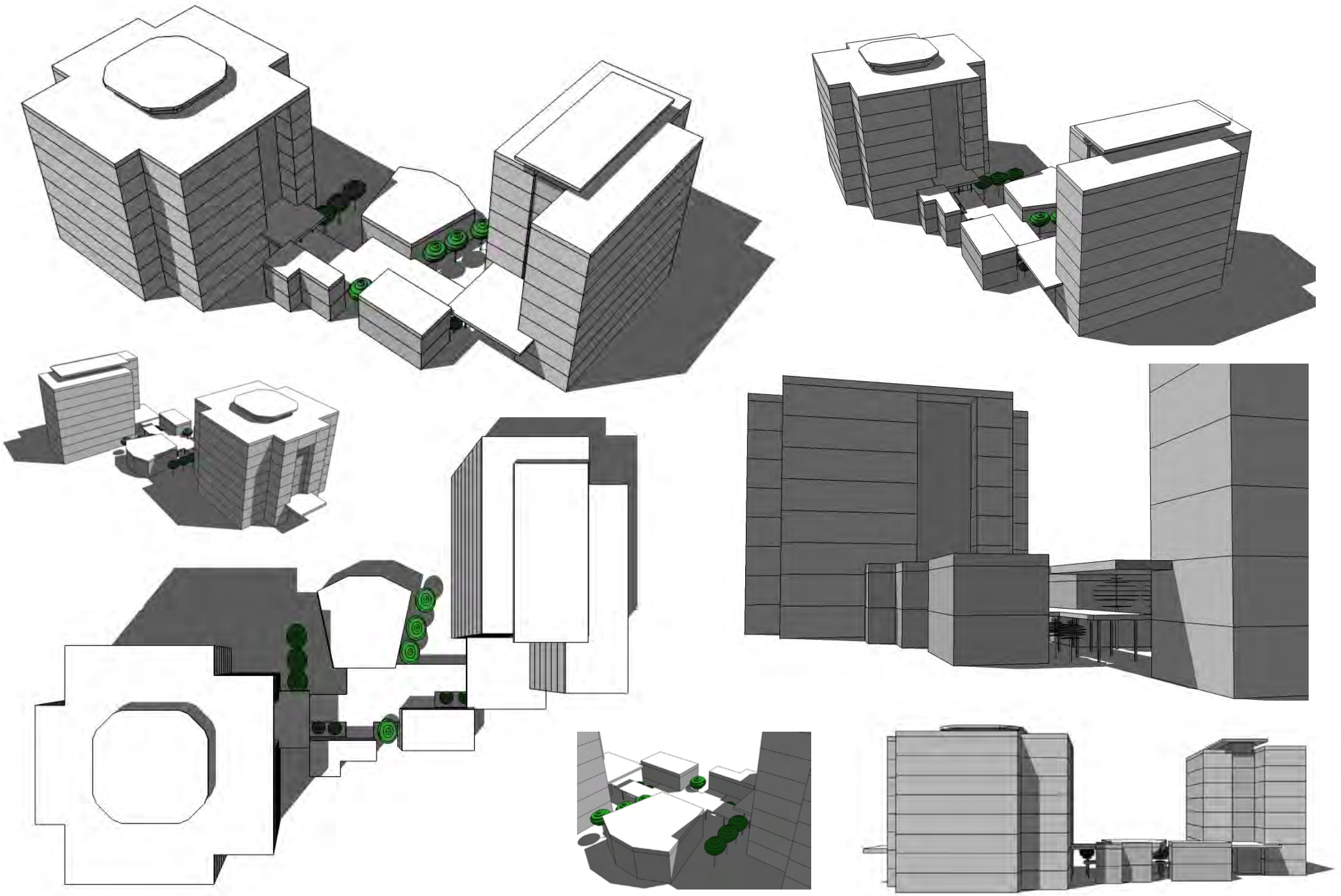
BUILDING AB CAS & M&A Conceptual Floor Plans



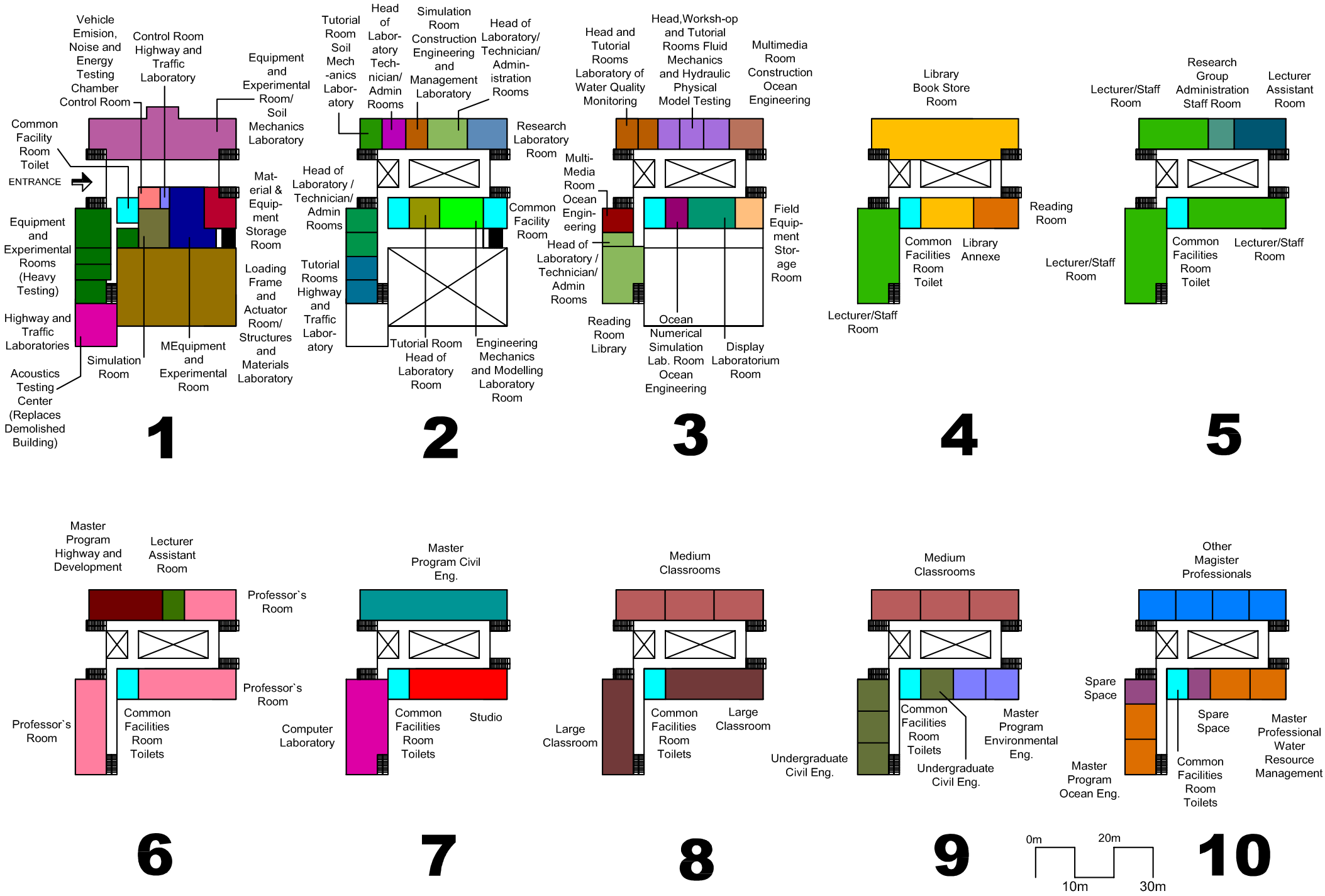
AP-C

38

BUILDING AB CRCS Conceptual Floor Plans



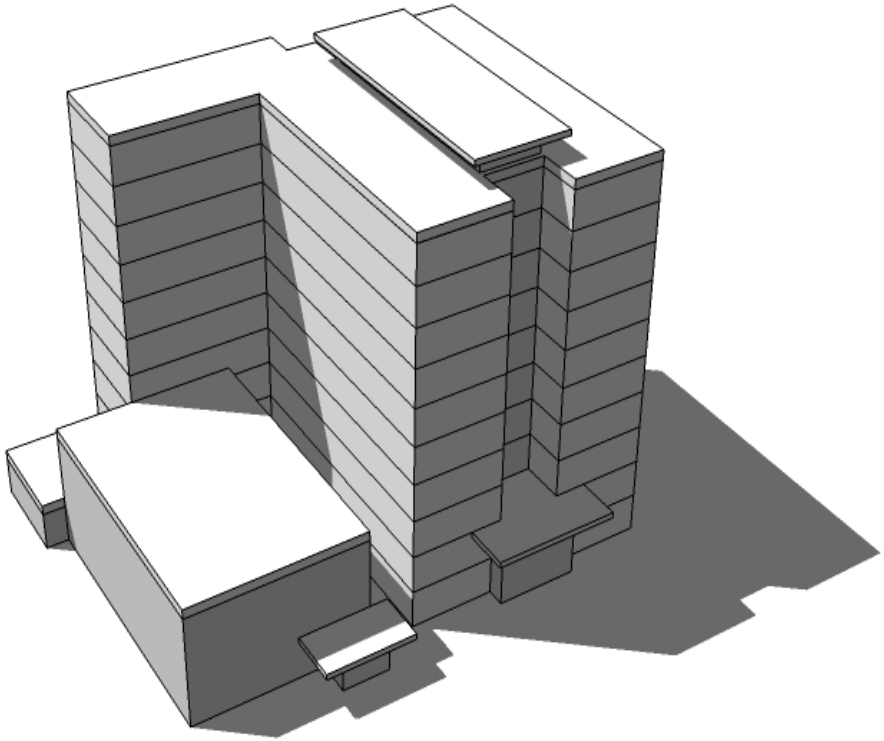
BUILDING AB CAS & M&A and CRCS with Shared Facilities Massing Images

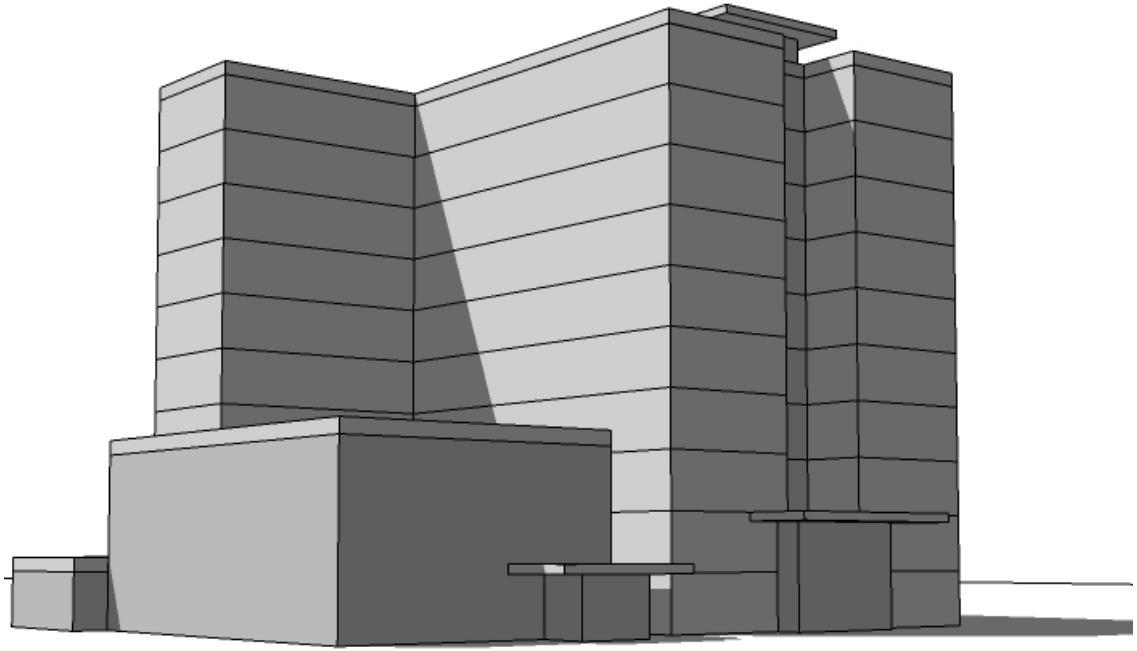


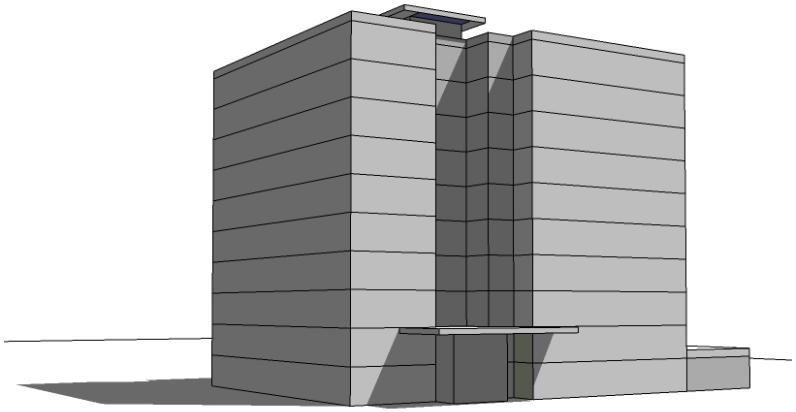
AP- C

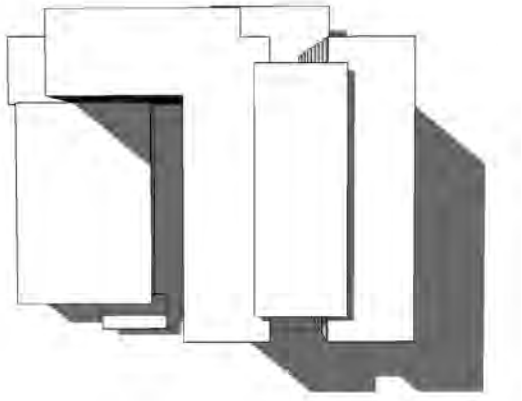
40

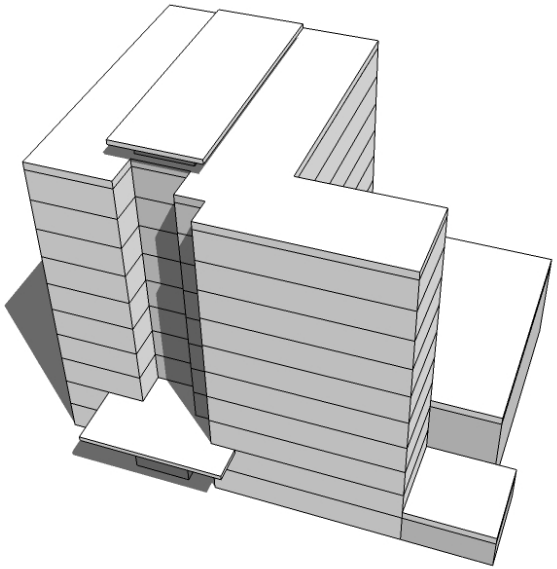
BUILDING C CIBE Conceptual Floor Plans





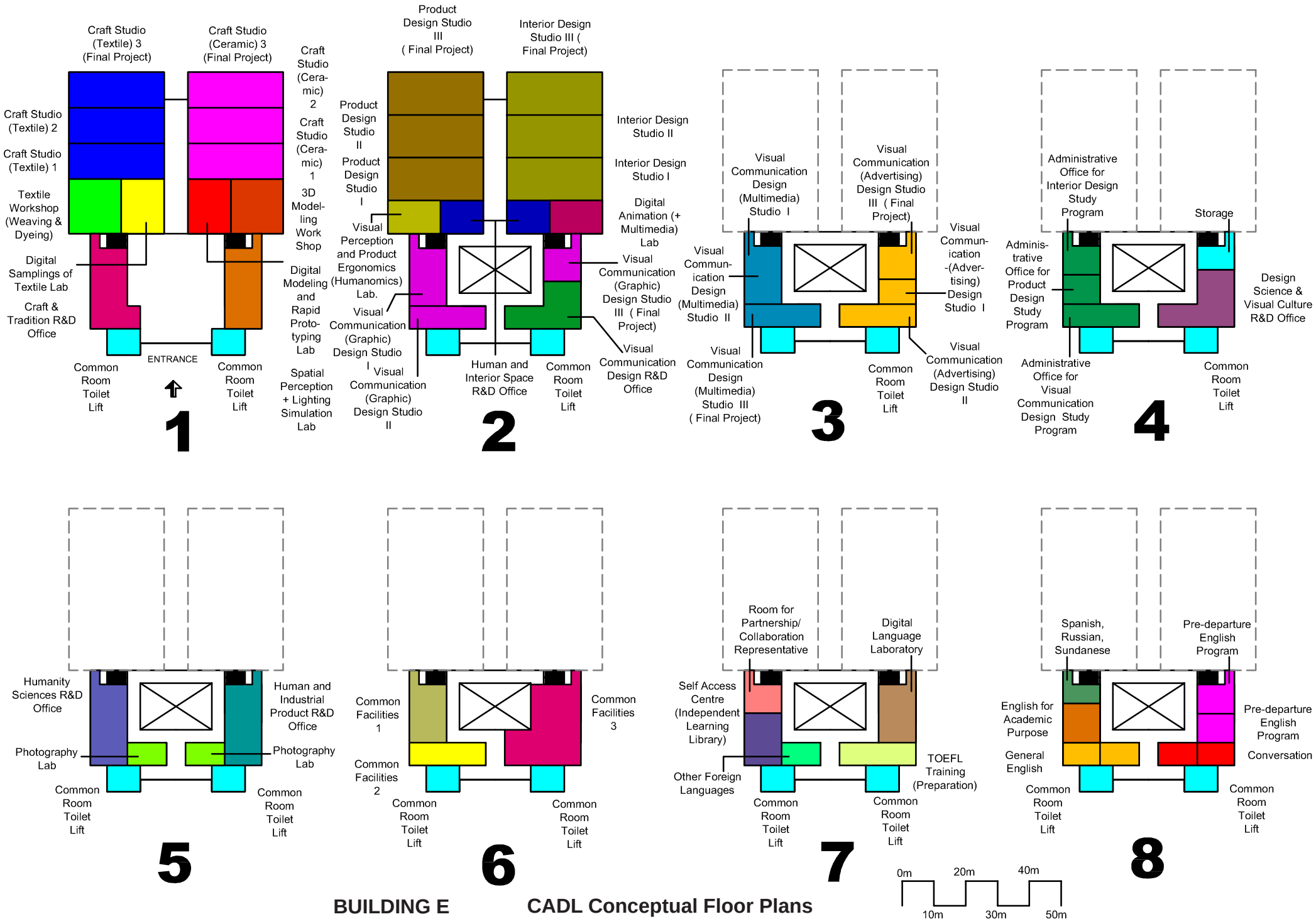




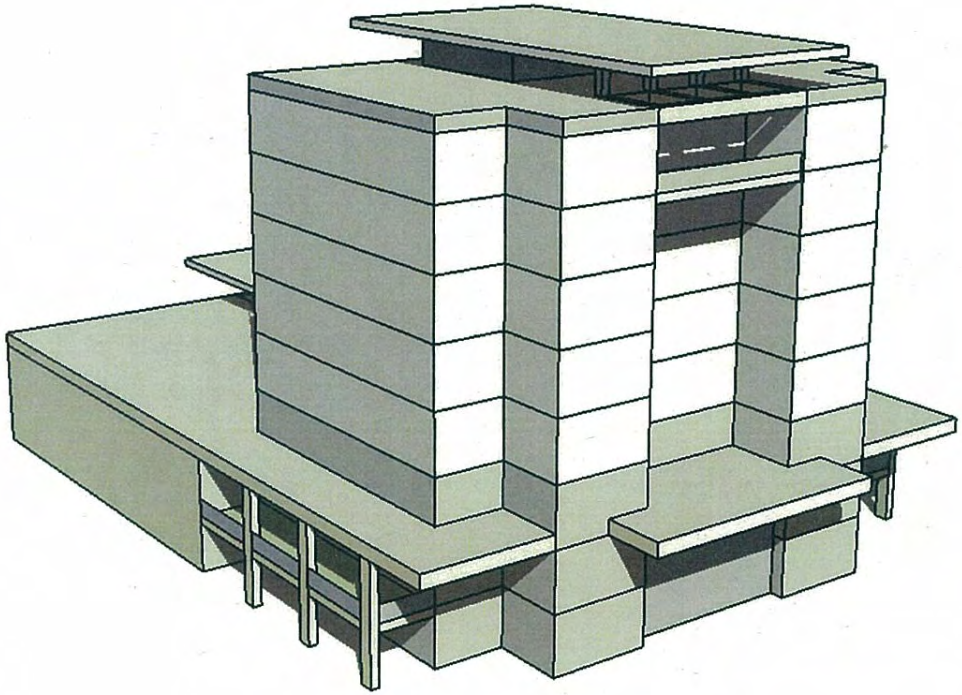


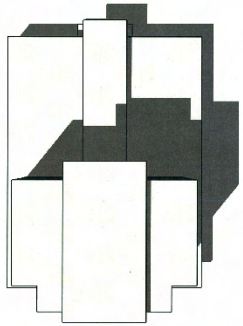
AP- C

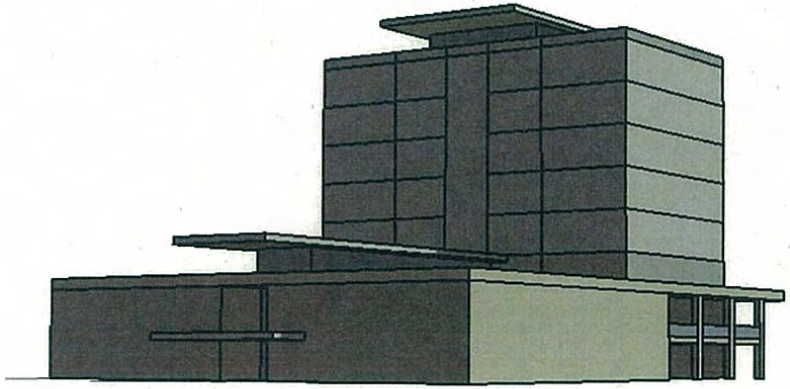
BUILDING C CIBE Massing Images

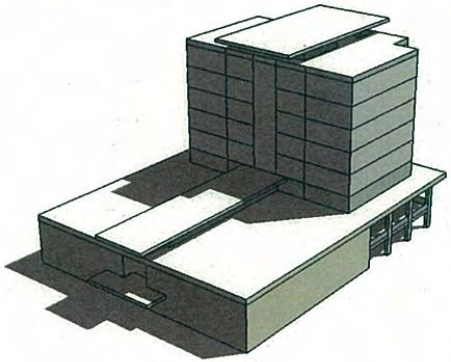


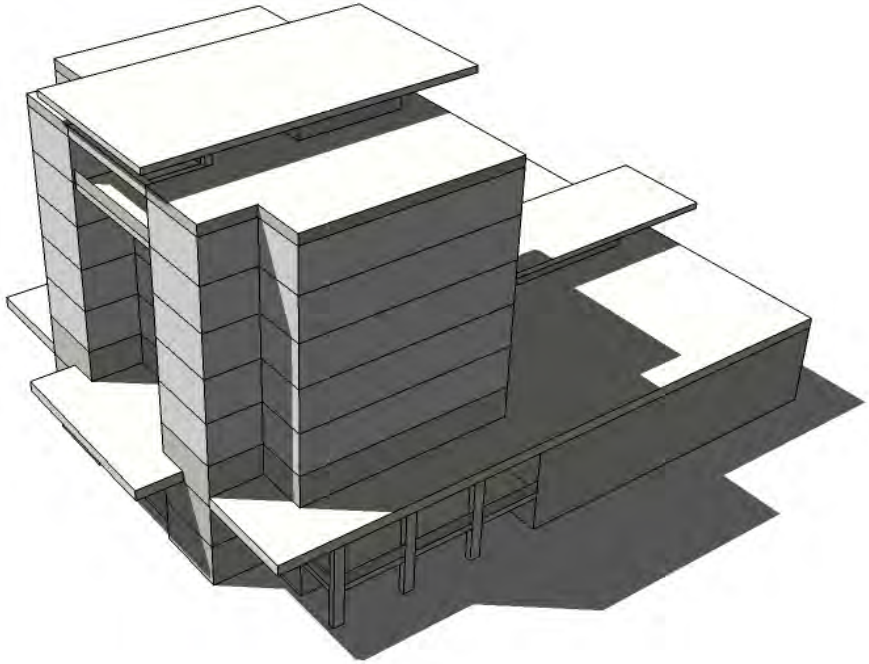
BUILDING E **CADL Conceptual Floor Plans**











BUILDING E CADL Massing Images