

**PC-1**

**DNA DATABANK FOR CRIME INVESTIGATION**

**CENTRE FOR APPLIED MOLECULAR BIOLOGY  
87-WEST CANAL BANK ROAD  
THOKAR NIAZ BAIG  
LAHORE**

Code Number for project

(To be filled in by  
Planning Commission)

## **PART 'A'** **PROJECT DIGEST**

1. Name of project: DNA Databank for Crime Investigation.
2. Authorities responsible for:
- i) Sponsor: Ministry of Science & Technology (MoST), Government of Pakistan
  - ii) Execution: Center for Applied Molecular Biology (CAMB), Canal Bank Road, Thokar Niaz Baig, Lahore-53700.
  - iii) Operation and maintenance: Center for Applied Molecular Biology (CAMB), Canal Bank Road, Thokar Niaz Baig, Lahore-53700.
3. Time required for completion of project:  
(in months) 36 months
4. (a) Plan provision:
- i) If the project is included in the current Five-year Plan, specify actual allocation. This will be included in the annual plan.
  - ii) If not included in the current Plan, how is it now proposed to be accommodated (inter/intra Sectoral adjustments in allocation or other resources may be indicated). N.A.
  - iii) If the project is proposed to be Financed out of block provision for a programme; indicate: N.A.

Total block provision	Amount already committed	Amount proposed for this project	Balance available
Not Applicable			

- (b) If project is not in the Plan: what warrants its inclusion in the Plan. N.A.

5. **Relationship of the project with the objectives of the sector:**  
*Indicate the contribution of the project, quantified if possible, to the targets of the five year Plan, and the names of other projects (whether sanctioned or under preparation) which would form part of an integrated programme within the sector.*

The proposed programme is in line with the decisions made in the meeting of PCST in which the Chief Executive emphasized to strengthen the S & T capability and to promote its applications in every walk of life.

Recombinant DNA and gene cloning is expected to broaden the base of industrial structures in agriculture, health, industry, and environment. DNA Typing can be used to identify important traits in animals. Humans DNA typing offers a benign method of crime investigation. Recent world-wide awareness of human rights will force nations within the UN family to avoid corporal punishment and brutal means of crime investigation and enforce the uses of benign and fool-proof methods such as DNA Typing. Implementation of this project will improve the Pakistani criminal justice system and safeguard the basic human rights in the society. Forensic applications of DNA Typing facility will provide speedy justice and in turn bring back the innocent citizens in the National work force. All these efforts will not only reduce the socioeconomic burden on the affected families but as a whole on the National Economy.

6. Capital cost of project:

Local costs:	Rs. 35.18 million
Foreign exchange costs:	Rs. 2.72 million
Total	Rs. 37.90 million

7. Annual recurring expenditure after completion:

Local:	Rs. 5.69 million
F.E.C.	N.A.
Total:	Rs. 5.69 million

8. Objectives of the project preferably in quantitative terms:

The overall aim of this project is to aid the crime investigation and dispensation of justice.

1. Improve and expand the applications of previously established DNA Typing procedures to human identification.
2. Develop software for storage of information, duly protected from tempering and accessible only to authorized persons.
3. Generate and preserve DNA profiles of selected convicts to develop into a national DNA databank.
4. Train crime investigation officials in the identification, collection and preservation of biological evidence collected from the crime scene and promote the uses of DNA analysis in crime investigation.

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Director

## PART 'B'

### PROJECT DESCRIPTION AND FINANCING

9. **Location of project:** *(Attach map) give name of place and administrative districts in which the Research institute/Center will be selected.*

The project is located at the Centre for Applied Molecular Biology, 87-Canal Bank Road, Thokar Niaz Baig, Lahore-53700.

10. **Existing facilities:** *Give information about the organization doing similar research work at present. indicate their staff, budget for the last five years and their output in terms of number of studies etc. Mention if there is any organization to ensure coordination of work done by different research institutes.*

No other laboratory in the country is working to use DNA profiling in crime investigation.

11. **Description of project:**

- (a) *Give brief history, proposed facilities and justification of project. Indicate the basis for selecting the area of research and justify the priority that should be given to the area. Indicate the benefit of research to the sector and the economy.*

**Brief History of the project:** The Centre for Applied Molecular Biology (CAMB) was established in 1988. This Centre is located back-to-back with the Centre of Excellence in Molecular Biology (CEMB). The aim symbiotic relationship between the twin Centers is designed to utilize basic research developed at CEMB for applications by CAMB. The development phase of CAMB ended in 1996. Since then this Centre has been working to exploit the uses and applications of DNA research in agriculture, health, industry and environment, being carried out at CEMB.

**Description of the Project:** DNA is an organic polymer found in each and every cell of our body. It determines the color of our hair, eyes and skin, our height, our blood group and all other biological properties and characteristics of our body. Each cell has many different command regions called GENES and each gene controls a particular trait of the individual. The genes are arranged on thread like structures called chromosomes just as paragraphs are arranged in a chapter of a book. Altogether there are 23 pairs of chromosomes in each cell; one chromosome of each pair comes from the mother and the other member of the pair from the father. There are 3.2 billion base-pairs of nucleotides which are the alphabets of genetic language, located on 23 pairs of chromosomes. It has been biologically, genetically and statistically proven that DNA of each human is distinctly different from that of another individual.

Identification of in-born differences of DNA sequences, has given birth to unique methods of human identification, in the same manner as “finger prints” do. The fingerprints are uniquely powerful. “Computer Databases” have been generated for fingerprints. Such databases are available “online” across the country in USA, however in many crimes, no fingerprints are left behind. A very common example, and an important one, is rape. For some crimes one may find fingerprints, but for many violent crimes it is harder, if not impossible, to find fingerprints. DNA profiling therefore provides a complementary method of crime investigation and perhaps more powerful and definitely more lasting.

When a criminal commits a crime, he / she leaves behind traces of his / her body cells (contained in blood from the criminal when he is injured; semen if the crime is rape, saliva and hair, pieces of nails or skin etc.) at the scene of the crime. These cells of the criminal's body contain “DNA fingerprint” which can help the crime investigating officer in identifying the real criminal from a group of suspects.

Human DNA Typing involves purification of DNA from human cells collected from the crime scene, the victim and the suspect(s) and amplification of certain suitably informative genes from these DNA samples. Every allele (segment) of each polymorphic gene selected for analysis is identified and the composite set of “allele pairs” present in every sample is recorded. This collection of “allelic pairs” of selected genes present in each sample is the GENOTYPE (or DNA fingerprint!) of the criminal. If a suspect's genotype is identical to the genotype, found in the biological material, recovered from the crime scene, there is high probability that this particular suspect committed the crime. A sufficiently high number of human genes (loci) are identified and genotyped in each sample to increase the statistical probability. Innocent persons who have been wrongfully accused of a crime can be acquitted easily, quickly if the genotype does not match.

**DNA Typing** is a modern technique being practised in over 15 different developed countries. It provides decisive evidence to establish a suspect's crime, help acquit wrongfully accused persons, provide non-refutable evidence in case of rape and provide protection against false eye witness testimony. Implementation of this project will improve the Pakistani criminal justice system and safeguard the basic human rights in the society.

**Above in view** the Ministry of Science & Technology approved a project on “DNA Typing for Crime Investigation” for the ultimate introduction of DNA analysis as a new, powerful, and reliable method of Crime investigation. This project achieved the following objectives:

- ☞ Procedures were developed for the isolation of DNA from minute quantities of biological materials such as, blood, semen, saliva, hair, bones, pieces of nails or skin, dried blood etc. The procedures thus developed in our laboratory provide advanced analytical capability in the country, which can be used in crime investigation.

☞ The above procedures were validated in one thousand samples collected randomly from different clans and ethnicities, mainly in the Punjab province. This has yielded data to prove the statistical strength of DNA analysis in Pakistani populations.

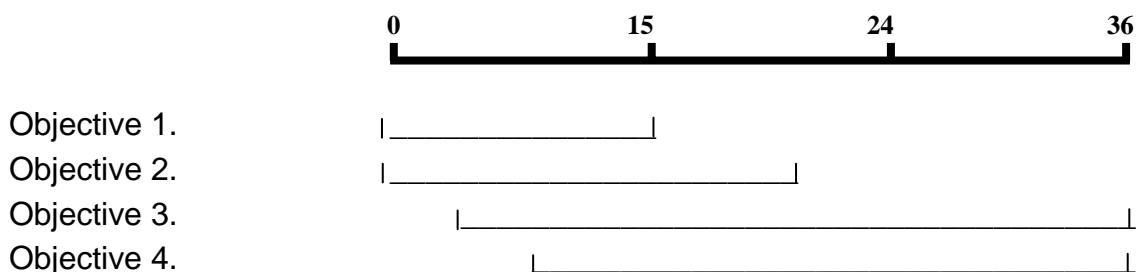
☞ As a result, a moderate level DNA Typing facility has been established. This facility is being used by crime investigating agencies, in cases, which are difficult to solve by routine procedures. Following is a list of the cases in which CAMB helped the various provincial crime investigating agencies.

• Paternity .....	37
• Murder.....	13
• Rape .....	27
• Sodomy .....	09
• Dead body Identification.....	15
• Robbery .....	02
<b>TOTAL:.....</b>	<b>103</b>

**Proposal:** In a background of the above and in continuation of the previously approved programme on DNA analysis for crime investigations, it is proposed to undertake the following objectives:

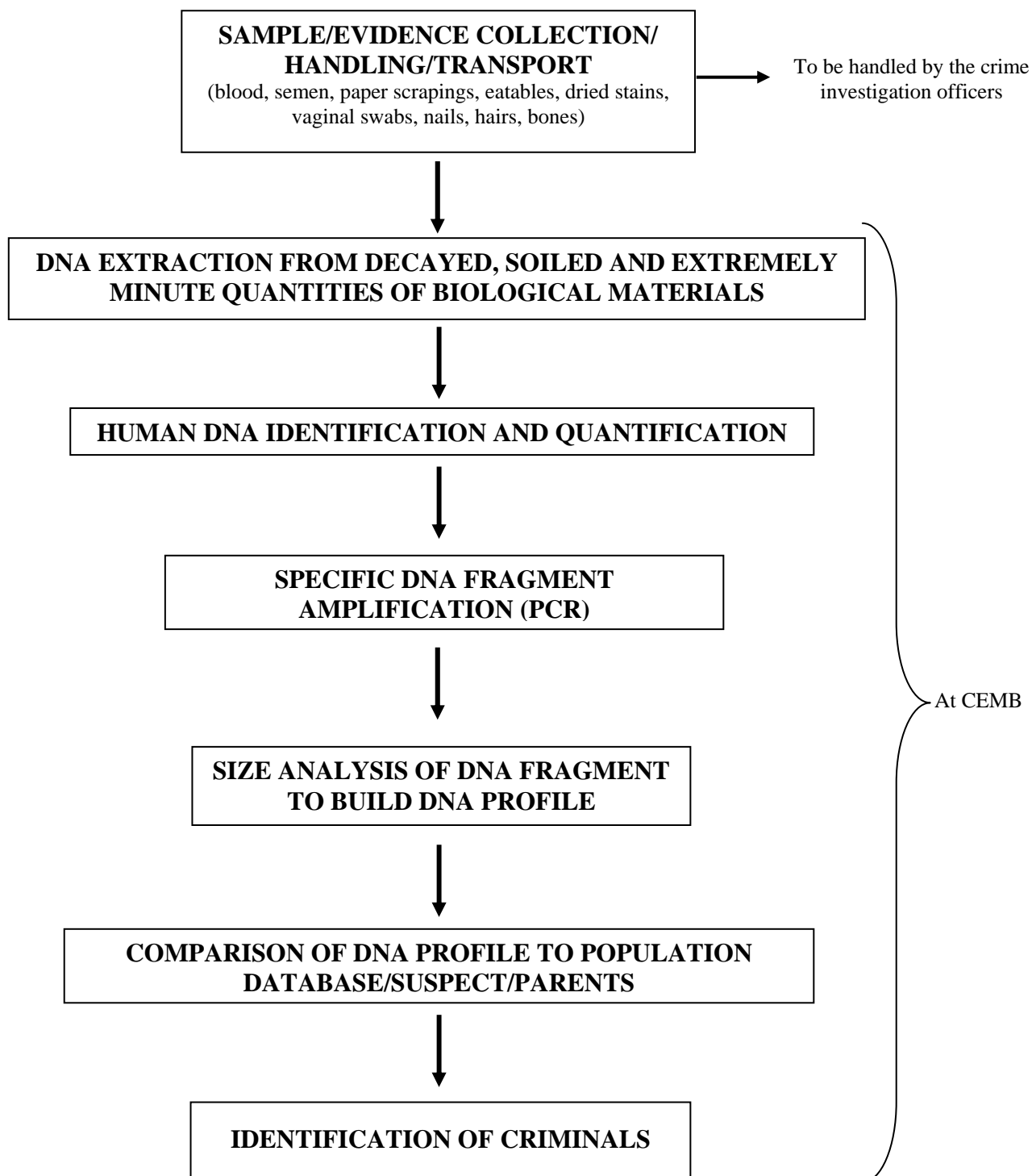
1. Improve and expand the applications of previously established DNA Typing procedures to human identification.
2. Develop software for storage of information, duly protected from tempering and accessible only to authorized persons.
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**TIME SCHEDULE**

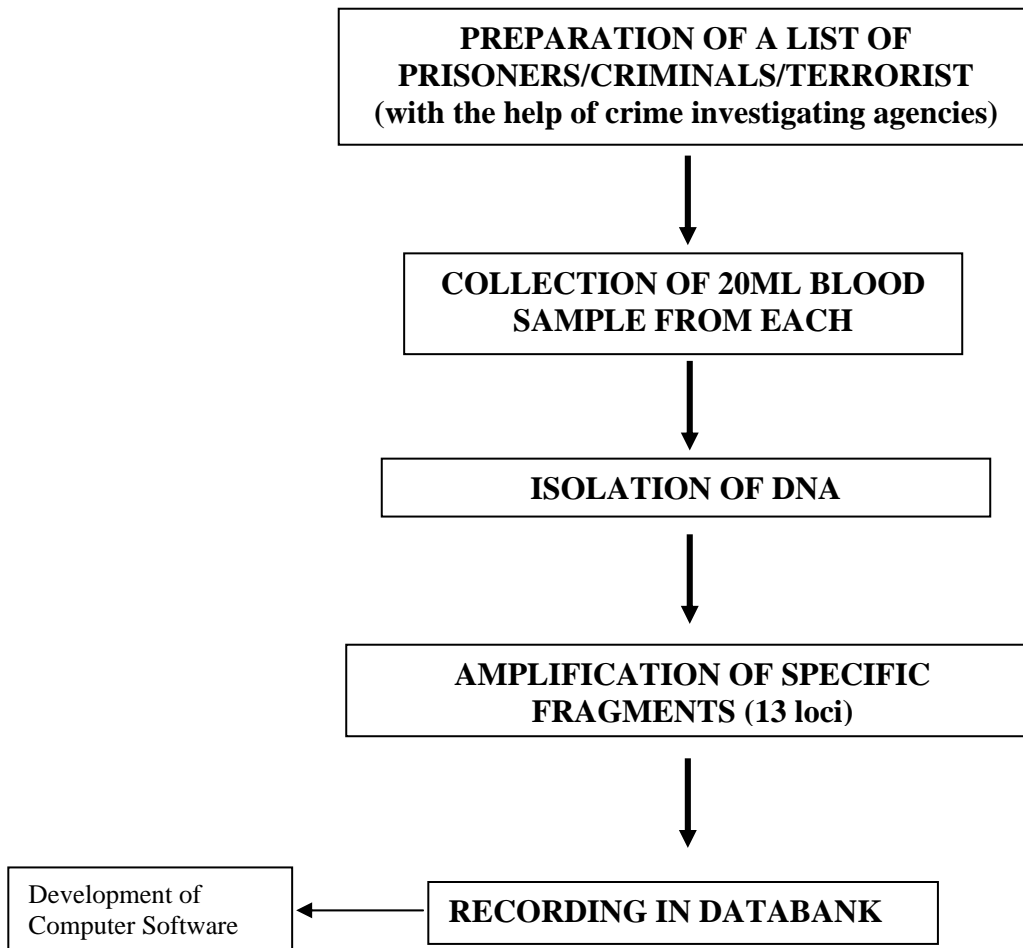


**Proposed methodology.** The flow sheet given below, will be used as the basis of our proposed work plan to further extend the objectives of this programme.

## CRIME INVESTIGATION



# DEVELOPMENT OF DNA DATA BANK



- (b) *Indicate relationship with other programmes in the same sector and in other sectors.*

The project is related to Pakistani justice system and criminology.

- (c) *Mention the intermediate outputs in the form of number of study papers to be produced within the next five years. Indicate whether these studies would result in commercial application or commercial leasing out of the process developed. If so, indicate expected income.*

A computer programme will be developed for storing DNA genotypes.

Three research papers will be published. Forensic applications of DNA Typing facility will provide speedy justice and in turn bring back the innocent citizens in the National work force. All these efforts will not only reduce the socioeconomic burden on the affected families but as a whole on the National Economy.

- (d) *Administrative arrangements for conducting research. Give availability of manpower in the specialized field. Indicate methods of dissemination of research findings.*

The existing administrative arrangements in the Centre will be applicable to the conduct of this project. A major part of the needed manpower is already available. Additional technical manpower will be hired through the usual institutional process.

**12. Arrangements for monitoring and evaluation of the project during implementation.**

The monitoring authorities of the Centre for Applied Molecular Biology will evaluate and monitor the project.

**13. Give date when capital expenditure estimates were prepared: If prepared more than one year ago, confirm if they are still valid.**

January 2005

14. **Give summary of capital cost, covering the whole of the investment period as indicated below:**

Item	(Rupees in millions)			
	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	Total
Salaries	1.26	1.33	1.40	3.99
Equipment	5.13	4.58	—	9.71
Consumable materials & Accessories	5.00	3.00	1.90	9.90
Books, Journals & Informatics	0.30	0.25	0.10	0.65
Computers and Soft wares for development of database	1.40	1.38	—	2.78
Foreign Training	1.23	1.23	—	2.42
Training and Workshops	0.31	0.50	0.60	1.41
Mobile Lab	5.50	—	—	5.50
Other costs@3%	0.50	0.50	0.50	1.50
<b>TOTAL</b>	<b>20.63</b>	<b>12.77</b>	<b>4.50</b>	<b>37.90</b>

15. **Basis of cost estimates:** *(give full details)*

The costs are calculated on the basis of market prices.

16. **Financial plan:**

- (i) *Give complete sources of financing of the project. Clarify sources of financing such as federal/provincial, foreign/local grant/loan etc.*

During developmental phase of the project, total financing are required from GOP. However, after completion, 50% recurring expenditures will be met from earnings.

- (ii) *Provide details of recurrent expenditure on the basis of fixed and variable costs. Also specify the items such as establishment charges, interest payments, depreciation and non salary items, maintenance charges, etc. Indicate the operational arrangements of implementation and the agency responsible for meeting the recurrent cost.*

As above

17. **Beneficiary participation:**

*Executing agencies to confirm whether prospects for beneficiary participation have been considered and if so, provide a detailed mechanism for involving beneficiary.*

The project after completion will help generate partly its own expenditure. Both the Centre and the justice system in the country will benefit from the establishment of forensic services.

18. **Risk analysis:**

*Give a detailed list of assumptions and the basis of changes therein. Also Indicate likely events which may delay the projects and means of addressing these delays.*

Technically the project is firm footed. The success lies in the cooperation extended by the Police and Justice departments.

19. **Estimates of annual recurring expenditure after completion of each phase of project:** *(Also indicate the source of financing recurring expenditure).*

After completion of the project, there will be no recurring expenditure.

20. **Authority responsible to meet the recurring expenditure after completion of the project.**

N.A.

21. **Unit cost for each category of service or output:** *Indicate number of technical personnel and man years, number of studies, cost per study cost per man year.*

N.A.

22. **Comparative unit cost of similar projects under implementation and completed.**

N.A.

23. **Give statement showing phasing of repayment of loans: indicate debt servicing capacity (i) of project, (ii) of loan receiving organization:**

N.A.

24. **In case of industrial research, if the processes developed are to be leased to commercial firms, give cash flow statement (inflow and outflow) for the next five years.**

N.A.

25. **Annual phasing of physical work and financial requirements for the project:**  
*(Attach bar Diagrams)*

(in million rupees)

	Percentage of physical work	Financial requirements		
		Local	F.E.C.	Total
1st year	54%	19.27	1.36	20.63
2nd year	34%	11.41	1.36	12.77
3rd year	12%	4.50	—	4.50
<b>Total:</b>	<b>100%</b>	<b>35.18</b>	<b>2.72</b>	<b>37.90</b>

## PART 'C'

### PROJECT REQUIREMENTS

#### 26. (a) Manpower:

I. <u>Regular Project Staff</u>	<b><u>FOR EXECUTION Man Months</u></b>	<b><u>FOR OPERATION Number (Annexure-I)</u></b>
1. Scientific Posts	144	144
2. Para-Scientific	36	36
II. <u>Consultants</u>		
1. Local	NA	NA
2. Foreign	NA	NA

(b) *Give list of employment to be generated by gender.*

N.A.

(c) *Give manpower required during the first year of the implementation of project. Give details of specific skills required (scientists, lab/field workers, technician etc.) separately for male and female and their grades.*

Please see Annexure-I

(d) *Likely shortage of manpower by occupation.*

None

(e) *Steps to be taken to assure availability of manpower.*

Two M.Phil thesis/Year

(f) *Approximate number of persons required to be trained per year (locally and abroad) and the kind of skills to be learnt.*

N.A.

#### 27. Civil works:

(a) *Total covered area of the building (basic for determining the space requirement) alongwith Line-plans, number of stories, etc.*

Facilities at CAMB, Lahore are proposed to be used.

(b) *If houses, provide their number and categories alongwith covered area and Line-plans.*

N.A.

- (c) *Size of the plot on which building/houses are to be constructed viz the percentage of open and constructed area.*

N.A.

- (d) *Give description of already completed or under construction building/houses viz. the new proposed construction.*

N.A.

- (e) *Existing water-supply and sewerage arrangement in the area as well as for the present project.*

Already exists

- (f) *Unit-cost supported by item-wise detailed estimates of the building/houses separately for civil-works, water supply, sewerage other utilities including HVAC (if present), external development etc.*

N.A.

- (g) *Percentage of contingencies, departmental charges and escalation based on base-cost.*

N.A.

28. **Physical and other facilities required for project:**

<b>Item</b>	<b>To be provided from</b>	<b>To be provided Project itself</b>	<b>from Public Utility</b>
(a)	Power supply		
(b)	Water		
(c)	Other utilities	N.A.	
(d)	Education facility		
(e)	Others		

29. **Materials, supplies and equipment requirement:**

**A-I** Minimum total requirements for execution:

To be completed only for major items costing more than 10% of the total cost.

Item	Unit	Quantity	Local unit rate	Cost	Quantity	Foreign Unit rate	Cost	Already available with the Agency
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1. Materials

- (a) Please see Annexure-III  
 (b)  
 (c)

2. Spares and supplies

- (a)  
 (b)  
 (c)

Equipment and machinery

- (a)  
 (b) Please see Annexure-II  
 (c)

**A-II** Materials, spares and supplies and equipment for operation of project:

Item	Unit	Local		Foreign		
		Quantity	unit rate	Cost	Quantity	unit rate

1. Materials

- (a)  
 (b)  
 (c)

2. Supplies and spares

- (a)  
 (b)

30. **In the case of imported material and equipment for execution, indicate:**

- (a) *Justification for imports:* The research materials are not manufactured by local market therefore imported.

- (b) *Proposed source of supply:* N.A.

## PART 'D'

### ENVIRONMENTAL IMPACT ASSESSMENT

31. **Indicate environmental impact likely to be generated as a result of implementation of the project. Detailed quantification and analysis of the likely impacts separately on human life, animal life, forests and vegetation etc. should be provided. The quantification of impacts should include the following:**

- |       |   |  |
|-------|---|--|
| i)    | Traffic noise.  | NIL.   |
| ii)   | Air pollution.  | NIL.   |
| iii)  | Water pollution.  | It is obvious that CAMB's project is not an industrial project. There will be no adverse impact of the project on the environment. In fact, the Centre has initiated a programme to develop remedial processes for chemically contaminated soil and underground water. Another project is initiated to develop "environmental diagnostic kit" a sensitive tool to monitor chemical pollution in the environment. These projects will help to restore contaminated sites and drains and to improve the habitat. |
| iv)   | Drainage/Run off.   | NIL.   |
| v)    | Community Severance.  | NIL.   |
| vi)   | Crop yield.   | NIL.   |
| vii)  | Ground water contamination.   | NIL.   |
| viii) | People's health.  | NIL.   |
| ix)   | Wild Life.  | NIL.   |
| x)    | Ecology.  | NIL.   |
| xi)   | Bio-physical characteristics of the project site including water, geology and soils, ecological (aquatic & terrestrial) natural resources (mineral/forestry/agriculture), and visual quality etc. | CAMB's PC-I project site is located in a suburban setting in the south of Lahore Metropolitan area. It is a 56-acre terrestrial habitat. Landscaping has given this project site considerable scenic charm. The project site is a considerable scenic charm. The project site does not contain any mineral or forestry resources.  |
| xii)  | Restoration/ preservation and reuse of disturbed areas, through embankments etc.  | N.A.   |
| xiii) | Protection of habitats along communication routes i.e. roadways, rail track and around an airport etc.  | N.A.   |

