1.1 INTRODUCTION:

Healthcare is one of the fastest growing sectors in India undergoing rapid transition. The number of hospitals is increasing day by day. To be successful, a hospital requires a great deal of preliminary study and planning. It must be designed to meet the needs of the people it is going to serve. Today's clinical laboratory is one of a hospital's largest departments and produces vital information for effective healthcare delivery.(10) The importance of hospital laboratory services cannot be overestimated because the practice of medicine today requires more and more laboratory examinations. (1) In response to accelerating changes in the healthcare field, designers and clients have devoted a great deal of attention to creating flexible designs and furnishings. As medical services expand through the years, clinical laboratories are also seeing increasing test workload and service performance expectations. (Indian journal of pathology & Clinical research) Development in medical sciences is leading to emergence of hospital laboratory services as a medical speciality.

The medical or clinical laboratory is the place where materials of human origin and/or human healthcare environment are collected, stored, processed and/or analyzed and reported for the purpose of screening, diagnosis, prognosis, treatment or prevention of diseases and for clinical research. (4)

Clinical Laboratories may also be defined as laboratory for the biological, microbiological, immunological, chemical, immunohaematological, haematological, biophysical, cytological, pathological or other examination of materials derived from the human body for the purpose of providing information for the diagnosis, prevention and treatment of disease in, or assessment of the health of, human beings, and which may provide a consultant advisory service covering all aspects of laboratory investigation including the interpretation of results and advice on further appropriate investigation (7).

It contains discrete departments for a variety of lab test types and houses sophisticated specialized instrumentation. Although often viewed as an ancillary service, doctors rely heavily on fast, accurate tests for disease prevention, diagnosis, and treatment. In fact, estimates show that clinical labs provide about two-thirds of all objective information on patients' health status (Coffman, 1998). This remarkable reliance on lab based equipment for diagnostic testing increases dependency on various technologies. With improved intellectual process control and data management advances, the lab may become the most used, and most important, source of diagnostic information in medicine frequently in hospital-based clinical labs. (Felder et al., 1999). (10)

A hospital laboratory service can be a high income generating and an economic asset to the hospital. The planning and design of the laboratory in the hospital has been neglected to such extent that many hospital today are facing overcrowded working conditions and a poorly functioning laboratory service. Increasing demand on diagnostic services should be an incentive for a more careful consideration of the function and requirements of this rapidly growing service in the hospital. (1) Thus, proper planning of laboratory services is important in the initial project phase.

Laboratory construction, whether new construction, expansion, or renovation project, it is not only simply to buy the reasonable equipment, but also comprehensive consideration of the overall planning laboratory, rational layout, and graphic design, as well as electricity, water, air, ventilation, air purification, safety, environmental protection, infrastructure and basic conditions. Therefore, the laboratory building is a complicated system, in the modern laboratory, advanced scientific instruments and superior sound lab is to enhance the level of modern technology, a prerequisite for the growth of scientific research. "People-oriented, people and the environment" have become the high concern. "safety, environmental protection, practical, durable, aesthetic, economic, excellence, leadership," is the spirit of the planning design.

Al Abeer Educity is an upcoming multi-speciality (750 bedded) cum teaching hospital in Melmuri (Kerala), offering a wide range of services: ENT, General Surgery, Orthopaedics, Gynaecology, Paediatrics, Dental, Tuberculosis and Chest, General Medicine, Ophthalmology, Dermatology, Cardiology, Psychiatry, Neurology, Urology & Nephrology. In the initial phase (soft launch), services that will be provided includes: General Surgery, General Medicine, Orthopaedics, ENT, Dermatology, Ophthalmology, and Cardiac. Thus, laboratory services needs to be planned accordingly.

Laboratory services are important part of the hospital and also the location of Al Abeer Educity is such that they need to have a fully functionally laboratory within the hospital premises. Thus the focus of the study is to organize and plan full-fledged laboratory services for the hospital cum teaching hospital as per the need.

1.1.1 AIM: To organise and plan the laboratory services at Al Abeer Educity.

1.1.2 OBJECTIVES:

General Objective:

To organise and plan the laboratory services at Al Abeer Educity.

Specific Objective:

1) To plan infrastructure and equipment for the laboratory services at Al Abeer Educity.

2) To determine the human resource required for the laboratory at Al Abeer Educity.

3) To plan the process flow of laboratory at Al Abeer Educity.

1.1.3 RESEARCH APPROACH: This is a descriptive study, basically done by doing secondary research using guidelines, standards & norms provided by government of different countries like UK, USA etc. and various accreditation & governing bodies like FGI, NABL, GCLP, CEA etc.

A checklist was prepared for planning of laboratory service and was used as a guide for incorporating all necessary requirements for the hospital laboratory services. A report was prepared for organization and planning of laboratory services which include details regarding infrastructural requirements, equipment requirements, manpower requirement and process flow of laboratories.

1.2 LITERATURE REVIEW

An extensive review of guidelines was done for planning of laboratory services.

Various guidelines taken into consideration:

1. MCI
2. GCLP
3. NABL
4. Clinical Establishment Act
5. IS/ISO 15189
6. HBN 15
7. FGI

1.2.1 Infrastructure:

As per MCI, in the teaching hospital building there should be a central laboratory and each ward shall have a laboratory for routine examination.

Central Laboratory should be well equipped and updated preferably along with common collection area for all investigations in histopathology, cytopathology, haematology, immunopathology, microbiology, biochemistry and other specialized work if any. (2)

As per Guidelines for Good Clinical Laboratory Practice (GCLP), Infrastructure of laboratories should be planned according to the services provided by the laboratory. The basic infrastructure facilities include:

• Reception room/area where requisition forms are received and reports disbursed

• Specimen collection room/area, toilets, privacy for special purposes eg. Semen collection, facilities for disabled persons, toilet for staff

• Quality water supply for analytical purpose

• Uninterrupted power supply

• Analytical work area

• Specimen/Sample/slide storage facility including cold storage where applicable

• Record room/area

• Facility for cleaning of glassware, sterilization /disinfection

• Waste disposal facility including biomedical wastes

• Fire-safety equipment

• Ventilation, climate control and lighting arrangements

• Separate room/area for meetings/administrative work

• Separate facilities/area for staff for hand washing, eating and storing food, drinks etc.

• Communication facility with referral centers

• Transport of specimen/samples to referral centers

• Additional infrastructure facilities may be added for special tasks as and when needed.

Other Considerations:

1. Eye wash facility should be available as "stand-alone" facility or attached to sink. Portable, sealed, refillable bottles should also be available.
2. Adequate fire extinguishers should be readily available in the laboratory. (3)

As Clinical Establishment Act (CEA), the following should be considered:

1. The laboratory shall be developed and maintained to provide safe, clean and hygienic environment for patients, their families, staff and visitors.

2. The facility shall be well illuminated and ventilated and shall have adequate water supply and electricity through regular or alternate sources.

3. Total area requirements can be broadly classified in two categories, viz., common area and laboratory area. The former includes facilities such as reception, waiting, sample collection, reporting, dispatch, and hand washing. Clean toilet facility shall be available in the vicinity of the laboratory facility.

4 The laboratory area for activities including test analysis, washing, biomedical waste storage and ancillary services like Storage of records, reagents, consumables, stationary etc eating area for staff. In view of wide variation of tests and equipments involved in the laboratory processes, indicative list for facility infrastructure requirement are detailed.

5. Common area can be shared between the different divisions/sections of the laboratory/HCO. Within the laboratory various work benches/sections can also share the resources and space however not compromising the quality of work.

6. Auxiliary area for reception, waiting, toilet etc shall be adequate as per the requirement and workload of the laboratory.

7. Ancillary area for storage of records, reagents, consumables, stationary etc eating area for staff shall be as per requirement and workload of the laboratory.

8. The area shall be well lighted, ventilated with continuous water supply.

Following basic signage shall be available:

a) Name of the service provider e.g. (XYZ Diagnostic/clinic/Hospital)

b) Timings of services e.g. (24hrs/8am to 8pm)

c) Scope of services e.g. (Biochemistry/ Haematology/ microbiology/ Histopathology including services outsourced)

Others

a) Fire exit route

b) Safety instructions e.g. BMW

c) Rate list of the test shall be available on request.

d) Laboratory shall identify the outsourced tests and patient must be informed regarding the same

The space requirement for Auxiliary and Ancillary area which shall have reception/dispatch, waiting area, toilet sample collection area, reporting area etc. as per the scope of service provided and workload: 3:6 for reception, waiting, toilet etc. shall be adequate as per the requirement and workload of the laboratory.

Ancillary area for etc. eating area for staff shall be as per requirement and workload of the laboratory

Table: 1.2.1.1: Space requirement-support areas

Area	**Requirement**	
Auxiliary area	Reception/Dispatch Area, Waiting Area, Sample Collection Area, Toilet Area/Change Room etc.	As per Workload
Ancillary Area	Storage of records, reagents, consumables, stationary etc.	As per Workload

II. The minimum space requirement for the operation of lab equipments shall include analysis, washing and storage area: (4)

Table: 1.2.1.2: Space requirement-clinical lab areas

	Lab Area(approx)			
	Column II			
Branch of Medical Clinical Laboratory	Sub Laboratory	Analysis area	Washing area and BMW	Ancillary area/space
Clinical Biochemistry		40 sq ft	36 sqft + 10 sq ft (BMW)	10% of total area of the lab
Pathology				
	Clinical Pathology	30 sq ft and washing area		
	Cytopathology			
	Haematology			
	Histopathology	100 sq ft+ 100 sq ft for block and gross storage including Grossing and washing area		
Microbiology and Serology				
	Bacteriology	60 sq ft		
	Parasitology			
	Mycology	30 sq ft		
	Mycobacteriology	75 sq ft		
	Virology (Culture based)	100 sq ft		
Genetics		150 sq ft		
	Cytogenetics			
Nuclear Medicine (in-vitro tests)	AERB			

As per IS/ISO 15189:2007, following should be considered:

1) There should be enough space for functioning of laboratory i.e. the laboratory shall have space allocated so that its workload can be performed without compromising the quality of work, quality control procedures, and safety of personnel or patient care services.

2) Patients, employees and visitors shall be protected from recognized hazards.

3) The environment in which the primary sample collection or examinations or both are undertaken shall not invalidate the results, or adversely affect the required quality, of any measurement.

4) Laboratory facilities for examination should permit correct performance of examinations. These include, but are not limited to, energy sources, lighting, ventilation, water, waste and refuse disposal, and environmental conditions.

5) The laboratory should have procedures for checking that the environment does not adversely affect the performance of specimen collection and equipment. The laboratory shall monitor, control and record environmental conditions.

6) There shall be effective separation between adjacent laboratory sections in which there are incompatible activities. Measures shall be taken to prevent cross-contamination.

7) Appropriate measures shall be taken to safeguard samples and resources from unauthorized access.

8) Relevant storage space and conditions shall be provided to ensure the continuing integrity of the sample slides, histology blocks, retained micro-organisms, documents, files, manuals, equipments, reagents, laboratory supplies, records and results.

9) Work areas shall be clean and well maintained, Storage and disposal of dangerous materials shall be those specified by relevant regulations.

10) Measures shall be taken to ensure good housekeeping in the laboratory. Special procedures and training for personnel could be necessary to that end. (7)

As per NABL,

1) The laboratory shall ensure adequate space in relation to the following:

   - ❖ Patient reception
   - ❖ Sample collection
   - ❖ Workbench
   - ❖ Equipment
   - ❖ Storage of volatile and inflammable reagents
   - ❖ Radioisotope related work as per the regulatory agency (AERB) requirement
   - ❖ Washing
   - ❖ Isolation for biohazardous materials

2) The laboratory should have adequate lighting, power plugs and uninterrupted power supply. The use of exposed cables should be minimum. All computers, peripherals, equipments and communication devices should be supported in such a way that service is not likely to be interrupted.

3) The laboratory shall have procedures in place to ensure the integrity of refrigerated and/or frozen stored samples/reagents/consumables in the event of an electrical failure.

4) The facility for primary sample collection at sites other than its main laboratory shall also comply with the relevant requirements of ISO 15189. A representative sample of these facilities shall be assessed by NABL for their compliance with the requirements.

5) Cytopathology laboratory shall have a dedicated space for FNAC procedure. (5)

As per Drug and Cosmetics Act: Blood Bank should have an area of 100 sq. ft., for component separation a minimum of 50 sq. ft. and for apheresis a minimum of 10 sq. ft.(12)

1.2.2 Equipments:

As per Clinical Establishment Act (CEA):

1. Each laboratory shall prepare an exhaustive list of equipment and consumables required and available for general functioning of the laboratory and specialized equipment for special tests.

2. Laboratory shall have adequate equipment to meet work load requirement.

3. Equipment shall be suitably located in the laboratory so as to allow accessibility and sequential utilization thus minimizing the need for frequent movement of specimens or reagents.

4. All equipment shall be in good working condition at all times. Periodic inspection, cleaning, maintenance of equipment should be done. An equipment log book should be maintained for all major equipment. Laboratories should maintain necessary instructions for operation and maintenance of equipment in the form of Standard Operating Procedures (SOPs). A copy of SOP shall be readily available.

5. The laboratory shall have record of maintenance contracts including warranty cards and telephone numbers of staff to be contacted in case of equipment malfunction. User manual shall be available readily for reference. The staff shall be aware of trouble shooting measures to be adopted for preventing equipment malfunction.

6. The laboratory shall have provision of calibration and validation of all the new equipment before routine use.

7. Periodic performance check/calibration check for all equipment shall be done using reference standard/reference material. The frequency of performance check shall be based on the day-to-day performance of the equipment.

8. Equipment performance shall be verified from Internal Quality Control results and External Quality Assessment results. Outlier parameter trend analysis record shall be maintained in respect of its effect on the equipment (3) Minimum essential equipment requirement in a laboratory is given in the act.

As per IS/ISO 15189:2007,

1) The laboratory shall be furnished with all items of equipment required for the provision of services (including primary sample collection, and sample preparation and processing, examination and storage).

2) When selecting equipment, account should be taken of the use of energy and future disposal (care of the environment).Each item of equipment shall be uniquely labelled, marked or otherwise identified.

3) Laboratory management shall establish a programme that regularly monitors and demonstrates proper calibration and function of instruments, reagents and analytical systems.

4) It shall also have a documented and recorded programme of preventive maintenance, which, at a minimum, follows the manufacturer's recommendations. (7)

As per NABL,

1) Microscopes used for screening shall have 10 X and 40 X objectives.
2) Spare bulbs and fuses shall be available in the laboratory.
3) All equipment such as centrifuges capable of creating bio-hazardous aerosols should be used in extractor cabinets or rooms fitted with extractor facilities.
4) The laboratory performing Cytopathology tests on CSF must use cytocentrifuge for processing the samples. (5)

1.2.3 Furniture & Fixtures:

As per Clinical Establishment Act:

Furniture and fixtures shall be available in accordance with the activities and workload of the laboratory. The furniture and fixtures shall be functional all the time. Indicative list of items is as follows: (4)

Essential Furniture and fixture in a lab:

Table: 1.2.3.1: Essential furniture list

S. No.	Articles
1.	Table
2.	Chairs
3.	Blood Collection Chairs/Couch
4.	Lab working bench with sink with elbow tap
5.	Storage Cabinet for records
6.	BMW storage area

1.2.4 Manpower:

As per IS/ISO 15189:2007

There shall be staff resources adequate to the undertaking of the work required and the carrying out of other functions of the quality management system. (7)

As per GCLP,

1) Each laboratory should designate a Head of the laboratory who should be overall in-charge of the daily functioning of the laboratory including administration.
2) A Quality Manager should be designated for monitoring and maintaining of day-to-day quality management system.
3) The qualifications and experience of the staff outlined in NABL document 112 (2007) should be followed unless specified by the health care providers.(3)

Table 1.2.4.1: Manpower requirement-Lab wise

	Column I	Column II		
Medical (Clinical) Laboratory		For processing of samples and operation of equipment	For interpretation signing and reporting	Administrative staff
Clinical Biochemistry	Qualified	MSc MLT, BSc MLT, DMLT and vocational and/or certificate course in technology	M.B.B.S. with post graduate diploma/ degree in Biochemistry / Pathology/Microbiology/Lab medicine or equivalent recognized by MCI or NBE or as applicable	As per requirement

			and registered medical practioner with Medical Council of India/ State Medical Council	
	Trained	MSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ BSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ Metric with 5 yrs of experience in clinical laboratory under qualified authorised signatory refer to next column	MBBS with work experience in a clinical laboratory registered with Medical Council of India/ State Medical Council	
Pathology including Clinical Pathology, Cytopathology, Haematology, Histopathology	Qualified	MSc MLT, BSc MLT, DMLT and vocational and/or certificate course in technology	M.B.B.S. with post graduate diploma/ degree in Pathology /or equivalent recognized by MCI or NBE or as applicable and registered with Medical Council of India/ State Medical Council. M.B.B.S. with post graduate diploma/ degree in	

			Microbiology for reporting histopathology of infectious diseases	
	Trained	MSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ BSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ Metric with 5 yrs of experience in clinical laboratory under qualified authorised signatory refer to next column		
Microbiology and Serology including Bacteriology, Parasitology, Mycology, Mycobacteriology, Virology (Culture based)	Qualified	MSc MLT, BSc MLT, DMLT and vocational and/or certificate course in technology	M.B.B.S. with post graduate diploma/ degree in Microbiology /Lab medicine or equivalent recognized by MCI or NBE or as applicable and registered medical practioner with Medical Council of India/ State Medical Council	
	Trained	MSc Medical Biochemistry/ Medical Microbiology/		

		Biotechnology/ BSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ Metric with 5 yrs of experience in clinical laboratory under qualified authorised signatory refer to next column		
Immunoserology	Qualified	MSc MLT, BSc MLT, DMLT and vocational and/or certificate course in technology	M.B.B.S. with post graduate diploma/ degree in Biochemistry / Pathology/Microbiology/Lab medicine or equivalent recognized by MCI or NBE or as applicable and registered with Medical Council of India/ State Medical Council	
	Trained	MSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ BSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ Metric with 5 yrs of experience in clinical	MBBS with work experience in a clinical laboratory and registered with Medical Council of India/ State Medical Council	

		laboratory under qualified authorised signatory refer to next column		

As per Clinical Establishment Act,

1. The laboratory shall have qualified staff as per the scope of service provided.

2. The laboratory shall have services of a qualified Pathologist/Biochemist /Microbiologist or Registered Medical Practitioner competent for interpretation and reporting.

3. The laboratory shall have the services of qualified technologist to process the sample and operation of equipment.

4. The test reports can be processed and generated by the BSc MLT, DMLT, MSc MLT, MSc Medical Biochemist and MSc Medical Microbiologist.

5. The person signing and interpreting the report shall be registered with Medical Council of India / State Medical Council In case of location of laboratory in the peripheral area where qualified personnel for interpretation and reporting is not available a Registered Medical Practitioner MBBS/MD/MS in other specialization can release and interpret the routine reports as per local law & regulation. (4)

Minimum human resource requirement shall be as follows:

Table: 1.2.4.2: Minimum Manpower requirement

Human resource	Basic Composite (upto 30 samples)	Medium (30-100 samples)	Advanced (>100 samples)	
Designation, minimum qualification of Technical Head of Lab / Specialist/	MBBS from a recognised institution (with atleast one	Incharge can be MD/DNB in Pathology/Biochemistry/ Medical Microbiology /Lab Medicine/ Diploma in Clinical Pathology	Incharge can be MD/DNB Pathology/Lab Medicine/ Biochemistry/ Medical	Mandatory

Signatories	year experience in laboratory work- Desirable	(DCP) with one year post diploma experience / MBBS with PhD in any of the 3 subjects/ Apart from incharge, if any special test of other speciality is done, it is desirable that specialist of that subject need be there on full time/part time or outsourced (Special tests means any other apart from routine basic biochemistry, haematology,or medical microbiology tests as listed in basic composite lab)	Microbiology/ DCP with one year post diploma experience / MBBS with PhD in any of the 3 subjects/ Apart from incharge, if any special test of other speciality is done, it is desirable that specialist of that subject need be there on full time/part time or outsourced (Special tests means any other apart from routine basic biochemistry, haematology, or microbiology tests as listed above)	
Number of laboratory technicians with DMLT / MLT/BSc in lab sciences/ MSc in lab sciences/PhD in lab sciences qualification (govt / university)	1	2 Lab Technicians	4 Lab Technicians	Mandatory
Support staff (Lab Assistant / Lab Attendant) Roster of	1	1	2	Mandatory

salary of staff Periodic health check up and vaccination of staff				

Research Papers/ Articles:

An article published in 1997 by Karen K Mortland on Laboratory Design for today's technology in Washington DC. The article summarizes that rapid advancements in technologies and methodologies have rendered many existing labs inefficient. Today's laboratory managers must consistently monitor the productivity of their labs to ensure their status as lowest cost provider in their particular health care domain. Laboratory administrators must do more than respond to today's competitive circumstances. Laboratories must be prepared to adapt to changing market trends and technologies.

Incorporating new technologies can substantially alter demands placed on the laboratory environment. Physical alterations to the lab, including utilities, often accompany the inclusion of the new technologies. Flexibility and room for expansion in the floor plan and the mechanical systems are necessary. As outpatient services continue to grow, laboratories have gained a new visibility as a vital part of health care market strategies. A well-designed lab that provides the health care community with efficient and state of the art service is viewed as a tool to attract physicians and HMO's to a facility. (11)

1.3 Methodology

A descriptive study was carried for a period of 64 days at Al Abeer Educity, Kerala. Al Abeer Educity is an upcoming 750 bedded hospital which is under construction.

Data collection tools used are guiding documents i.e. guidelines, norms and standard published by various organization and government of different countries.

Guiding documents used include:

1) Medical Council of India (Standards for admission of 150 students)
2) National Accreditation Board for Laboratories standards
3) Good Clinical Laboratory Practices guidelines
4) Clinical Establishment Act for laboratories
5) IS/ISO 15189:2007 standards
6) Health Authority-Abu Dhabi (HAAD)
7) Health Building Note (HBN-15), UK
8) Facility Guideline Institute guidelines, USA

These all documents were thoroughly read and the requirements were taken into consideration while planning for laboratory services at the hospital. All the points were incorporated in the plan for the laboratory services. A checklist was also prepared.

At the moment, laboratory is under construction so major attention was given to infrastructure requirement. Also the layout of laboratory was reviewed and the necessary changes required were informed. Further on the basis of rough calculation of workload. List of equipment required & manpower planning was done.

Limitation of the study:

This study cannot be generalized since the study is carried out taking into consideration the requirements of Al Abeer Educity.

The location of the hospital is such that every equipment will be required, as the accessibility to nearby areas is difficult.

1.4 Results

Al Abeer Educity is an upcoming multi-speciality (750 bedded) cum teaching hospital, offering a wide range of services like ENT, General Surgery, Orthopaedics,

Gynaecology, Paediatrics, Dental, Tuberculosis and Chest, General Medicine, Ophthalmology, Dermatology, Cardiology, Psychiatry, Neurology, Urology, Nephrology

Laboratory services are planned to cater the need of the hospital as well as the need of medical college. Area of hospital laboratory is approx. 10219250 cm^2 (11,000 sq. ft.) with 3716090 cm^2 (4000 sq. ft.) area for future expansion. Details about layout of Hospital Laboratory along with space allocated and required as per guidelines and standards is as follows:

Table: 1.4.1: Space planning

Room No.	**LABORATORY AREA**	**Space Allocated (lxb)(cm)**	**Space Required**	
			As per CEA/D&CA (cm^2)	**As per HAAD HFG (cm^2)**
A-1-128	**SAMPLE COLLECTION AREA (First Floor)**	315X400 (126000 cm2)	As per workload	1. 90,000 (For Sample Collection) 2. 2,00,000 (For Reception, Sorting & Preparation of Specimen)
A-1-337	**SAMPLE COLLECTION AREA (EHC-First Floor)**	330X250 (82500 sq cm)	As per workload	1. 90,000 (For Sample Collection) 2. 2,00,000 (For Reception, Sorting & Preparation of Specimen)
A-3-264	**SAMPLE COLLECTION AREA (Third Floor)**	680X310 (210800 sq cm)	As per workload	1. 90,000 (For Sample Collection) 2. 2,00,000 (For Reception, Sorting & Preparation of Specimen)
A-3-263	**RECEPTION AND REPORTING**	360X949 (341640 cm^2)	As per workload	1,20,000

A-3-262	**LAB WAITING AREA**	680X960 (652800 cm^2)	As per workload	1,00,000
A-3-260	**LAB MANAGER ROOM**	360X320 (115200 cm^2)	As required	120000
A-3-261	**PATHOLOGIST'S ROOM**	360X320 (115200 cm^2)		
A-3-257	**FNAC**	360X320 (115200 cm^2)		
A-3-256	**COLD STORE**	360X320 (115200 cm^2)	As per workload	100000
A-3-252	**STAFF ROOM (One Male & One Female)**	320X490 (156800 cm^2)	As required	150000 (each for male & female rest room)
A-3-251	**LAB WASHING**	340X630 (214200 cm^2)	100334	100000
A-3-244	**MEDIA ROOM**	360X440 (158400 cm^2)	As per workload	
A-3-243	**AUTOCLAVE**	630X315 (198450 cm^2)	As required	
A-3-240	**BACTERIOLOGY**	500X660 (330000 cm^2)	55741.36	250000
A-3-242	**MICROBIOLOGY**	575X660 (379500 cm2)		250000
A-3-241	**MYCOLOGY**	380X660 (250800 cm^2)	27870.68	250000
A-3-253	**BIOCHEMISTRY**	650X965 (627250 cm^2)	37160.907	250000
A-3-254	**HEMATOLOGY & IMMUNOLOGY**	650X965 (627250 cm^2)	27870.68	250000
A-3-255	**HISTOPATHOLOGY**	660X664 (438240 cm^2)	185804.534	250000
A-3-259	**CYTOLOGY**	660X471 (310860 cm^2)		250000
A-3-258	**CLINICAL PATHOLOGY**	660X471 (310860 cm^2)	27870.68	250000
A-3-239	**SEROLOGY**	455X955 (434525 cm^2)		250000
A-3-265	**PATIENT'S TOILET**	150X150 (22500 cm^2)		40000

A-3-266	**PATIENT'S TOILET**	150X150 (22500 cm^2)		40000
A-3-245	**STAFF'S TOILET**	110X150 (16500 cm^2)		30000
A-3-246	**STAFF'S TOILET**	110X150 (16500 cm^2)		
A-3-247	**STAFF'S TOILET**	110X150 (16500 cm^2)		
A-3-248	**STAFF'S TOILET**	110X150 (16500 cm^2)		
A-3-249	**STAFF'S TOILET**	110X150 (16500 cm^2)		
A-3-250	**STAFF'S TOILET**	110X150 (16500 cm^2)		
BLOOD BANK				
A-3-268	**BLOOD BANK WAITING AREA**	930X360 (334800 cm^2)	As per workload	1,00,000
A-3-269	**REFRESHMENT AREA**	470X360 (169200 cm^2)		
A-3-270	**DONOR'S TOILET**	150X150 (22500 cm^2)		40000
A-3-267	**RECEPTION AND REGISTRATION**	360X371 (133560 cm^2)		1,20,000
A-3-275	**BLOOD COLLECTION**	600X940 (752000 cm^2)		50000 (for each blood collection chair bay)
A-3-274	**APHERESIS**	335X375 (125625 cm^2)	1,00,000	
A-3-273	**MEDICAL EXAM**	335X375 (125625 cm^2)		
A-3-276	**STORE & RECORD**	660X345 (227700 cm^2)		60000
A-3-271	**LAB-1**	420X555 (233100 cm^2)		
A-3-272	**LAB-2**	420X623 (261660 cm^2)		
A-3-277	**WASH ROOM**	630X363 (228690 cm^2)		
A-3-278	**COMPONENT SEPARATION**	1290X620 (799800 cm^2)	5,00,000	

Workload Calculation: In a study in 1990, in a teaching hospital it was estimated that laboratory tests averaged at 8-20 tests/ patient in medical ward during an ALS of 10 days, giving a ratio of 2 tests per day, excluding radiographic investigations or other tests carried out in specialized laboratories.

So, if 750 bedded hospital, then with 10 days ALS will treat

365 ÷ 10 = 36.5 (say 37) patients/bed/year Or

37 x 750 = 27750 patients/ year

Thus, hospital laboratory will carry out

27750 x 8 = 2, 22,000 tests/ year Or

27750 x 20 = 5, 55,000 tests/ year

1.4.1 Infrastructure planning

Infrastructure planning for each laboratory area was done. Infrastructure planning includes civil, MEP, Fire, HVAC, IT, pneumatic layout, furniture & fittings requirement & Flooring, ceiling, wall finish, cornice, door etc. requirements. Details about each area are as follows:

1) Sample Collection Area (First Floor)

Table: 1.4.1.1: Infrastructure planning-Sample Collection (1st Floor)

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)	Handicapped toilet Facility	As per NFPA	AC	1	Barcoding system
Fan	Handwashing facility	Smoke Detector		Countertops	Computer
Electrical Points 6/16 amps					Printer
					Data Point
					Voice Call

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Phlebotomy chair	Sliding Door (Solid Core/ Glass, Paint finish, Single leaf/ double leaf, half glazed, 92 cm clear opening)
Workstation (Laminated, Small, 90cm high)	Cupboards (Wall Mounted-Overhead & Under bench)
Adjustable-height office Chair	Bins for Collection of waste
Louvered panel for storage bins OR Side Shelves to keep syringes, needles, cotton etc.	Dispenser: Disposable gloves
Display Board	Wall Mounted Soap Dispenser
	Wall Mounted Paper Towel Dispenser
	Curtain track: bed screen
	Curtain: bed screen
Flooring	Vinyl, Standard slip resistant, seamless, coved
Ceiling	Plasterboard, paint, washable
Cornice (if required)	Aluminium, powdercoat
Skirting	Vinyl, Prefinished, Floor Vinyl Coved, 15cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	Composite, Prefinished PVC, Corner gaurds to 1500 AFFL/ Cash rail at 900 AFFL
Door Protection (if required)	
Lighting	General flourescent & downlights

2) Sample Collection Area (EHC-First Floor):

Table: 1.4.1.2: Infrastructure planning-Sample Collection (EHC-1st Floor)

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)	Handicapped toilet Facility	As per NFPA	AC	1	Barcoding system
Fan	Handwashing facility	Smoke Detector		Countertops	Computer

Electrical Points 6/16 amps					Printer
					Data Point
					Voice Call

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Phlebotomy chair	Sliding Door (Solid Core/ Glass, Paint finish, Single leaf/ double leaf, half glazzed, 92 cm clear opening)
Workstation (Laminated, Small, 90cm high)	Cupboards (Wall Mounted-Overhead & Underbench)
Adjustable-height office Chair	Bins for Collection of waste
Louvered panel for storage bins OR Side Shelves to keep syringes, needles, cotton etc.	Dispenser: Disposable gloves
Display Board	Wall Mounted Soap Dispenser
	Wall Mounted Paper Towel Dispenser
	Curtain track: bed screen
	Curtain: bed screen
Flooring	Vinyl, Standard slip resistant, seamless, coved
Ceiling	Plasterboard, paint, washable
Cornice (if required)	Aluminium, powder coat
Skirting	Vinyl, Prefinished, Floor Vinyl Coved, 15cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	Composite, Prefinished PVC, Corner guards to 1500 AFFL/ Cash rail at 900 AFFL
Door Protection (if required)	
Lighting	General fluorescent & down lights

3) Sample Collection Area (3rd Floor)

Table: 1.4.1.3: Infrastructure planning-Sample Collection (3rd Floor)

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				

Tubelight (UPS Light-1)	Handicapped toilet Facility	As per NFPA	AC	0	Barcoding system
Fan	Handwashing facility	Smoke Detector			Computer
Electrical Points 6/16 amps					Printer
					Data Point
					Voice Call

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Phlebotomy chair	Sliding Door (Solid Core/ Glass, Paint finish, Single leaf/ double leaf, half glazed, 92 cm clear opening)
Workstation (Laminated, Small, 90cm high)	Cupboards (Wall Mounted-Overhead & Under bench)
Adjustable-height office Chair	Bins for Collection of waste
Louvered panel for storage bins OR Side Shelves to keep syringes, needles, cotton etc.	Dispenser: Disposable gloves
Display Board	Wall Mounted Soap Dispenser
	Wall Mounted Paper Towel Dispenser
	Curtain track: bed screen
	Curtain: bed screen

Flooring	Vinyl, Standard slip resistant, seamless, coved
Ceiling	Plasterboard, paint, washable
Cornice (if required)	Aluminium, powdercoat
Skirting	Vinyl, Prefinished, Floor Vinyl Coved, 15cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	Composite, Prefinished PVC, Corner gaurds to 1500 AFFL/ Cash rail at 900 AFFL
Door Protection (if required)	
Lighting	General flourescent & downlights

4) Reception & Reporting Area:

Table: 1.4.1.4: Infrastructure planning-Reception & Reporting Area

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)	Drinking Water Facility	As per NFPA	AC	0	Computer
Fan		Smoke Detector			Printer
Electrical Points 6/16 amps					Data Point
					Voice Call

Furniture Layout	
Furniture Requirements	Fixtures & Fittings
Workstation	Cupboards (wall mounted over bench & under bench)
Adustable height office chairs	Bin for general waste (Black Colour)
Display Board	

Flooring	Tiles, Standard slip resistant;
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x 120 cm
Cornice (if required)	Aluminium, powdercoat
Skirting	Laminate, Prefinished, 15 cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent & down lights

5) Laboratory Waiting Area:

Table: 1.4.1.5: Infrastructure planning-Laboratory Waiting area

MEP				

Electrical	Plumbing	**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Tubelight (UPS Light-1)		As per NFPA	AC	0	
Fan		Smoke Detector			
Electrical Points 6/16 amps					
Furniture Layout					
Furniture Requirements			**Fixtures & Fittings**		
Chairs: Waiting			Bin for general waste		
Rack for magazine/ newspaper			Door		
Flooring	Tiles, Standard slip resistant;				
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x 120 cm				
Cornice (if required)	Aluminium, powdercoat				
Skirting	Timber, Paint, 15 cm high & 2 cm thick				
Wall Finish	Paint, Acrylic Washable				
Wall Protection (if required)					
Door Protection (if required)					
Lighting	General fluorescent				

6) Lab Manager's Room:

Table: 1.4.1.6: Infrastructure planning-Lab Manager's Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)		As per NFPA	AC	0	Computer
Fan		Smoke Detector			Data Point
Electrical Points 6/16 amps					Voice Call
UPS power point for computer					
Furniture Layout					

Furniture Requirements	**Fixtures & Fittings**
Workstation with drawers	Cupboards (wall mounted)
Adjustable height office Chairs	Bin for general waste (Black Colour)
Adjustable height office Chairs: Visitor	Door (Solid Core/ Glass, Painted, Single leaf, half glazed with 92 cm clear opening & Lockable)
Display Board	
Flooring	Tiles, Standard slip resistant;
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x 120 cm
Cornice (if required)	Aluminium, powdercoat
Skirting	Timber, Paint, 15 cm high & 2 cm thick
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent

7) Pathologist's Room:

Table: 1.4.1.7: Infrastructure planning-Pathologist's Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)	Handwashing facility	As per NFPA	AC	0	Computer
Fan		Smoke Detector			Data Point
Electrical Points 6/16 amps					Voice Call
UPS power point for computer					
Furniture Layout					
Furniture Requirements		**Fixtures & Fittings**			
Workstation with drawers		Cupboards (wall mounted)			

Adjustable height office Chairs	Bin for general waste (Black Colour)
Adjustable height office Chairs: Visitor	Door (Solid Core/ Glass, Painted, Single leaf, half glazed with 92 cm clear opening & Lockable)
Display Board	
Flooring	Tiles, Standard slip resistant;
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x 120 cm
Cornice (if required)	Aluminium, powdercoat
Skirting	Timber, Paint, 15 cm high & 2 cm thick
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent

8) FNAC:

Table: 1.4.1.8: Infrastructure planning-FNAC

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)	Handwashing Facility	As per NFPA	AC		Barcoding Facility
Fan		Smoke Detector			Computer
Electrical Points 6/16 amps					Data Point
UPS power point for computer					Voice Call
Furniture Layout					
Furniture Requirements		**Fixtures & Fittings**			
Examination Bed		Cupboards (Wall mounted & Underbench)			
Workstation with drawers		Self-Closing Door (Solid Core/ Glass, Paint finish, Single leaf, half glazzed, 92 cm clear opening)			
Adjustable height office Chairs		Bins for Waste Collection			

Display Board	
Stool	
Flooring	Vinyl, Standard slip resistant, seamless, coved
Ceiling	Plasterboard, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Vinyl, Prefinished, Floor Vinyl Coved 15 cm high
Wall Finish	Paint, Acrylic Washable For wet areas: Tiles, Glazed, Splashback
Wall Protection (if required)	
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 900 AFFL Door protection also be done to door frame
Lighting	General fluorescent
Remarks	Windows desirable

9) Cold Store:

Table: 1.4.1.9: Infrastructure planning-Cold Store

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)		As per NFPA	AC		Access Control
Electrical Points 6/16 amps		Smoke Detector			
Furniture Layout					
Furniture Requirements	**Fixtures & Fittings**				
Storage Shelf	Self-Closing Door (Lockable, Single leaf, half glazed)				
Refrigerator					
Flooring	Vinyl, Standard slip resistant, seamless, coved				
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x120 cm				

Cornice (if required)	Aluminium, Powder coat
Skirting	
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent
Remarks	Windows desirable

10) Staff's Rest Room:

Table: 1.4.1.10: Infrastructure planning-Staff's Rest Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)		As per NFPA	AC		
Fan		Smoke Detector			
Electrical Points 6/16 amps					
Furniture Layout					
Furniture Requirements		**Fixtures & Fittings**			
Comfortable Chairs		Cupboards(wall mounted or underbench)/ Lockers: Personal belongings			
Table		Door (Solid Core/ glass, paint finish, Single leaf, obsevation panel, 92 cm clear opening & lockable			
Kettle		Bins for General Waste Collection (Black)			

Flooring	Tiles, Standard slip resistant
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Timber, Paint, 15 cm high X 2 cm thick
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	Vinyl, Prefinished, Kickplate:30 cm high
Lighting	General fluorescent

11) Lab Washing:

Table: 1.4.1.11: Infrastructure planning-Lab Washing

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tubelight (UPS Light-1)	Sinks with 3 taps (elbow Operated)	As per NFPA	AC		
Electrical Points 6/16 amps	One sink for hazardous substances (elbow operated tap)	Smoke Detector			
	Handwashing facility				

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Countertops (75 cm X 620 cm)	Self-Closing Door (Solid core/ glass, Paint finish, Single leaf, observation panel & pull handle/ push plate)
	Detergent dispenser: sinks
	Soap dispenser: hand washing facility
	Paper towel dispenser: hand washing facility
	Dispenser Disposable gloves
	Waste Bin (Black)
	Shelf: Stainless Steel

Flooring	Vinyl, non-slip, Safety, seamless, coved. (tiles also acceptable)
Ceiling	Plaster wood, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Vinyl, Prefinished, Floor vinyl coved 15 cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 90 AFFL Door protection also required for door frame
Lighting	General fluorescent
Remarks	Window desirable

12) Media Room:

Table: 1.4.1.12: Infrastructure planning-Media Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)	Sinks-2 (elbow Operated)	As per NFPA	AC		
Electrical Points 6/16 amps		Smoke Detector			

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Countertops	Cupboards/ Shelf (wall mounted)
Office Chair	Self-Closing Door (Solid Core/ Glass, Paint finish, Single leaf, half glazed, 92 cm clear opening)
	Bins for Waste Collection (Red, Blue, Black, Yellow)

Flooring	Vinyl, non-slip, Safety, seamless, coved. (tiles also acceptable)
Ceiling	Plaster wood, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Vinyl, Prefinished, Floor vinyl coved 15 cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 90 AFFL Door protection also required for door frame
Lighting	General fluorescent
Remarks	Window desirable

13) Autoclave:

Table: 1.4.1.13: Infrastructure planning-Autoclave

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)	Sinks-2 (elbow Operated)	As per NFPA	AC		

Electrical Points 6/16 amps		Smoke Detector			
Furniture Layout					
Furniture Requirements	**Fixtures & Fittings**				
	Self-Closing Door (Solid core/ glass, Paint finish, Single leaf, observation panel & pull handle/ push plate)				
Flooring	Vinyl, non-slip, Safety, seamless, coved. (tiles also acceptable)				
Ceiling	Plaster wood, Prefinished, Drop-in tiles, 60 cm x120 cm				
Cornice (if required)	Aluminium, Powder coat				
Skirting	Vinyl, Prefinished, Floor vinyl coved 15 cm high				
Wall Finish	Paint, Acrylic Washable				
Wall Protection (if required)					
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 90 AFFL Door protection also required for door frame				
Lighting	General fluorescent				

14) Clinical Laboratory (Serology, Bacteriology, Mycology, Microbiology, Biochemistry and Histopathology & Immunology, Histopathology, Clinical Pathology & Cytology):

Table: 1.4.1.14: Infrastructure planning-Clinical Laboratories

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)	Hand washing Facility	As per NFPA	AC		Barcoding Facility
Electrical Points 6/16 amps	Eye wash Facility & Emergency Shower	Smoke Detector	Exhaust		Computer
	Sinks (Elbow Operated taps)				Data Point Voice Call
Furniture Layout					

Furniture Requirements	Fixtures & Fittings
Workstations	Cupboards (Wall mounted & Under bench)
Table with drawers	Self-Closing Door (Solid Core/ Glass, Paint finish, Single leaf, half glazed, 92 cm clear opening)
Adjustable height office Chairs	Bins for Waste Collection
Display Board	Soap dispenser: hand washing facility
	Paper towel dispenser: hand washing facility
	Dispenser Disposable gloves

Flooring	Vinyl, Standard slip resistant, seamless, coved.
Ceiling	Plasterboard, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Vinyl, Prefinished, Floor vinyl coved 15 cm high
Wall Finish	Paint, Acrylic Washable For wet areas: Tiles, Glazed, Splash back
Wall Protection (if required)	
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 90 AFFL Door protection also required for door frame
Lighting	General fluorescent
Remarks	Window desirable

15) Toilets (Patient's, Staff's and Donor's):

Table: 1.4.1.15: Infrastructure planning-Toilets

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)	Hand washing Facility	As per NFPA	Exhaust		
	Handicapped toilet facility				
Furniture Layout					
Furniture Requirements	**Fixtures & Fittings**				

	Door (Solid Core, Paint finish, Single Leaf, 92 cm clear outward opening, privacy latch, emergency release)
	Grab rail (1-behind toilet, 1 to side) (drop down rail, optional)
	Soap dispenser: hand washing facility
	Paper towel dispenser: hand washing facility
	Dispenser Toilet paper
	Bin for waste collection
Flooring	Tiles, Non slip, Ceramic. OR Non slip Vinyl Flooring
Ceiling	Plasterboard, Prefinished, Water resistant Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Tiles, To match floor, coved OR Coved vinyl skirting
Wall Finish	Paint, Acrylic Washable For wet areas: Tiles, Glazed, Splash back
Wall Protection (if required)	
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 90 AFFL. Door protection also be done to door frame & on both sides of door
Lighting	General fluorescent

16) Blood Bank Waiting Area:

Table: 1.4.1.16: Infrastructure planning-Blood Bank Waiting Area

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)		As per NFPA	AC		
Fan		Smoke Detector			
Furniture Layout					
Furniture Requirements		**Fixtures & Fittings**			
Chairs: Waiting		Bin for general waste			
Rack for magazine/ newspaper		Door			

Flooring	Tiles, Standard slip resistant.
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Timber, Paint, 15 cm high & 2 cm thick
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent

17) Reception & Registration Area:

Table: 1.4.1.17: Infrastructure planning-Reception & Registration Area

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)		As per NFPA	AC	1	Computer
Fan		Smoke Detector		Countertop	Printer
Electrical Points 6/16 amps					Data Point
					Voice Call
					Barcoding System
Furniture Layout					
Furniture Requirements		**Fixtures & Fittings**			
Workstation		Cupboards (Wall mounted)			
Adjustable-height office chairs		Bin for general waste			
Display Board					
Flooring		Tiles, Standard slip resistant.			
Ceiling		Acoustic, Prefinished, Drop-in tiles, 60 cm x120 cm			
Cornice (if required)		Aluminium, Powder coat			
Skirting		Timber, Paint, 15 cm high & 2 cm thick			
Wall Finish		Paint, Acrylic Washable			

Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent

18) Refreshment Room:

Table: 1.4.1.18: Infrastructure planning-Refreshment Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)		As per NFPA	AC		
Fan		Smoke Detector			
Electrical Points 6/16 amps					

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Resting Couch/ Bed	Self-Closing Door (Solid Core, Paint finish, Single Leaf, 92 cm clear outward opening, privacy latch, emergency release)
Table	
Chair	
Refrigerator	

Flooring	Tiles, Standard slip resistant.
Ceiling	Plasterboard, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Laminate, Prefinished, 15 cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent & down lights

19) Blood Collection Area:

Table: 1.4.1.19: Infrastructure planning-Blood Collection Area

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)	Hand washing Facility	As per NFPA	AC		Voice Call
Fan		Smoke Detector			
Electrical Points 6/16 amps					

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Donor Couch	Cupboards (overhead)
Table with drawers	Storage bins
Chair mobile/ Stool: adjustable, mobile	Trolley
Display Board	Waste Collection bins

Flooring	Vinyl, Standard slip resistant
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Vinyl, Prefinished, Floor vinyl coved15 cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent & Down lights colour corrected over each collection chair

20) Apheresis:

Table: 1.4.1.20: Infrastructure planning-Apheresis

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				

Tube light (UPS Light-1)	Hand washing Facility	As per NFPA	AC		Voice Call
Fan		Smoke Detector			
Electrical Points 6/16 amps					

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Apheresis Couch	Door
Chair	Cupboards (overhead)
Table	

Flooring	Vinyl, Standard slip resistant
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Vinyl, Prefinished, Floor vinyl coved15 cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent & Down lights colour corrected over each collection chair

21) Medical Exam Room:

Table: 1.4.1.21: Infrastructure planning-Medical Exam Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)		As per NFPA	AC		Voice Call
Fan		Smoke Detector			Data point
Electrical Points 6/16 amps (UPS points for computer)					Computer

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Table (Wooden Laminated)	Cupboards (Overhead)

Adjustable height office Chair	Door (Solid Core, Paint finish, Single Leaf, 92 cm clear outward opening, Lockable)
Display Board	
Stool	
Flooring	Tiles, Standard slip resistant
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Laminate, Prefinished, 15 cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	
Lighting	General fluorescent

22) Store & Record Room:

Table: 1.4.1.22: Infrastructure planning-Store & Record Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)		As per NFPA	AC		

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Metal Shelving	Self-Closing Door (Solid Core/ Glass, Paint finish, Single leaf, half glazed, 92 cm clear opening, lock set)
Flooring	Tiles, Standard slip resistant
Ceiling	Plasterboard, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Timber, Paint, 15 cm high X 2 cm thick
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	Vinyl, Prefinished, Kick plate to 30 cm high
Lighting	General fluorescent

23) Lab-1 & Lab-2:

Table: 1.4.1.23: Infrastructure planning-Lab-1 & Lab-2

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)	Hand washing Facility	As per NFPA	AC		Barcoding Facility
Electrical Points 6/16 amps	Sinks (Elbow Operated taps)	Smoke Detector	Exhaust		Computer
					Data Point
					Voice Call

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Workstations	Cupboards (Wall mounted & Under bench)
Table (wooden Laminated)	Self-Closing Door (Solid Core/ Glass, Paint finish, Single leaf, half glazed, 92 cm clear opening)
Adjustable-height office Chairs	Bins for Waste Collection (Red, Blue, Black, Yellow)
Display Board	Soap dispenser: hand washing facility
	Paper towel dispenser: hand washing facility
	Dispenser Disposable gloves

Flooring	Vinyl, Standard slip resistant, seamless, coved.
Ceiling	Plasterboard, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Vinyl, Prefinished, Floor vinyl coved 15 cm high
Wall Finish	Paint, Acrylic Washable For wet areas: Tiles, Glazed, Splash back
Wall Protection (if required)	
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 90 AFFL Door protection also required for door frame
Lighting	General fluorescent
Remarks	Window desirable

24) Wash Room:

Table: 1.4.1.24: Infrastructure planning-Wash Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)	Sinks (elbow Operated)	As per NFPA	AC		
Electrical Points 6/16 amps	One sink for hazardous substances (elbow operated tap)	Smoke Detector			
	Hand washing facility				

Furniture Layout	
Furniture Requirements	**Fixtures & Fittings**
Countertops	Self-Closing Door (Solid core/ glass, Paint finish, Single leaf, observation panel & pull handle/ push plate)
	Detergent dispenser: sinks
	Soap dispenser: hand washing facility
	Paper towel dispenser: hand washing facility
	Dispenser Disposable gloves
	Waste Bin
	Shelf: Stainless Steel

Flooring	Vinyl, non-slip, Safety, seamless, coved. (tiles also acceptable)
Ceiling	Plaster wood, Prefinished, Drop-in tiles, 60 cm x120 cm
Cornice (if required)	Aluminium, Powder coat
Skirting	Vinyl, Prefinished, Floor vinyl coved 15 cm high
Wall Finish	Paint, Acrylic Washable
Wall Protection (if required)	
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 90 AFFL. Door protection also required for door frame
Lighting	General fluorescent
Remarks	Window desirable

25) Component Separation Room:

Table: 1.4.1.25: Infrastructure planning-Component Separation Room

MEP		**Fire**	**HVAC**	**Pneumatic Station**	**IT**
Electrical	Plumbing				
Tube light (UPS Light-1)		As per NFPA	AC		
Electrical Points 6/16 amps		Smoke Detector	Exhaust		
Furniture Layout					
Furniture Requirements	**Fixtures & Fittings**				
	Self-Closing Door (Solid Core/ Glass, Paint finish, Single leaf, half glazed, 92 cm clear opening)				
	Bins for Waste Collection				
Flooring	Vinyl, Standard slip resistant, seamless, coved.				
Ceiling	Acoustic, Prefinished, Drop-in tiles, 60 cm x120 cm				
Cornice (if required)	Aluminium, Powder coat				
Skirting	Vinyl, Prefinished, Floor vinyl coved 15 cm high				
Wall Finish	Paint, Acrylic Washable				
Wall Protection (if required)					
Door Protection (if required)	Composite, Prefinished PVC, Protection plate to 900 AFFL. Door protection also required for door frame				
Lighting	General fluorescent				
Remarks	Window desirable				

1.4.2 Equipment Planning: Equipment planning includes details of equipments required in each laboratory area. The list of equipments required for each laboratory area is as follows:

Table: 1.4.2.1: Equipment List Area Wise

LABORATORY AREA	**Equipments**
	Description
SAMPLE COLLECTION AREA (First Floor)	Needle Destroyer
	Tourniquets

	BP Apparatus
	Stethoscope
	Oxygen Cylinder (For emergency)
	Sample Carrying trays
SAMPLE COLLECTION AREA (EHC-First Floor)	Needle Destroyer
	Tourniquets
	BP Apparatus
	Stethoscope
	Oxygen Cylinder (For emergency)
	Sample Carrying trays
SAMPLE COLLECTION AREA (Third Floor)	Needle Destroyer
	Tourniquets
	BP Apparatus
	Stethoscope
	Oxygen Cylinder (For emergency)
	Sample Carrying trays
PATHOLOGIST'S ROOM	Microscope
FNAC	Oxygen Cylinder
	Defibrillator with monitor
	BP Apparatus
	Stethoscope
	Instrument Trolley
	Foot Step
	Cameo Syringe Pistol, Aspire-Gun, or other type aspiration handle
	Weighing Machine
	Stretcher Trolley
	Dressing Trolley
COLD STORE	Refrigerator without freezer
	Temperature Sensor: Refrigerator
	Refrigerator for sample storage
MEDIA ROOM	Refrigerator
	Hot Plate
	Biosafety Cabinet (II)

	Electrical Precision Balance
	Hot Air Oven
	Culture Jars
	Droppers
	Spatulas
	Petri dish carrying trays
AUTOCLAVE	Autoclave
BACTERIOLOGY	Microscope
	Stopwatch
	Biosafety Cabinet (II)
	Spirit lamp/gas
	Pipette
	Sterile loops/forceps
	Centrifuge
	Incubator
	Refrigerator
	Culture Media
	Rapid test kits Malaria, Dengue, HIV, HCV, Syphilis, scrub typhus, typhoid, pregnancy test
	Antibiotic disc
MICROBIOLOGY	Microscope
	Hot Air Oven
	Incubator
	Shaker
	VDRL Rotator
	Photoelectric Colorimeter
	Centrifuge
	Water Bath
	Biosafety Cabinet (II)
	Precision Balance
	PH Meter
	Reagent Refrigerator
	Reagents
	Culture Media
	Petri dish

MYCOLOGY	Microscope
	Stopwatch
	Biosafety Cabinet (II)
	Autoclave
	Spirit lamp/gas
	Sterile loops/forceps
	Pipette
	Centrifuge
	Incubator
	Refrigerator
	Antibiotic disc
	Cooling Incubator
	Rapid test kits Malaria, Dengue, HIV, HCV, Syphilis, scrub typhus, typhoid, pregnancy test
	Tube racks/slide racks
BIOCHEMISTRY	Dry bath Incubator
	Cyclomixer
	Semi Auto Analyzer
	ABG Machine
	Electrolyte Analyzer
	Nycocard
	Refrigerator
	Biochemistry Fully auto Analyzer
	Immuno analyzer
	Hormone analyzer
	Microscope
	Stopwatch
	Spirit lamp/gas
	Pipette
	Simple Balance
	Tube racks/slide racks
	Modified Neubaurs chamber
	VDRL Rotator
	Water bath
	Incubator
	Calorimeter

	Flame Photometer
	Sterilizer
HEMATOLOGY & IMMUNOLOGY	Microscope
	Stopwatch
	Spirit lamp/gas
	Pipette
	Centrifuge
	Incubator
	Refrigerator
	Tube racks/slide racks
	Sahli's Hemoglobin meter
	Modified Neubaurs chamber
	Thoma WBC pipette
	RBC Pipette
	Semi auto coagulation analyzer
	Westergren tube
	Wintrobes tube
	Hematology fully automated analyzer
	Rapid MP kits
HISTOPATHOLOGY & CYTOLOGY	Microscope (10X & 40X)
	Stopwatch
	Spirit lamp/gas /hot air oven
	Microtome
	Wax Bath
	Tissue Processor
	Pipette
	Cytocentrifuge for CSF
	Centrifuge
	Incubator
	Refrigerator
	Tube racks/slide racks
	Grossing equipment like surgical blade/ knife/cassettes etc.
	Tissue processor (Optional) according to the workload

	L- mound/ embedding station
	Water bath
	Hotplate
	Staining moulds/ staining jars/slide trays
CLINICAL PATHOLOGY	Microscope
	Stopwatch
	Spirit lamp/gas
	Pipette
	Centrifuge
	Incubator
	Refrigerator
	Tube racks/slide racks
	Modified Neubaurs chamber
	Urine testing strips
	Occult blood strips
SEROLOGY	2-10 microliter single-channel, adjustable pipette
	2-5 ml repeating pipette
	Humidified Chamber
	Incubator 35-40^{0}C
	Fluorescence Microscope
	Slide washing reservoirs
	ELISA Reader
	ELISA Washer
STAFF'S TOILET	Emergency shower & Eye wash
BLOOD COLLECTION	Blood Bank Refrigerator 165 Liter (storing unscreened Blood)
	Blood Bank refrigerator 300Litre (Storing Screened Blood)
	Tube stripper
	Dielectric Tube Sealer- Bench Top
	Weighing device for blood container
	Blood Collection Monitor
	For Hemoglobin determination: Calorimeter-Photoelectric Colorimeter / Hemoglobin meter
	For Temperature and Pulse Measurements-Clinical thermometer – -100C -1100C

	Watch with seconds hand and stop watch – std
	Emergency Equipment: Oxygen cylinder with mask, gauss and pressure regulator
	Sphygmomanometer & Stethoscope
	Needle Destroyer
	Donor Weighing Scale
	Emergency Medicine trolley
	Trays for blood sample containers
APHERESIS	Cell separator (Apheresis Machine)
	Portable tube sealer
	Emergency Medicine trolley
	Oxygen Cylinder
	Tubing sets
	Donor's Weighing Machine
MEDICAL EXAM	Height Measuring Tape
	Compound Microscope- Binocular Microscope
LAB-1 & LAB-2	Table top centrifuge
	Refrigerator for diagnostic kits and reagents. Maintaining 1^0 to 80^0C with digital display and alarm.
	Slide viewing box
	Incubator
	Hot Air oven
	Mechanical shakers - VDRL – Mini rotary shakers
	Test tube racks - small – standard
	Test tube racks - medium – standard
	Test tube racks - large – standard
	Interval timer electric or spring wound - Racer timer – digital
	Insulated containers for transporting blood between 20^0C and 100^0C to wards and hospitals
	Micropipettes – variable volume
	Wash Bottles - 250 ml – standard
	Elisa Reader
	Elisa Washer
	Needle Destroyer

WASH ROOM	Autoclave portable
COMPONENT SEPARATION	Refrigerated Centrifuge
	Plasma Expresser
	Dielectric Tube Sealer-Bench Top/Portable
	Platelet Agitator with Incubator
	Plasma Thawing bath
	Cryo Thawing bath
	Electronic weighing scale with facilities for balancing two blood bags
	Blood Bank refrigerator for storing of Packed Red cells
	Laminar Air Flow Bench- Horizontal
	Deep Freezer – 40 with circular temperature recorder
	Deep Freezer-80 with circular temperature recorder

1.4.3 Manpower Planning:

Table: 1.4.3.1: Minimum Manpower Requirement (Lab)

MINIMUM MANPOWER REQUIREMENT (GENERAL)	
Manpower	Qualification
Director/ Lab In-charge	MD/DNB Pathology/Lab Medicine/ Biochemistry/ Medical Microbiology/ DCP with one year post diploma experience / MBBS with PhD in any of the 3 subjects/
Specialist	Apart from in charge, if any special test of other speciality is done, it is desirable that specialist of that subject need be there on full time/part time or outsourced (Special tests means any other apart from routine basic biochemistry, haematology, or microbiology tests as listed above)
Laboratory Head	Who will be overall in-charge of that laboratory
Quality Manager	
Laboratory technicians	DMLT / MLT/BSc in lab sciences/ MSc in lab sciences/PhD in lab sciences qualification (govt / university)
Support Staff	Support staff (Lab Assistant / Lab Attendant)

Table: 1.4.3.2: Manpower requirement Clinical Lab wise

Medical (Clinical) Laboratory		**For processing of samples and operation of equipment**	**For interpretation signing and reporting**
Clinical Biochemistry	Qualified	MSc MLT, BSc MLT, DMLT and vocational and/or certificate course in technology	M.B.B.S. with post graduate diploma/ degree in Biochemistry/ Pathology/Microbiology/Lab medicine or equivalent recognized by MCI or NBE or as applicable and registered medical practioner with Medical Council of India/ State Medical Council
	Trained	MSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ BSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/Metric with 5 yrs. of experience in clinical laboratory under qualified authorised signatory	MBBS with work experience in a clinical laboratory registered with Medical Council of India/ State Medical Council
Pathology including Clinical Pathology, Cytopathology, Haematology, Histopathology	Qualified	MSc MLT, BSc MLT, DMLT and vocational and/or certificate course in technology	M.B.B.S. with post graduate diploma/ degree in Pathology /or equivalent recognized by MCI or NBE or as applicable and registered with Medical Council of India/ State Medical Council. M.B.B.S. with post graduate diploma/ degree in Microbiology for reporting histopathology of infectious diseases

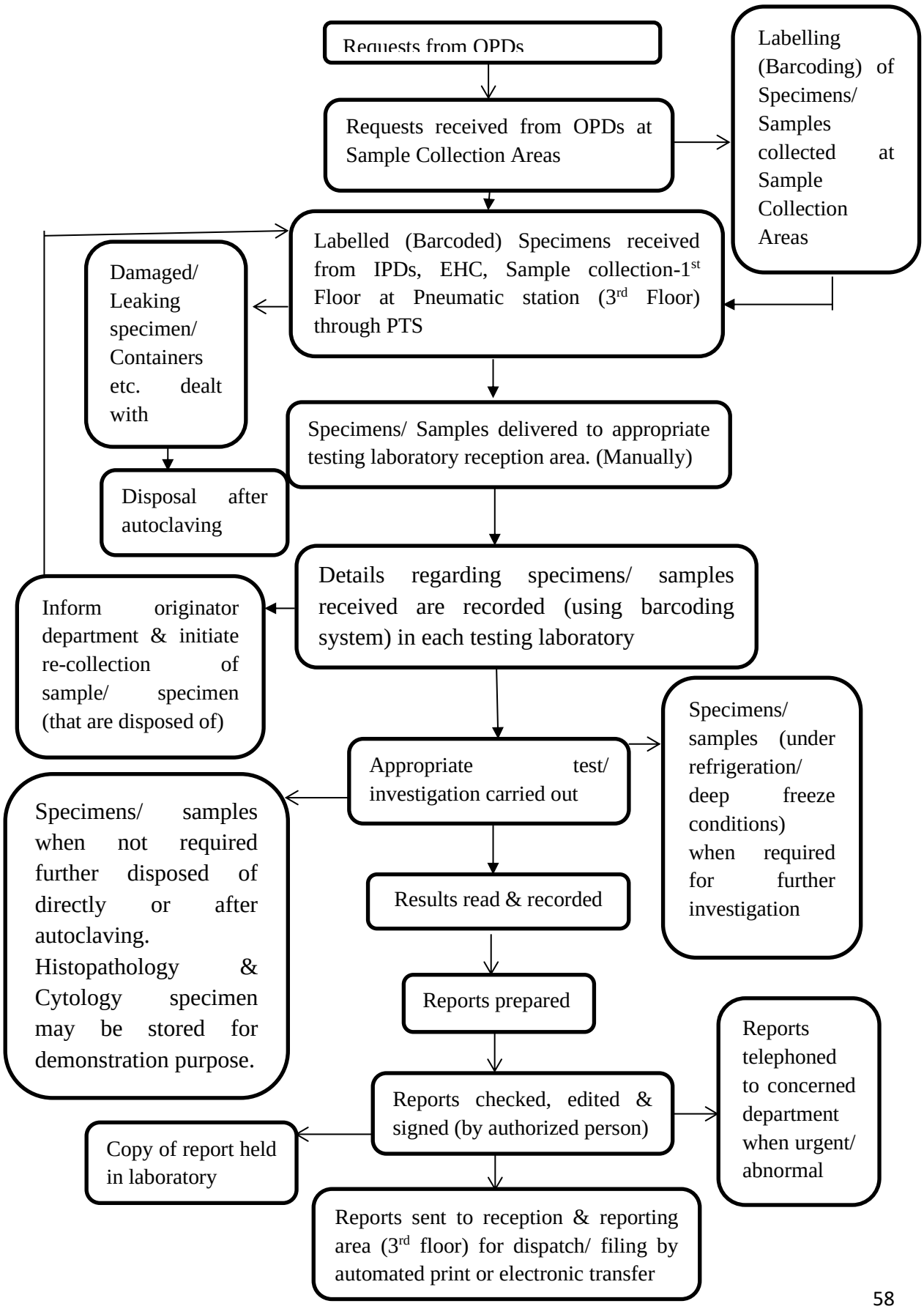
	Trained	MSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ BSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/Metric with 5 yrs. of experience in clinical laboratory under qualified authorised signatory	
Microbiology and Serology including Bacteriology, Mycology	Qualified	MSc MLT, BSc MLT, DMLT and vocational and/or certificate course in technology	M.B.B.S. with post graduate diploma/ degree in Microbiology /Lab medicine or equivalent recognized by MCI or NBE or as applicable and registered medical practioner with Medical Council of India/ State Medical Council
	Trained	MSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/ BSc Medical Biochemistry/ Medical Microbiology/ Biotechnology/Metric with 5 yrs. of experience in clinical laboratory under qualified authorised signatory	

Table: 1.4.3.3: Minimum Manpower Requirement (Blood Bank)

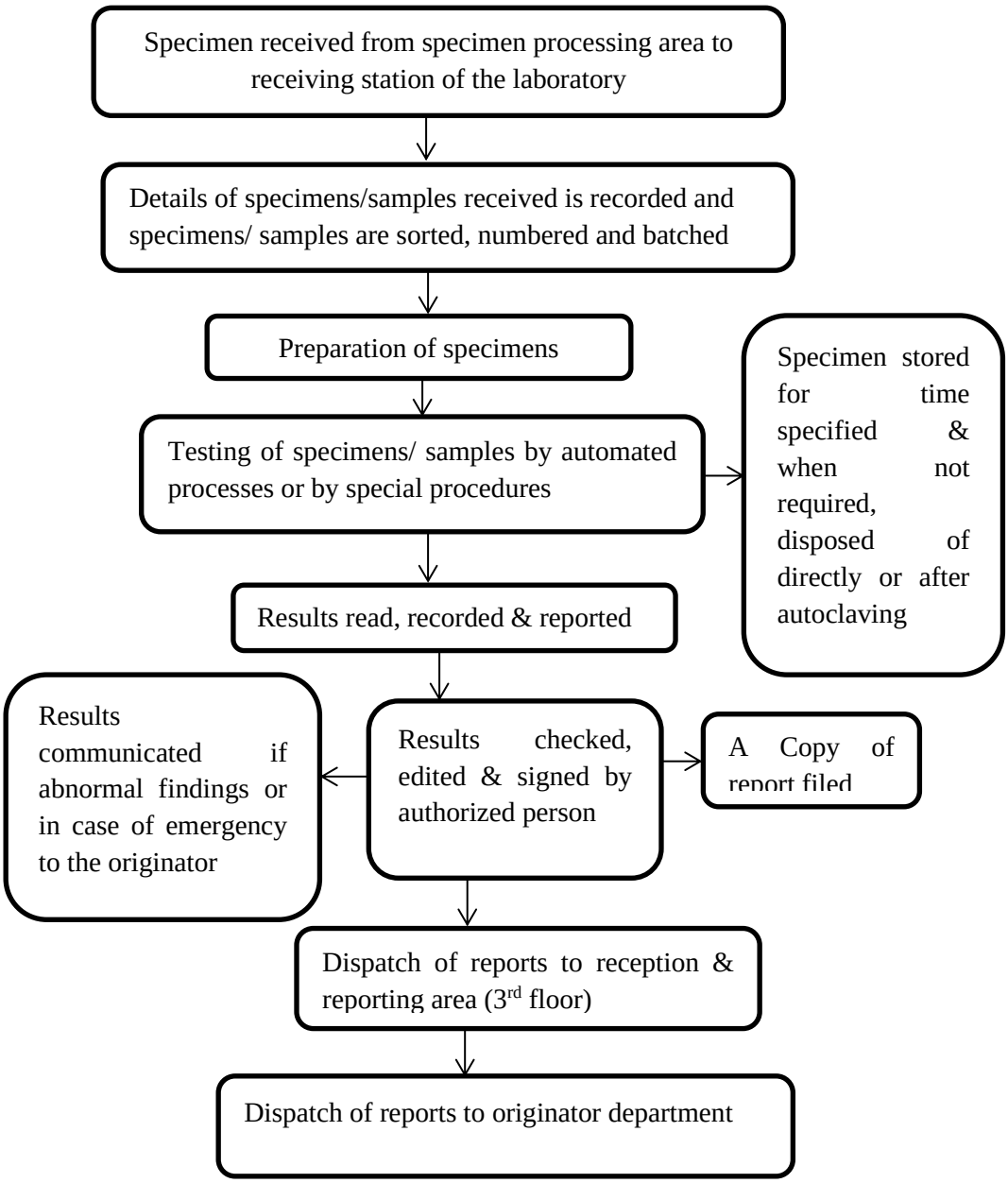
Manpower	**Qualifications**
Medical Officer	1. Blood banks collecting more than 10,000 units of blood and/or having blood component license should employ a Diploma or M.D or M.D. (Pathology) with minimum one year experience in blood bank to head the services. 2. Blood banks collecting < 10,000 units should at least have an MBBS doctor with minimum one year experience in blood bank to manage the services. 3. A quality manager should be appointed / deputed (either a medical officer or a senior MLT trained in quality management) in all blood banks collecting >10,000 units per year.
Blood Bank Technician(s)	1. Degree in Medical Laboratory Technology (M.L.T) with six months' experience in the testing of blood and/or its components; or 2. Diploma in Medical Laboratory Technology (M.L.T) with one year's experience in the testing of blood and / or its components. Note: the degree or diploma being from a University / Institution recognized by the Central Government or State Government.
Registered Nurse	
Technical supervisor (where blood components are manufactured as required)	1. Degree in Medical Laboratory Technology (M.L.T) with six months' experience in the preparation of blood components; or 2. Diploma in Medical Laboratory Technology (M.L.T) with one year's experience in the preparation of blood components, Note: the degree or diploma being from a University / Institution recognized by the Central Government or State Government.

1.4.4 Process Flow of Laboratories:

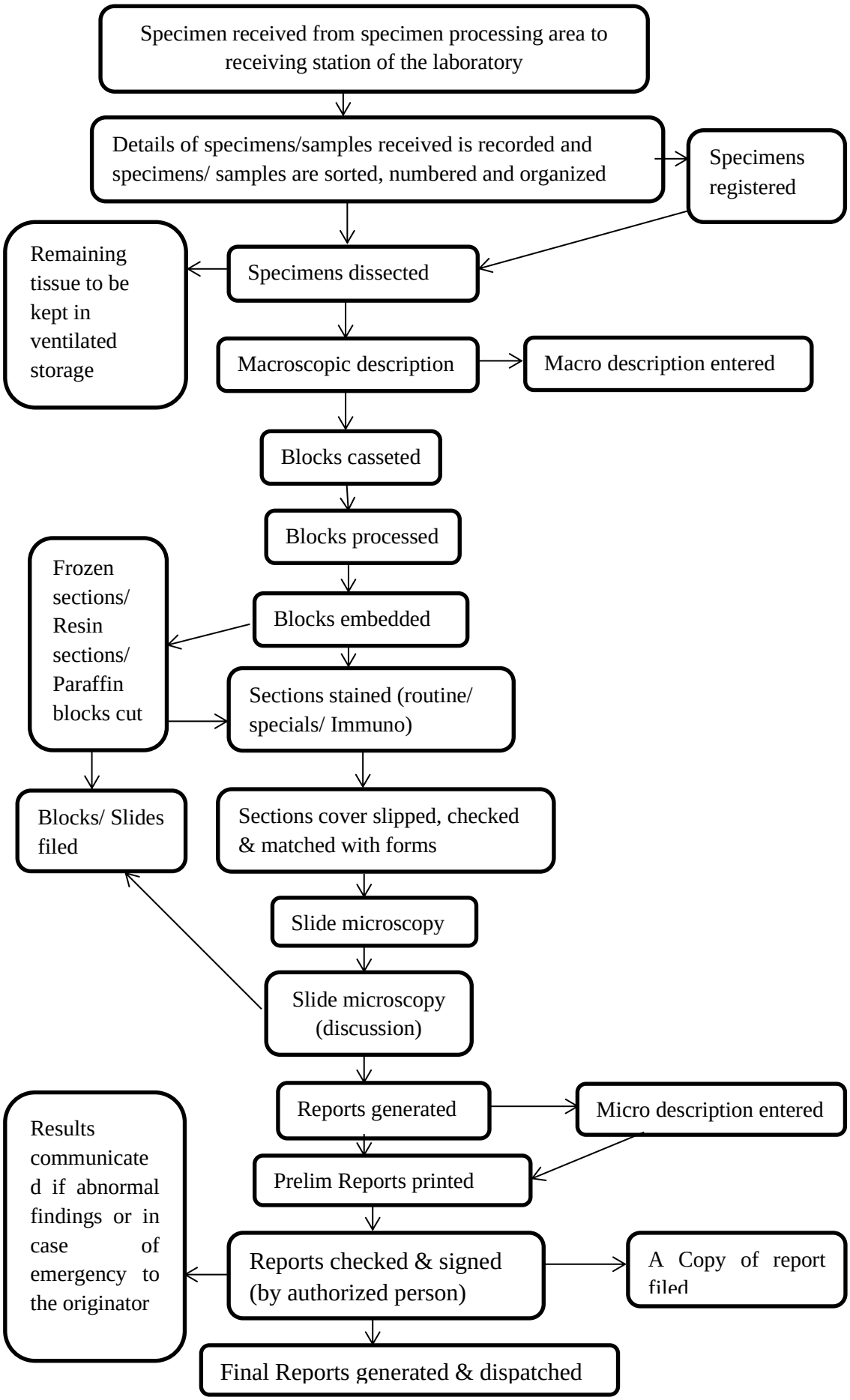
1) Figure 1.4.4.1 Flow of requests, specimen & reports



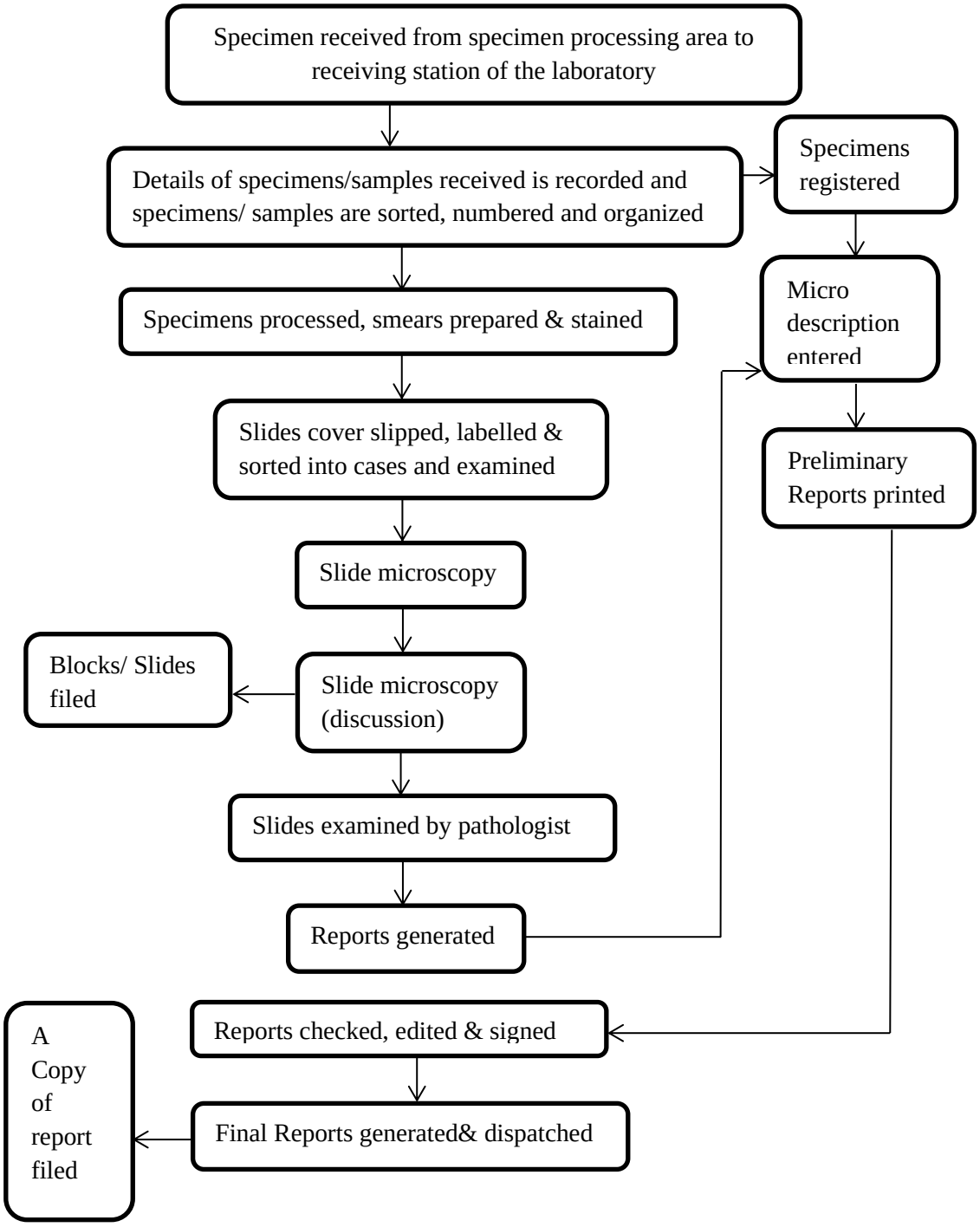
2) Figure: 1.4.4.2 Workflow of Biochemistry lab, Pathology lab, Haematology lab



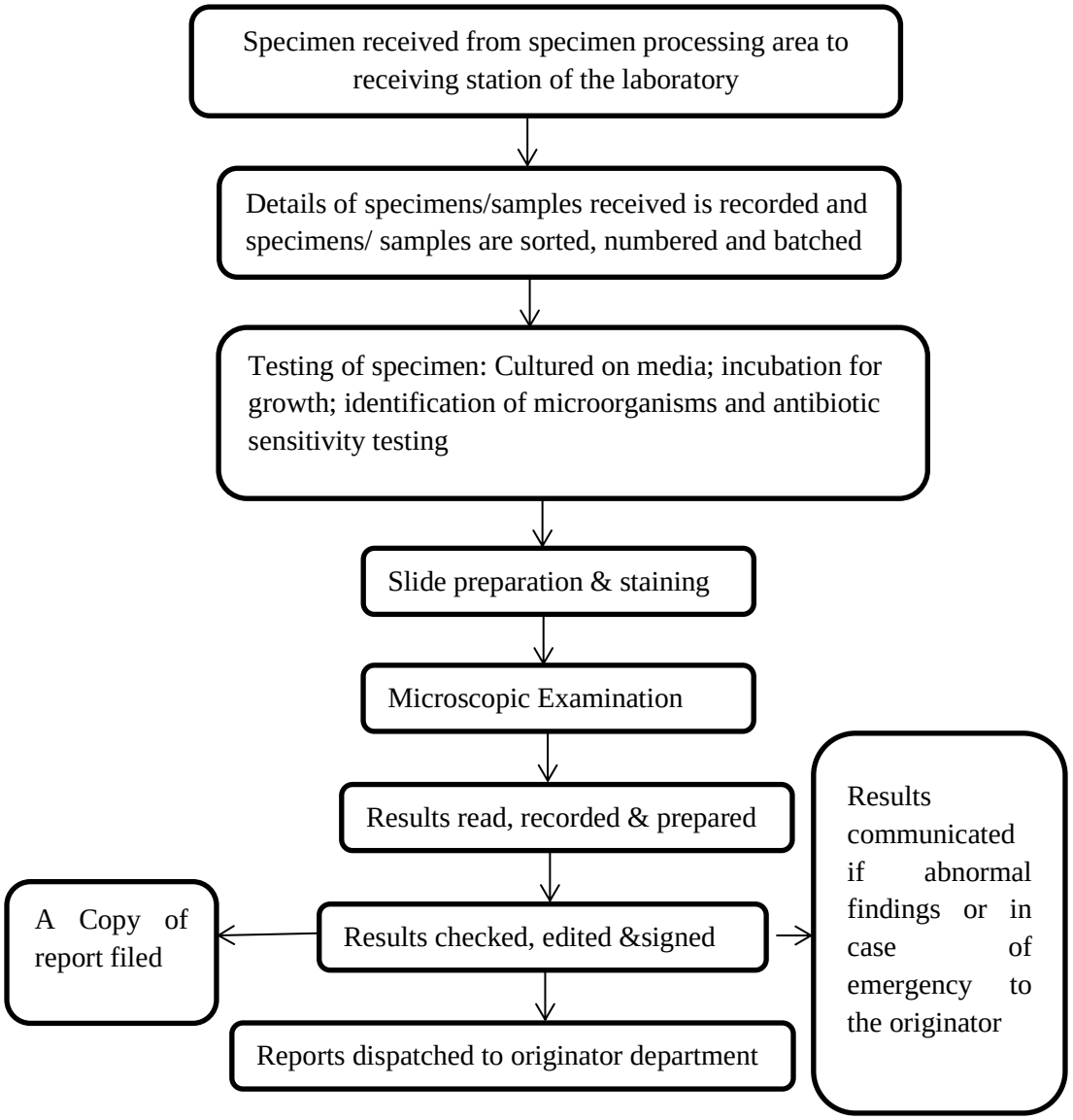
3) Figure: 1.4.4.3 Workflow of Histopathology lab



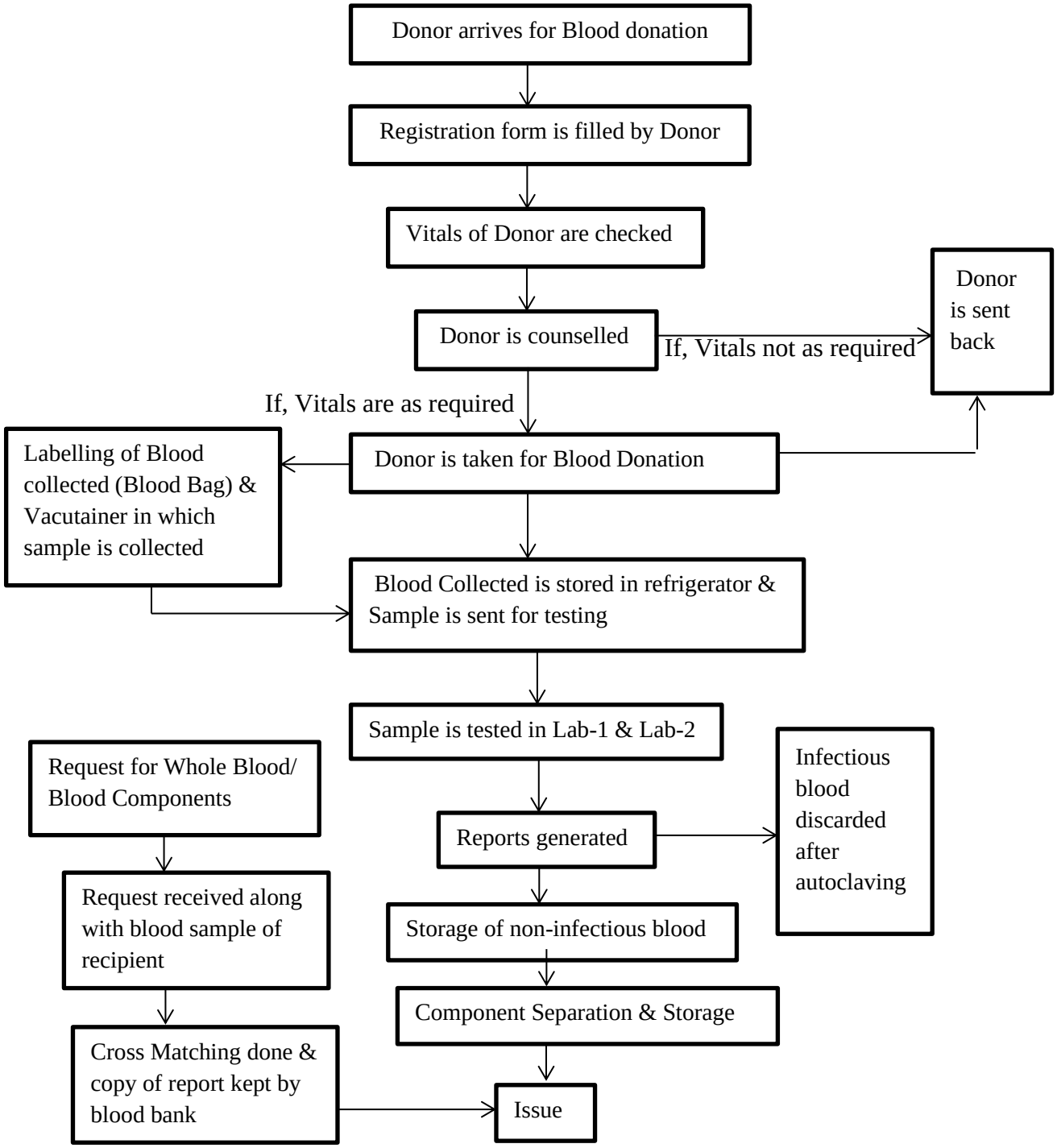
4) Figure: 1.4.4.4 Workflow of cytopathology lab



5) Figure: 1.4.4.5 Workflow of Microbiology Lab



6) Figure: 1.4.4.6 Workflow of Blood Bank



1.5 Discussion:

Planning included infrastructural planning, equipment planning, manpower planning and process flow of each laboratory area. At this point of time construction of laboratory is going on.

1.5.1 Infrastructure Planning: The space allocated to different laboratory areas is sufficient and fulfils the minimum space requirement provided by Clinical Establishment Act, 2010 (Requirements of Clinical Establishment Act are given major importance). The space for record room and sample storage area were not earmarked.

MEP, HVAC, Fire, Pneumatic, IT requirements for each laboratory area is enumerated.

Flooring of laboratory area especially clinical areas should be resistant to chemicals. Thus, Vinyl flooring is recommended for major areas in laboratory. Ceiling of major areas recommended is acoustic. Cornice (if required) should be of aluminium with powdercoat finish of all laboratory areas. Skirting (if required) will depend in the type f flooring. For vinyl flooring, vinyl, prefinished, floor vinyl coved 15 cm high skirting is recommended. Wall Finish recommended for all the laboratory areas is acrylic, washable paints and for wet areas, tiles with splashback property are recommended.

Lighting recommended for all laboratory areas is general fluorescent & down light.

Wall Protection (if required) should be of composite, prefinished PVC, corner guards above 1500 AFFL. Door Protection (if required) should be of composite prefinished PVC, protection plates above 900 AFFL.

1.5.2 Equipment Planning: As the location of hospital is such that referring a patient to another place is difficult. Thus, the laboratory will be equipped will all major equipments necessary and used for regular testing. List of equipments for each laboratory area is listed.

1.5.3 Manpower Planning: Minimum manpower required for a laboratory includes a Director who is overall in charge of laboratory, specialists for specialised laboratory testing, a quality manager, head of each laboratory who will be in charge of that lab, lab technician & lab attendants. For laboratory handling 30-100 samples/ day, 2 Lab technician and 1 Lab attendant (minimum) and for more than 100 samples/day, 4 Lab technician and 2 Lab attendant (minimum) are required.

Number of staff required in laboratory will depend on equipments purchased and workload of the laboratory.

1.6 Conclusion

Planning of laboratory services is complete. But yet quantification of equipments and number of manpower required is to finalized. Changes that are recommended for infrastructure includes:

1) Sample Collection area on ground floor with WC
2) WC for sample collection area on fist floor.
3) Area of record keeping, sample storage
4) Pneumatic station was earlier planned in sample collection area (3rd floor) now shifted to lab manager's room. And Lab Manager's room is shifted to reception & reporting area.
5) Staff's rest room to be divided into two rooms i.e. separate rest room required for male & female staff.
6) Autoclave room also divided into two rooms i.e. separate room is required for dirty & clean autoclave.

The implementation is under process. Presently, infrastructural requirements are under implementation and others will follow.

1.7 Supplementary

1.7.1 Instrumentation

CHECKLIST	
Particulars	Yes/ No
1) Infrastructure	
1.1 Does the laboratory areas provided satisfy the need of MCI of a teaching hospital	
1.2 Does the infrastructure requirements as per NABL or IS/ISO 15189 are met.	
1.3 Space requirement	
a) Is the Area allocated for ancillary areas and auxillary area are as per standards	
b) Is the Area allocated for Clinical Laboratories are as per standards of CEA	
i) Bacteriology lab (≥55472 cm2)	
ii) Mycology lab (≥27870 cm2)	
iii) Biochemistry lab (≥37160 cm2)	
iv) Heamatology lab (≥27870 cm2)	
v) Histopathology lab (≥185805 cm2)	
vi) Clinical Pathology lab (≥27870 cm2)	
c) Area allocated for Blood Bank is as per standards of Drug & Cosmetics Act	
i) For Blood Bank (≥92902 cm2)	
ii) For Component Separation (≥46450 cm2)	
iii) For Apheresis (≥9290 cm2)	
1.4 Is there hand washing facility in the areas was samples/specimen/ chemicals/ hazardous substances are handled.	
1.5 Are all the areas adequately lighted and ventilated.	
1.6 Does the toilet facilities provided for patients as well as staff have provision for disabled patients.	
1.7 Is there any planning for access to voice call, data points, computer, printer etc.	
1.8 Is the flooring, ceiling, wall finish etc. specifications planned for each lab area, is suitable area wise.	
1.9 Is Emergency shower & Eye wash facility is provided in areas where chemicals/ hazardous substances are used.	
2) Equipment Planning	

2.1 Are all the areas planned to be equipped with basic necessary equipments.	
2.2 Are all the equipments as mentioned in CEA are planned for laboratory areas.	
2.3 Does the equipments planned meet the requirements of NABL (if any).	
3) Manpower requirements	
3.1 Does the requirements as mentioned in CEA, NABL & IS/ISO 15189:2007 are met.	
3.2 Is there planning for a recuritment of director or in charge of laboratory with suitable degree & experience.	
3.3 Is there planning for a recuritment of specialists for special laboratory with suitable degree & experience.	
3.4 Is there planning for a recuritment of quality manager for laboratory with suitable degree & experience.	

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