



**TECHNICAL CELL, EPC MISSION,
PLANNING DEPARTMENT, LUCKNOW,**

**As Executing Agency of
Department of Medical Education,
Government of Uttar Pradesh**

E-Tender For

**“Design, Engineering and Procurement for Construction of
Autonomous State Medical College Ballia, India on EPC Mode”**

Tender No.: 117 (1) (SE)/General/Technical Cell/2026 dt 14.05.2026

Volume-4

Design Basis Report (DBR)

(June, 2026)

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ARCHITECTURAL **DESIGN BASIS REPORT**

1. INTRODUCTION

The Construction of Autonomous State Medical College Ballia includes Upgradation of District Hospital to 420 bedded hospitals. These are being established at District Ballia in the State of Uttar. The mandate of these Institutes is to develop-

- Medical Education
- Medical Research
- Tertiary Healthcare

The proposed Medical College shall have 420 Bedded multi-Specialty with captive Hospital, Medical College (at undergraduate level with annual intake of 100 students) and Multipurpose Hall, Guest House, Hostels, Residential facilities, construction of boundary wall and other ancillary requirements to make the campus self-sufficient. Also the proposed project is to be constructed as per the Harmonized guidelines and Standards for Universal Accessibility in India, 2021.

Department of Medical Education, Government of Uttar Pradesh has engaged UPPWD as the Executing Agency for setting up of Autonomous State Medical College Ballia, Uttar Pradesh. UPPWD, on behalf of Department of Medical Education, has appointed M/s. Space Designers, Lucknow, as Architectural cum DPR Consultant for Preparation of Master Plan and Concept Designs for this Project. As per directions and approval of Finance Department, the project is to be executed EPC (Engineering, Procurement & Construction) basis wherein the Master Plans & Concept Designs shall be provided to the EPC Contractor s and after award of work the EPC Contractor shall be responsible for complete detailed designing, engineering, procurement and construction of the project.



Fig 1a : Uttar Pradesh, India



Fig 1b : Ballia, Uttar Pradesh

Ballia district is one of the districts of Uttar Pradesh, India. Ballia district is a part of Azamgarh division situated in the east of Uttar Pradesh. The main economic activity is agriculture. City is the district headquarters and commercial market of this district. It is the birthplace of former prime minister of India Chandra Shekhar. There are six tehsils in this district: Ballia, Bansdih, Rasra, Bairia, Sikandarpur and Belthara. Rasra is the second major commercial area of the district, having a government sugar mill and a cotton weaving industry. Though Ballia's core occupation is agriculture there are some additional small industries. Maniar is known for its bindi industry and is a major supplier.

In the early historic period, there appears to have been a fairly significant urban centre at the site of present-day Pakkakot, where archaeologists have found city walls dating back to the Maurya period and a Buddhist monastery dating from the Gupta or post-Gupta period.

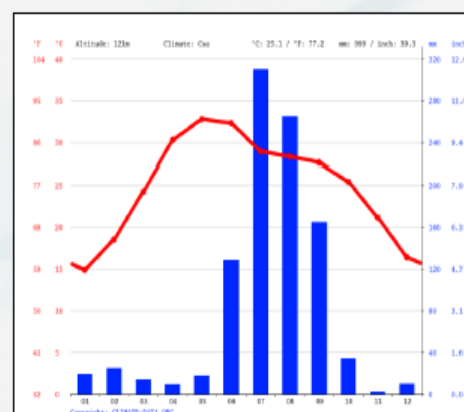
Ballia district was established in 1879 out of Ghazipur district along with some parts of Azamgarh district. Before being separated, Ballia tehsil had formed a subdivision of Ghazipur district, comprising the parganas of Ballia, Doaba, and Kharid. In addition, the new district included the parganas of Lakhnesar and Kopachit from Ghazipur district, as well as Bhadaon and Sikandarpur from Azamgarh district. These formed the tehsil of Rasra.

Some administrative changes then took place in the following years. In April 1882, Bansdih tehsil was created out of Kharid pargana along with the new pargana of Sikandarpur East, which was formed out of 225 villages of Sikandarpur pargana. At the same time, 212 villages of Kopachit pargana were detached to form the new pargana of Kopachit East, which went into Ballia tehsil. Then in April 1883, tappa Dhaka of pargana Zahurabad was joined with Sikandarpur West, and in November 1884, 13 villages of Lakhnesar pargana that lay on the right bank of the Sarju were transferred back into Ghazipur district. Another major change happened in March 1892, when the parganas of Garha and Sarai Kota, previously in Muhammadabad tehsil of Ghazipur district, were moved into Ballia and placed in Ballia tehsil.

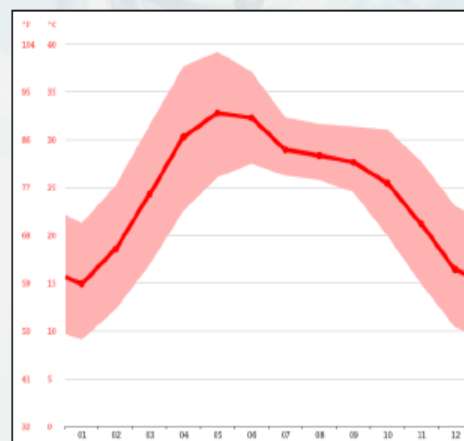
According to the 2011 census Ballia district had a population of 3,239,774. This gives it a ranking of 108th in India (out of a total of 640). The district has a population density of 1,087 inhabitants per square kilometre (2,820/sq mi). Its population growth rate over the decade 2001-2011 was 16.73%. Of Ballia's total population, 2,935,665 people lived in rural areas and 304,109 in urban areas according to the 2011 Census. Children aged 0–6 years made up 14.6% of the district's population.

2. CLIMATE STUDY

- In BALLIA, the climatic conditions are categorized as mild and moderate. In winter, there is much less rainfall than in summer. The average annual temperature in BALLIA is 25.1 °C | 77.2 °F. The annual precipitation in this location is approximately 999 mm | 39.3 inch. BALLIA are in the northern hemisphere. Summer starts here at the end of June and ends in September. There are the months of summer: June, July, August, September. The best time to visit is March, October.
- The variation in precipitation between the months with the lowest and highest levels of rainfall is 308 mm | 12 inch, as observed. The average temperatures vary during the year by 17.9 °C | 32.2 °F.
- The month with the highest relative humidity is August (81.82 %). The month with the lowest relative humidity is April (29.59 %). The month with the highest number of rainy days is July (24.17 days). The month with the lowest number of rainy days is November (0.63 days).



CLIMATE GRAPH: WEATHER BY MONTH



AVERAGE TEMPERATURE BY MONTH

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	14.9 °C (58.8) °F	16.6 °C (61.9) °F	24.3 °C (75.7) °F	30.3 °C (86.5) °F	32.6 °C (90.7) °F	32.5 °C (90.5) °F	29 °C (84.1) °F	28.4 °C (83.1) °F	27.7 °C (81.9) °F	25.5 °C (77.9) °F	21.2 °C (70.1) °F	16.4 °C (61.5) °F
Min. Temperature °C (°F)	9.1 °C (48.3) °F	12.2 °C (54) °F	16.9 °C (62.4) °F	22.6 °C (72.6) °F	26.1 °C (78.9) °F	27.5 °C (81.5) °F	26.2 °C (79.2) °F	25.8 °C (78.4) °F	24.5 °C (76.2) °F	20 °C (68) °F	14.9 °C (58.8) °F	10.3 °C (50.6) °F
Max. Temperature °C (°F)	21.8 °C (71.2) °F	25.2 °C (77.4) °F	31.5 °C (88.8) °F	37.7 °C (99.8) °F	36.2 °C (97.2) °F	37.1 °C (98.8) °F	32.3 °C (90.2) °F	31.7 °C (89) °F	31.4 °C (88.5) °F	31.1 °C (88) °F	27.7 °C (81.9) °F	23.1 °C (73.5) °F
Precipitation / Rainfall mm (in)	19 (0)	25 (0)	14 (0)	9 (0)	17 (0)	129 (5)	310 (12)	265 (10)	185 (6)	34 (1)	2 (0)	10 (0)
Humidity (%)	87%	80%	44%	30%	35%	54%	70%	82%	80%	65%	56%	64%
Rainy days (d)	2	2	2	2	3	8	18	18	13	2	0	1
avg. Sun hours (hours)	8.4	9.8	10.6	11.5	11.6	10.7	8.4	8.0	8.4	9.6	9.6	9.0

3. SITE ANALYSIS

The proposed site is spread over two sites, existing hospital site and Medical College site of 14.05 acres (approx.) in Ballia (Uttar Pradesh). The design approach intends to undertake all proposed construction to enable development of the proposed infrastructure. The present tender the scope of work relates to construction for required facilities in the prescribed area of two sites. In addition, the construction of boundary wall for the complete campus, peripheral road, external lighting, water collection tank along with other allied works shall be taken up under the scope of present tender. The details of both the site available for the proposed Construction of Autonomous State Medical College in district Ballia are-

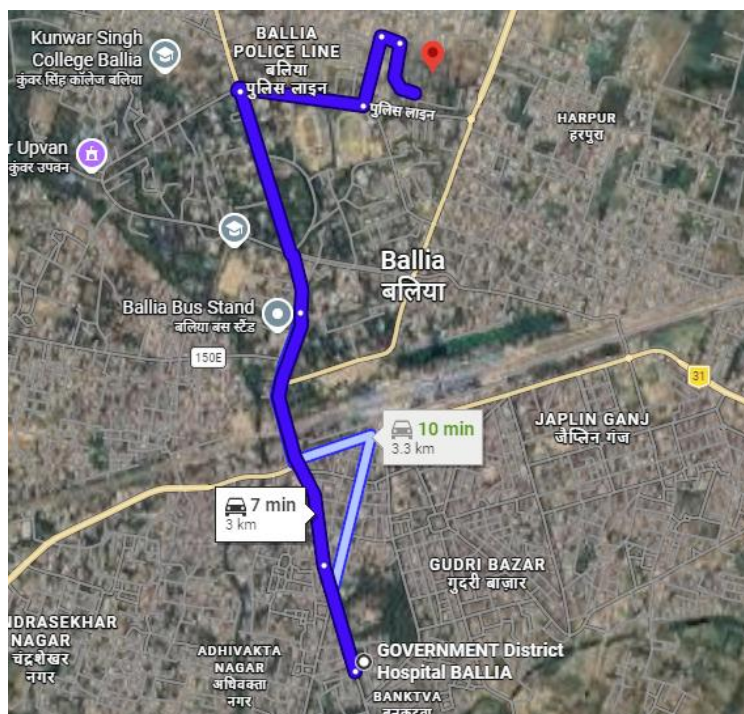
- a. **Medical College Campus** – This will be constructed on the Land of Existing District Jail of Ballia. Site is located at Sri Ram Vihar Colony, near the Police Line in Ballia, Uttar Pradesh.
- b. **Hospital Campus** – This will be constructed in the campus of Existing District Hospital of Ballia. Site is located at Kasim Bazar, Bahadurpur, Ballia, Uttar Pradesh.



Fig. 3a Medical College Site



Fig. 3b Hospital Site



Distance between Medical College & District Hospital is approx. 3 Kms.

4. EXISTING SITE CONDITION

a. Medical College Site (Existing site of District Jail)



5. CONNECTIVITY & CIRCULATION

The connectivity to the Medical College site is connected with Ballia-Manjhi Road and Police Line Road. This site is situated at appx 2.70 kms from Ballia Railway Station and 1.70 kms from Ballia Bus Stand.

The existing district hospital site is approx. 3.0 km from proposed medical college.

6. DISMANTLING WORK

a. Medical College Site

The Engineering, Procurement, and Construction (EPC) contractor is tasked with dismantling and demolition of complete existing structure of the Old District Jail Ballia before starting of the construction of Medical College.

The details of the structure/Buildings to be demolished are –

All Barracks

Admin building

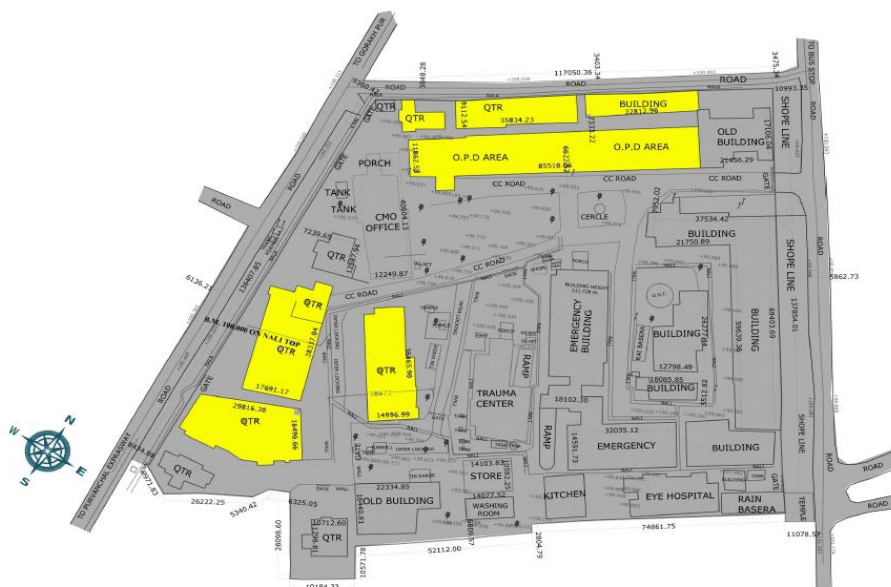
Boundary walls

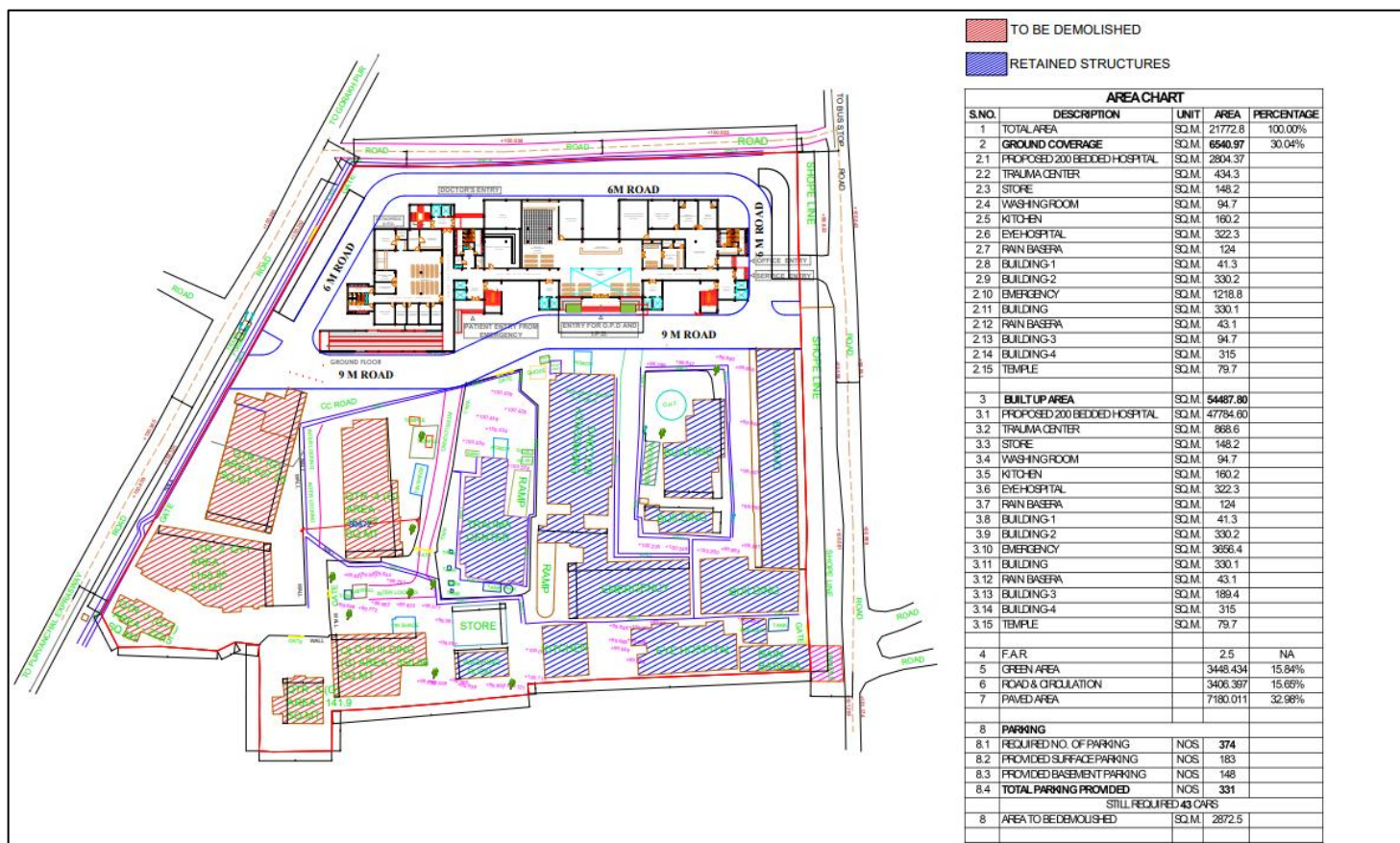
OHT & all other structures etc.

Note – The Young Adult Barrack of the District Jail, where Chittu Pandey, freedom fighter was once confined, is proposed to be retained and developed as a memorial in his honor. Chittu Pandey, a renowned freedom fighter and revolutionary, played a pivotal role in the Quit India Movement of 1942. Popularly known as the “Lion of Ballia” for his courage and leadership, he was born on 10 May 1895 in Rattuchak village of Ballia district, Uttar Pradesh. During the movement, he led the uprising against British rule, ousted British officials from Ballia, declared the district independent, and established a temporary national government. Chittu Pandey assumed charge as the interim administrator of this government, which succeeded in taking control from the British administration and securing the release of arrested Congress leaders. Subsequently, the British army recaptured Ballia and arrested Chittu Pandey along with several revolutionaries, imprisoning them in the District Jail of Ballia. In recognition of his immense contribution to India’s freedom struggle, the Hon’ble Chief Minister announced that the Medical College would be named after Chittu Pandey.

b. Hospital Campus

Various building has to be demolished after the shifting of the existing services. Construction of proposed hospital building can only be started after demolition and shifting of existing services.





DEMOLITION PLAN

7. MASTER PLAN

7.1 The Master Plan reflects the strategic planning of the proposed institute for the present and the emerging needs in view of advances in health care and the needs of the population. The objectives of Master Plan include integrated complex with zoning taking into account the environment and applicable bye-laws. The Master Planning of the campus has been done considering the following key parameters:

- Segregation of various types of movement, including normal and emergency vehicular movement and movement of vehicles for utilities have been planned.
- Creating a focus of an institution of excellence.
- Functional utility of all services with hygienic condition.
- Creating holistic environment for overall development of the inhabitants.
- Integrating academic and residential life.
- All blocks have been planned in the North south orientation enabling maximum daylight and minimum dependence on artificial lighting fixtures.

The master plan, based on above concepts and bye laws, is as under:

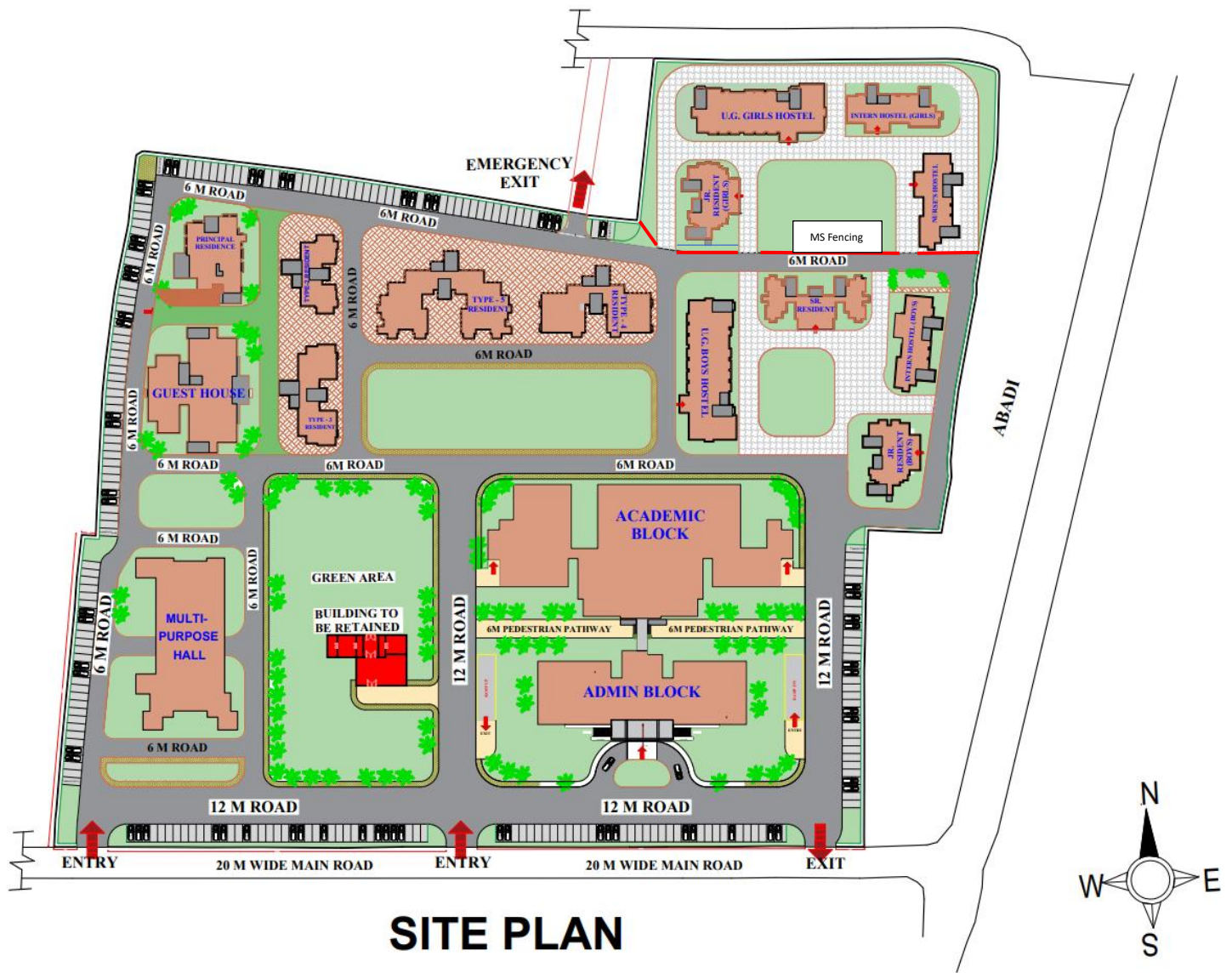


Fig. 7a – Medical College Campus

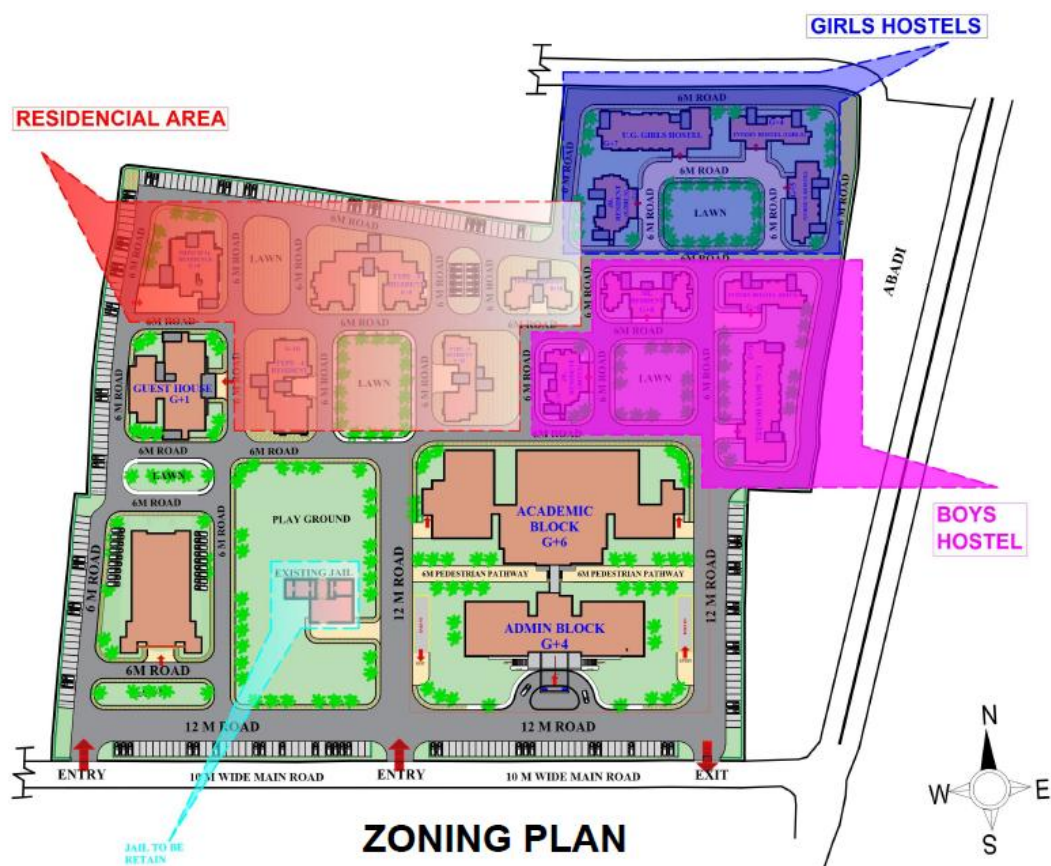


Fig. 7b – Zoning Plan (Medical College Campus)



Fig. 7c – Hospital Campus

7.2 Project Components:

The Medical College (Administrative block, Academic Block), 222 Bedded Hospital, Students' hostel, Interns Hostel, NMC/ Indian Public Health Standards (IPHS), Department of Medical Education and requirements.

a. Medical College Site:

The Medical College shall have intake of 100 MBBS students every year. It shall have facilities as under:

-

- Medical College with Administrative facilities
- Multipurpose Hall

Residential Facilities:

The Residential accommodations proposed are of various types, as under: -

- Residences of various types viz. Type II, III, IV, V and Principal Residence.
- UG Hostels for Boys and Girls
- Intern Hostels for Boys, Girls and Nurses
- Senior Resident Hostel
- Junior Resident Hostel for Boys and Girls

Other Facilities:

- Basement & Surface Parking and other Support Facilities
- Recreational & Sports Facilities

Service Blocks:

To accommodate services, the building for following facilities shall be separately provided, as per requirements: -

- Electrical Substations
- Pump Houses
- Other utilities

b. Hospital Site

The 222 Bedded Hospital shall comprise of the following departments:

- Department of Radio diagnosis
- CSSD & Laundry
- Outpatient Departments
- Inpatient Departments (202 Beds)
- Intensive Care Units (ICU) – 20 Beds
- Operation Theatre Complex
- Lecture theatre (158 seats)
- Canteen, Kitchen & Central Kitchen

7.3. Details of building floors and facilities

S.No.	Building Name	Plinth Area	Built-Up Area	Proposed Facilities
[A] Medical College Campus				
1	Academic (B+G+6) & Administrative Building (B+G+4)	32870.79 Sqm	33,520.45 Sqm	100 Admission
2	Multipurpose Hall (G+1)	2615.45 Sqm	2847.38 Sqm	500 Person
3	Guest House (G+1)	1510.33 Sqm	1628.20 Sqm	10 Suits
4	Senior Resident Hostel (G+8)	2905.57 Sqm	2956.03 Sqm	50 Accommodation
5	Principal Residence (G)	384.25 Sqm	429.80 Sqm	01 Units
6	Junior Resident Hostel - Boys (G+5)	1606.61 Sqm	1684.62 Sqm	30 Accommodation
7	Junior Resident Hostel - Girls (G+3)	1092.87 Sqm	1174.59 Sqm	20 Accommodation
8	U.G. Boys Hostel (G+9)	6196.61 Sqm	6225.21 Sqm	300 Accommodation
9	U.G. Girls Hostel (G+7)	4547.02 Sqm	4587.30 Sqm	200 Accommodation
10	Intern Boys Hostel (G+6)	1869.13 Sqm	1905.64 Sqm	60 Accommodation
11	Intern Girls Hostel (G+4)	1371.40 Sqm	1409.39 Sqm	40 Accommodation
12	Intern Nurses Hostel (G+5)	1679.15 Sqm	1706.65 Sqm	50 Accommodation
13	Type-II Residence (S+10)	3065.76 Sqm	3127.30 Sqm	20 Dwelling units
14	Type-III Residence (S+10)	3971.22 Sqm	3997.96 Sqm	20 Dwelling units
15	Type-IV Residence (S+10)	5423.85 Sqm	5433.49 Sqm	20 Dwelling units
16	Type-V Residence (S+5)	3933.18 Sqm	3977.57 Sqm	10 Dwelling units
17	Electric Sub Station (G)	221.00 Sqm	221.00 Sqm	
[B] Hospital Campus				
01	Hospital Building (2B+G+10)	37197.42 Sqm	37750.00 Sqm	222 Beds (Wards – 202 Beds + ICU – 20 Beds)

AREA STATEMENT			
S.No.	Description	Area	UNIT
1	Plot Area	56860.00	SQM
2	Permissible FAR (2.50%)	1,55,037.90	SQM
3	Total Built-Up Area	51976.48	SQM
4	Achieved FAR	0.91	
5	Green Area Required 20% of plot area	11372	SQM

8. CONCEPT

Hospital Block

The proposed hospital block is the most important component of the building design program. The proposed hospital block segment is 2B+G+10 storey structure.

The Department/ Specialties and their respective bed distribution is as under:

Requirement of Beds and Units:

The number of beds required for 100 admissions annually is 420. Currently 200 Beds are available in the existing District Hospital. So, 220 Beds are to be constructed as per NMC Guidelines for Medical College of 100 student intakes. They may be distributed for the purposes of clinical teaching as under:

Requirements for 100 admissions[M.B.B.S. – UG] only

S.No.	Infrastructural facilities		LOP (1 st Batch)	Ist Renewal (2 nd Batch)	IIInd Renewal (3 rd Batch)	IIInd Renewal (4 th Batch)	IVth Renewal (5 th Batch)	Recognition
1	Lecture Theatre [College building]	a) Number	2	2	3	3	4	4
		b) Capacity	120	120	120	120	120	120
		c) Type	Gallery	Gallery	Gallery	Gallery	Gallery	Gallery
	[Hospital Building]	a) Number	-	-	1	1	1	1
		b) Capacity	-	-	150	150	150	150
		c) Type	-	-	Gallery	Gallery	Gallery	Gallery
2	Examination Hall	Capacity	--	250	250	250	250	
		Number		1	1	1	1	
3	Central Library	a) Area (sq. m)	400	800	1200	1600	1600	1600
		b) Seating Capacity	50	100	150	200	200	200
		c) Books	1500	1500	3000	4000	5000	7000
		d) Journals (Indian + Foreign)	14 + 06	14 + 06	28 + 12	28 + 12	42 + 18	70 + 30
4	Hostel	a) Boys/ Girls Capacity @60%	60	120	180	240	300	300
		b) Residents Capacity @100%	45	47	47	54	62	62
		c) Interns Hostel @ 50%	--	--	--	--		50
		d) Nurses accommodation @20%	35	35	35	42	49	49
5	Residential Quarters	a) Teaching @20%	12	18	18	20	21	21
		b) Non -Teaching @20%	20	32	36	36	36	36
	Bed Distribution							
6	Medicine & Allied	a) Gen. Medicine	72/3	72/3	72/3	100/4	120/4	120/4
		b) Pediatrics	24/1	24/1	24/1	40/2	60/2	60/2
		c) TB & Chest	8/1	8/1	8/1	10/1	10/1	10/1
		d) Skin V.D.	8/1	8/1	8/1	10/1	10/1	10/1
		e) Psychiatry	8/1	8/1	8/1	10/1	10/1	10/1
		Total	120/7	120/7	120/7	170/9	210/9	210/9

S.No.	Infrastructural facilities		LOP (1 st Batch)	Ist Renewal (2 nd Batch)	IInd Renewal (3 rd Batch)	IIInd Renewal (4 th Batch)	IVth Renewal (5 th Batch)	Recognition
6(A)	Medicine & Allied For North East states and Hilly states	a) Gen. Medicine	64/3	72/3	72/3	100/4	120/4	120/4
		b) Pediatrics	18/1	24/1	24/1	40/2	60/2	60/2
		c) TB & Chest	6/1	8/1	8/1	10/1	10/1	10/1
		d) Skin V.D.	6/1	8/1	8/1	10/1	10/1	10/1
		e) Psychiatry	6/1	8/1	8/1	10/1	10/1	10/1
		Total	100/7	120/7	120/7	170/9	210/9	210/9
7	Surgery & Allied	a) Gen. Surgery	90/3	90/3	90/3	100/4	120/4	120/4
		b) Orthopedics	30/1	30/1	30/1	40/2	60/2	60/2
		c) Ophthalmology	10/1	10/1	10/1	10/1	10/1	10/1
		d) ENT	10/1	10/1	10/1	10/1	10/1	10/1
		Total	140/6	140/6	140/6	160/8	200/8	200/8
7(A)	Surgery & Allied For North East states and Hilly states	a) Gen. Surgery	80/3	90/3	90/3	100/4	120/4	120/4
		b) Orthopedics	24/1	30/1	30/1	40/2	60/2	60/2
		c) Ophthalmology	8/1	10/1	10/1	10/1	10/1	10/1
		d) ENT	8/1	10/1	10/1	10/1	10/1	10/1
		Total	120/6	140/6	140/6	160/8	200/8	200/8
8	OBG	a) OBG & ANC	25/1	25/1	25/1	30/1	30/1	30/1
		b) Gynecology	15/1	15/1	15/1	20/1	30/1	30/1
		Total	40/2	40/2	40/2	50/2	60/2	60/2
8(A)	OBG For North East states and Hilly states	a) Obstetrics & ANC	20/1	25/1	25/1	30/1	30/1	30/1
		b) Gynecology	10/1	15/1	15/1	20/1	30/1	30/1
		Total	30/2	40/2	40/2	50/2	60/2	60/2
Grand Total			300/15	300/15	300/15	380/19	470/19	470/19
Grand Total For North East states and Hilly states			250/15	300/15	300/15	380/19	470/19	470/19
9	OPD		400	500	600	700	800	800
10	Bed occupancy %		60%	60%	60%	75%	75%	75%
11	OT & ICU	a) Major OT	4	4	4	5	7	7
		b) Minor OT	2	2	2	2	2	2



Fig. – 8 (a) HOSPITAL BLOCK

9. DESIGN BASIS:

The project has been designed to provide tertiary healthcare facilities meeting the patient's needs and comfort. Some significant concepts that have been incorporated while designing and planning are listed below:

- Orientation of the building is kept to facilitate maximum natural light and ventilation.
- Modular Building design.
- Smooth horizontal and vertical movement of patients, staff and equipment. All the blocks and departments are inter-linked for horizontal circulations.
- Various small waiting spaces have been dedicated for patient and people near each department apart from common waiting areas as this will help in decongestion in peak period.
- Smooth accessibility for the differently abled persons.
- Natural light to all the patient rooms has been externally provided with windows in corridor for additional lighting.
- Air conditioning, firefighting and detection system.
- Energy efficient Building.
- Planning and allocation of services as per the National Building Code-2016 and applicable bye-laws.

10.MEDICAL COLLEGE SITE PLANNING

An integrated building is proposed for medical college. In this block, provision has been made for accommodating administrative offices.

The Medical College shall cater for 100 UG admissions. The block shall house pre-clinical and para-clinical departments. Scope for expansion has been kept to enable future expansion. The block is planned as (B+G+6). The facilities provided are as follows:

STACKING							
		ACADMIC BLOCK			ADMIN BLOCK		
S.NO.		LEFT SIDE	CENTER	RIGHT SIDE	LEFT SIDE	CENTER	RIGHT SIDE
8	SIXTH FLOOR	SERVICES	SKILL LABS	SERVICES			
7	FIFTH FLOOR	LANS AND SERVICES	COMMUNITY MEDICINE DEPARTMENT	LANS AND WORKSHOP			
6	FOURTH FLOOR	MUESEUM AND SERVICES	FORENSIC MEDICINE & TOXICOLOGY DEPARTMENT	MICROBIOLOGY DEPARTMENT	SERVICES	EXAMINATION ROOM AND HALL	SERVICES
5	THIRD FLOOR	PHARMACOLOGY DEPARTMENT ROOMS	STAFF SEATING AREA	PATHOLOGY DEPARTMENT	OFFICE, RECORD ROOM	PRINCIPAL ROOM, P.A. ROOM, MINI CONFERENCE	MEDICAL EDUCATION UNIT , COLLEGE COUNCIL
4	SECOND FLOOR	PHARMACOLOGY DEPARTMENT	LECTURE THEATER AND STAFF SEATING AREA	BIOCHEMISTRY DEPARTMENT	CAFETERIA, KITCHEN	SERVICES	CENTRAL RESEARCH LAB
3	FIRST FLOOR	PHYSIOLOGY DEP. AND LABS	STAFF SEATING AREA	LABS	COMPUTER LAB ,A/V ROOM	SERVICES	READING AREA
2	GROUND FLOOR	DISSECTION HALL, EMBALMING ROOM	LECTURE THEATER AND STAFF SEATING AREA	LAB AND MUSEUM	LIBRARY AND STAFF READING	SERVICES	READING AREA
1	BASEMENT -1	PARKING					

Fig. – 10 (a) Stacking diagram– Admin and academic block



Fig. – 10 (b) Academic block



Fig. – 10 (c) Academic block



Fig. – 10 (d) Admin block



Fig. – 10 (e) Admin block



Fig. – 10 (f) UG Boys hostel



Fig. – 10 (g) UG Girls hostel



Fig. – 10 (h) Interns Girls hostel



Fig. – 10 (i) Interns Boys hostel



Fig. – 10 (j) Senior Resident



Fig. – 10 (k) Junior Resident



Fig. – 10 (I) Principal's Residence

11. MULTIPURPOSE HALL

The Multipurpose Hall is a double storey double height structure. It shall be air conditioned, having capacity of 500 seating and has been designed for optimum values of acoustic parameters. Separate entry for VIPs has been planned. The Multipurpose Hall is located with adjoining lawns, parking space and easy access for outsiders. The Multipurpose Hall will serve the purpose for scientific conferences / seminars as well as for cultural programs. Care has been taken while designing the interior acoustics to achieve desired values of reverberation time, ambient noise level and diffusion. The selection of materials on the ceiling, walls and at stage has been made to achieve these parameters and materials have been fixed at locations to achieve aesthetic values in addition to the technical requirements. The provision for required audio and video system and stage lighting has been considered. Multipurpose Court & Gym has been proposed on the first floor.

12. RESIDENTIAL FACILITIES

HOSTEL FACILITIES

Hostel facilities have been planned with the following requirements.

- UG Students Hostel for Boys (300 nos.) and Girl students (180 nos.) with dining facilities. Interaction Area, Activity rooms and related facilities have been provided for all the hostels.
- Intern Hostel for Boys (60 nos.), Intern Hostel for Girls (40 nos.), Intern Hostel for Nurses (50 nos.) have been provided.
- Resident Hostels for Senior (50 nos.), Junior Residents for Boys (30 nos.) and Junior Residents for Girls (20 nos.)
- The provision has been made for Residential Units as per requirements and they are planned broadly as per norms prescribed by Ministry of Urban Development (MoUD), Govt. of India and UPPWD Standards. The different types of residential units planned are as follows:
 - Principal Residence
 - Type-II (S+10), Type-III (S+10), Type IV (S+10) and Type V (S+5), each block have a common core comprising of 2 nos. lifts and 2 nos. staircases

13. OTHER FACILITIES:

Service Blocks/ Facilities:

Service Blocks with adequate space like Electrical Substations, ETP/STP/ Fire Pump Rooms etc. has been planned.

Medical Services: -

Adequate Space provision has been made for CSSD inside Hospital building.



Fig 10 (m) – Entry and Exit gates

14.HOSPITAL SITE PLANNING

A) EXISTING FACILITIES AS PER GAP ANALYSIS

BEDS FOR MBBS 100 SEAT CAPACITY	TOTAL AS PER NMC	RUNNING	REQUIRED	GAP
GENERAL MEDICINE	100	60	40	-40
PEDITRICS	50	20	30	-30
DERMATOLOGY	10	0	10	-10
PSYCHIATRY	10	0	10	-10
GENERAL SURGERY	100	35	65	-65
ORTHOPEDICS	40	20	20	-20
OTORHINOLARYNGOLOGY(ENT)	20	0	20	-20
OPHTHALMOLOGY	20	15	5	-5
OBSTETRICS & GYNAECOLOGY	50	50	-	0
ICUs	20	0	20	-20
TOTAL NO OF BEDS	420	200	220	-220
	WE ARE DEMOLISHING OPD'S		AND PROVIDING IN HOSPITAL	
OPD / DAY	800			
OBSTETRICS & GYNAECOLOGY, LABOUR ROOM, Paediatrics	RUNNING IN WOMENS HOSPITAL			
MAJOR OT	7	RUNNING BUT NOT FULLY EQUIPPED	7	
MINOR OT	1		1	
	8		8	
TRAUMA CENTRE		RUNNING		
EMERGENCY		RUNNING		
PATHOLOGY		RUNNING		
CANTEEN		DEMOLISHING	PROVIDING	
LAUNDRY		DEMOLISHING	PROVIDING	
RADIOLOGY		RUNNING BUT NOT FULLY EQUIPPED	PROVIIDNG	
BLOOD BANK		RUNNING		
POST MORTEM HOUSE		RUNNING		
PSA PLANT		RUNNING		
STORE (DEAD STUCK)		RUNNING		
RAIN BASERA		RUNNING		
OPD'S		TO BE DEMOLISHED		
ESS	450KVA			
OXYGEN PLANT	200 LPM	RUNNING		
	500 LPM	NOT RUNNING		
WASTE MANAGEMENT AND INCERINATING PLANT		RUNNING		

NOTE: -Above existing facilities and required facilities analysis has been done based on the data provided by the authorities of ASMC, Ballia. The bidders are requested to do site visit as per the clause 2.3.5 of the ITB (Volume - 1)

B) PROPOSED HOSPITAL BLOCK

a) General

- The hospital building planned is a 2B+G+10 storey structure.
- All the entries on ground floor are well connected to lift lobby and staircase nearby for easy and convenient access for one and all to various departments on upper floors.
- The main/visitor entry corridor further leads into sizeable registration cum waiting area with registration counters and patient waiting.
- The floor wise distribution of various facilities in the Hospital Block is as under:

b) Basement-2 Floor: Car Parking

c) Basement-1 Floor:

Store, Linen Store, Common Toilets, IITV System, Fluoroscopy System, Ultra Sound, Museum, Waiting Area, MRI, Control Room, C.T. Scan, Store, Dark Room, 60mA Mobile x - ray, Room for 300mA, 500mA, 800mA

d) Ground Floor: Radio Diagnostics, Registration + Pharmacy

Common Toilet, waiting area, Dean office, Medical Superintendent Office, Hospital staff and Committee room, store, Sample Collection, Report Distribution and Registration, Reception Enquiry, Back office, Central Hospital Pharmacy, Laser Cutting room, Plaster room, Demo Room, Exam Chamber - 4nos., Minor O.T.

e) First Floor: OPD

Common Toilet, Registration Counter-3 nos., Waiting area-3 nos., Speech therapy, eng. lab, sound proof audiometric room, minor OT-3 nos., Sterilize room-3 nos., scrub-3 nos., examination-1 & 2-2 nos., dressing room male-3 nos., dressing room female-3 nos., demo room-3 nos., store/record room-3 nos., dispensary-3 nos., dark room, refraction room, examination chamber-4nos. (General Surgery O.P.D., Ophthalmic O.P.D., OTO-Rhinolaryngology OPD)

f) Second Floor: OPD

Common Toilet, registration counter-3 nos., waiting area-3 nos., dispensary-3 nos., store room-3 nos, demo room-3 nos, examination room-12nos., Hall, recreational therapy room, occupational therapy room, larger lab-2nos., holler, endoscopy, TMT (General Medicine OPD, Dermatology OPD, Psychiatry OPD)

g) Third Floor: OPD

Common Toilet, Ward-30 Beds, Nurses Station, Store-2Nos., CU, Nurses Duty Room with Toilet, Clinical Demonstration, Faculty Room, Examination & Treatment Room With Toi., Resident Doctor & Student Duty Room with Toi, Public Waiting Lobby, Reception/Help Desk, Prosthetic Dentistry, Dental Surgery, Examination Room-4Nos., Demo Room, Store Room, Dispensary, Ward-30 Beds, Nurses Station, Store-2Nos., CU, Nurses Duty Room with Toilet, Clinical Demonstration, Faculty Room with toi., Examination & Treatment Room With Toi., Resident Doctor & Student Duty Room with Toi., DU, Pantry. (30 Bedded Ward-2nos, Dental OPD)

h) Fourth Floor: General Wards

Common Toilet, Ward-30 Beds, Nurses Station, Store-2Nos., CU, Nurses Duty Room with Toilet, Clinical Demonstration, Faculty Room, Examination & Treatment Room With Toi., Resident Doctor & Student Duty Room with Toi, Public Waiting Lobby, Reception/HelpDesk, Ward-30 Beds, Nurses Station, Store-2Nos., CU, Nurses Duty Room with Toilet, Clinical Demonstration, Faculty Room with Toi., Examination & Treatment Room With Toi., Resident Doctor & Student Duty Room with Toi., Ward-30 Beds, Nurses Station, Store-2Nos., CU, Nurses Duty Room with Toilet, Clinical Demonstration, Faculty Room with toi., Examination & Treatment Room With Toi., Resident Doctor & Student Duty Room with Toi., DU, Pantry. (90 Bedded Ward)

i) Fifth Floor:

Common Toilet, 20 Bedded ICU Ward with Nurses, Demo Room, CU, Instrument Store, Pantry, Resident Doctor & Student Duty Room with Toi., Faculty Room With Toi, Nurses Duty Room With Toi, Change Room-3nos, Buffer, Drug Store, 26 Bedded Ward Nurses Duty Room with Toi, Nurses Station, CU, Store, 26 Bedded Ward Nurses Duty Room with Toi, Nurses Station, CU, Store, Clinical Demo Room, Faculty

Room with Toi., Examination & treatment room with toi, Resident Doctor & Student Duty Room with Toi., DU, Pantry. (26+26 Bedded Ward, 20 Bedded ICU ward)

j) Sixth Floor: OT Complex

4 nos. of OT, 6 beds of pre-operative, 8 Post Operative beds, Assistant rooms, operative rooms, Pantry, Surgeons, doctors' rooms.

k) Seventh Floor: OT Complex

(He/ She / P.D.A. Toilet) -2 sets, 4 beds of pre-operative, 8 Post Operative beds, Assistant rooms, operative rooms, Pantry, Surgeons, doctors' rooms, Patient rooms, Linen instrument room, Pantry, OT - 04Nos.

l) Eighth Floor:

Common Toilet, Radiodiagnosis, Dermatology, General Medicine, General Surgery, Anaesthesiology, Otorhinolaryngology, Ophthalmology.

m) Ninth Floor:

Hall, room, corridor, (He / She / P.D.A. / Staff toilets)- 2 sets, biochemistry lab, cold storage, media room, micro biology lab, central medical record, etc.

n) Tenth Floor:

Canteen, Kitchen, Store, Staff Dining, Central Kitchen Lobby, Common Toilet - 02 Sets, etc.

o) Terrace Floor:

HOSPITAL BLOCK - STACKING DIAGRAM

S.NO.		LEFT SIDE	CENTER	RIGHT SIDE
13	TENTH FLOOR	SERVICES	CANTEEN	CENTRAL KITCHEN
12	NINTH FLOOR	HALL	CENTRAL LABS	CENTRAL LABS
11	EIGHT FLOOR	GENERAL MEDICINNE	GENERAL SURGERY AND ANESTHESIOLOGY	OTORHINOLARYNGIOLOGY (ENT) AND OPHTHALOMOLOGY
10	SEVENTH FLOOR	STAFF AREA	OT COMPLEX	OT COMPLEX
9	SIXTH FLOOR	STAFF AREA	OT COMPLEX	OT COMPLEX
8	FIFTH FLOOR	26 BEDDED WARD	26 BEDDED WARD	20 BEDDED WARD
7	FOURTH FLOOR	30 BEDDED WARD,	30 BEDDED WARD,	30 BEDDED WARD,
6	THIRD FLOOR	30 BEDDED WARD,	DENTAL OPD	30 BEDDED WARD,
5	SECOND FLOOR	GENERAL MEDICINE OPD , HALL	DERMATOLOGY OPD	PSYCHIATRY OPD
4	FIRST FLOOR	GENERAL SURGERY OPD	OPHTHALMIC OPD	OTO - RHINOLARYGOLOGY (ENT) O.P.D.
3	GROUND FLOOR	ORTHOPEDIC OPD	CENTRAL PHARMACY ,RECEPTION AND WAITING AREA	STAFF AREA
2	BASEMENT -1	SERVICES	REGISTRATION AND SCANNING ZONE	CSSD AND LAUNDRY
1	BASEMENT -2	PARKING		

Hospital stacking

15. EXTERNAL DEVELOPMENT

15.1 SITE LEVELS

The proposed level of internal roads and Building Plinths shall be maintained as follows:

The site is on the Police Line Road. TBM is considered 100 on the edge of road at entrance of Main Gate. Level of Main Road (Police Line) is +100.27. Internal road level (at entrance) is to be maintained same as the External Road Level. The remaining internal roads shall be gradually laid in slope so as to maintain the levels at various intersection points as per the road layout plan. Average formation level of the site shall be kept 0.15mm below to the internal roads. Plinth of the proposed buildings shall be as per the tender drawings. In the existing Hospital campus Road level shall be kept at the same of level of internal roads.

15.2 ROADS

It is proposed to construct the roads as C.C. roads as per tender drawings or as per design on the basis of IRC SP:62 (latest amendment). Following points for roads are proposed:

- For pedestrian movement and parking areas, paver blocks/ Grass-Crete blocks /Chequered CC tiles shall be provided, as required.
- Kerb stones: All roads' edges shall be provided with kerb stones (Precast) & finished with synthetic enamel paint of approved shade.
- Adequate no. of RCC Pipes of suitable dia. shall be laid across the roads/pathways etc. to meet the requirements for crossing of cables, service lines etc.
- Road / Parking marking as per MORTH / IRC standards shall be done.
- Design and execution of retaining wall with RCC or Masonry / Stone Pitching shall be done as required to suit site conditions.

15.3 LANDSCAPES

a. Objective

Main objective of the landscape theme is to create a pleasant outdoor environmental for the patients and visitors to this prestigious complex, complementary to the character of the built form. The aim of the landscape theme is to creating an enabling healing environment for the patients.

b. Landscape Irrigation Design

Irrigation to the plantation shall be done with the combination of modern irrigation techniques and manual irrigation methods, in line with the site conditions and local agro climatic conditions and assist in conserving the landscapes besides saving water and ecology.

17. DESIGN CRITERIA

a. Public and Semi-Public Realms

A clear segregation of public and semi-public realms is aimed by creating clearly defined zones delineated by landscaping.

Each area aims to create a self-contained zone in itself to disable users from crossing over into restricted areas.

b. Buildings

The built form merges seamlessly with the landscape. The relationship is ensured by use of similar materials for the landscape palette corresponding to the building materials. Sandstone & Painting shall be used on facades.

c. Main Entrances

The campus has roundabouts at road junctions to facilitate smooth flow of traffic within the campus.

d. Paths and Roads

There will be a consistency in the way paths and roads are presented that clearly identifies their use, whether these are direct routes, recreational routes, service routes.

e. Lighting and Security

Adequate lighting provision has been made to enhance safety and security. Parking areas, entrance and service roads, and also isolated or dark areas are clearly defined and lit.

f. Parking areas

Segregated parking spaces have been earmarked for Patients, Staff and Students across the campus.

g. Avenue plantation

Avenue plantation is proposed along the hospital, frontage.

h. Cable and pipe management

All cables shall be suitably tagged with water/weather proof labels to ensure ease of maintenance

i. Boundary wall & Noise Barrier

Peripheral plantation shall act as a noise barrier; a variety of trees is proposed along the edge to enable noise reduction.

j. Manhole management

All manhole covers shall be etched/imprinted with unique number to ensure ease of maintenance.

18. HORTICULTURE / ARBORICULTURE AND PLANTATION: -

The Horticulture and Plantation works shall be carried out as per Tender Drawings, Design Basis Report, Technical Specifications and CPWD Guidelines & Specification.

a. Lawns

The lawns area in proposed campus is to be developed as shown in Master Layout Plan Drawing.

b. Trees / shrubs Plantation

- The peripheral plantation of trees along the roads, green belts and buildings shall be planted. The minimum height of individual variety of plants shall be as per CPWD guidelines for Horticulture & Landscaping. Tree guards for plants/trees shall be provided as per directions of Engineer in Charge.
- Herbal Plants- The different varieties of herbal plants shall be planted. The minimum height of individual variety of plants shall be as per CPWD guidelines for Horticulture & Landscaping.
- Shrubs- The different variety of shrubs shall be planted. The minimum height of individual variety of shrubs shall be as per CPWD guidelines for Horticulture & Landscaping.
- Ground Covers -The different varieties of Ground Covers shall be planted. The minimum height of individual variety of Ground Cover shall be as per CPWD guidelines for Horticulture & Landscaping.
- Climbers -The different varieties of Climbers shall be planted. The minimum height of individual variety of Climbers shall be as per CPWD guidelines for Horticulture & Landscaping.
- Roundabouts at different location shall be constructed as per drawing/requirement.

- Entrance Landscaping -. Landscaping at Main Entrance gates as shown in the Master Plan shall be completed as per architectural drawing. The necessary cattle catcher at entrance gates shall also be provided as per architectural drawing.
- Irrigation system for Horticulture and plantation- It shall be carried out as per DBR (Plumbing).
- Maintenance of plants shall be one year after overall completion of the project.

19. BOUNDARY WALL / FENCING

The planning and construction of external boundary wall, with entrance gate shall be undertaken along with the main work. The main entrance gates and guard room, as per design, along with the boundary wall is in the scope of EPC Contractor as per drawings.

20. SIGNAGES

Signages of different sizes are to be provided at different locations inside the campus based on NBC standards and functional requirements. Design basis of the signage is readability at vehicular movement & pedestrian movement. In general, wherever required signages will be bilingual. The signage scheme has been developed to enable way finding for the patients, students, visitors. Signage will be consistent across the campus.

The entrance signage shall be made of Stainless-steel alphabets fixed onto concrete base with dash fasteners. The building signages shall be made of Non backlit acrylic panels of approved pantone shades, mounted onto framework made of square hollow sections.

a. Fire Signage

Fire Signage shall be provided in the complex as per NBC 2016 Part -4. Material of signage shall be of acrylic/aluminium of required dimensions. At every floor near Lift landing diagram showing stairways shall be provided mentioning instructions - 'IN CASE OF FIRE USE STAIRS UNLESS INSTRUCTED OTHERWISE'. The signage shall be above call push button in Lift Lobby. Floor Signage will be provided in each floor within the staircase & should easily readable. Each corridor of every floor will have directional signage indicating Fire Escape route. These Signage will be LED lit with UPS power backup or of photo Luminescent paint. So that they will be visible in dark in case of power failure.

b. Deliverable

The EPC contractor shall provide signage plans, detail drawings, sign schedules. Care shall be taken to co-ordinate signage with the engineering services documentation to avoid gaps and overlaps. Some signages will be connected to a service (e.g. illuminated and exit signs), or required for customer services (e.g. hearing loops), building services and plant.

c. Existing installations

Over time it is inevitable that the signage installation will require alteration for a number of reasons such as:

- movement and changes in staff and services.
- alterations and additions to building and site
- feedback on signage deficiencies from staff, service users and visitors.

The elements of a sign system are inter-related and a change in one location may have impact on traffic flow and signage elsewhere. Accordingly, it is recommended that responsibility for alteration or amendment to the sign system come under the control of a nominated person or group. While requests can be acted upon as they arise, it is preferable to fabricate and install signs in batches to reduce costs and provide a considered rather than a piecemeal solution.

d. Checklist

The following checklist is provided to assist tender documentation quality assurance.

- Use NBC 2016 wherever possible to control materials and workmanship.
- Materials Specify the materials to be used in the manufacture of the planks, posts, supports and lettering.
- Finishes Specify the finishes to be used for planks and message, including applied finishes, method of application, paints, gloss level, surface texture, anodising etc.
- Fixing Specify the fixing and attachment methods, materials, finishes and coatings, corrosion resistance, vandal proofing, etc. Inclusions Detail materials and processes that are to be included in the tender price: fixtures, brackets, wire, bolts, screws, tape/adhesives, packaging, transport and handling, storage, installation, insurances and rectification of defects, etc.

e. Standard Sign Lengths

- Lengths (mm) - 600, 800, 1000, 1200, 1600, 2000, Special.

f. Typefaces

The following short list of typefaces are included here for legibility, and are recommended for the signages to be used in Medical College Site & Hospital site, Wayfinding, and Sign Systems and Information Graphics. Some are more suited to limited use on smaller projects due to the ornate design of certain characters, e.g. 'g'. Note: Corporate typefaces that are suitable for printed matter may not be suitable for signage.

- Sans Serif:
- Helvetica Neue, Akzidenz Grotesque, Arial, Astra - Frutiger, Avant Garde, Avenir 85, Avenir
- Next Demi, Corporate, Futura, Franklin Gothic, Frutiger 65, Frutiger Next, FF DIN, FF Meta,
- Futura, Geneva Haas, Interstate, Linotype 2000, Metro, MS Sans serif, Polo, News Gothic,
- Syntax, Tahoma, Unica, Univers, Vectora 75, etc.

g. Principal Colour Systems to be used:

- BS British Standard System - Architectural colours etc.
- Commission Internationale de l'Eclairage (C.I.E) - colour matching system.
- DIN (German Standards Institute) System, DIN 6164 Colour Chart.
- Munsell System.
- Natural Colour System (NCS) (Swedish).
- Ostwald Colour System, see DIN.
- OSA/UCS The Optical Society of America's Uniform Colour System, see Munsell.
- Pantone® Matching System (PMS) - Proprietary system for printing industry, paints.
- RAL System - paint industry pigments.

Colour descriptions (Munsell and associated systems) include:

- Hue – basic pure colours from Red to Blue, chromatic colours.
- Value – lightness of a colour, neutral colours (greys) range from black to white (no hue).

Value applies to both chromatic and neutral colours.

- Chroma – saturation or intensity of a colour.

h. Safety Signs

AS 1319: Safety signs for the occupational environment.

i. Background colour Word legend colour

- White (Regulatory) Black
- Yellow (Warning) Black
- Green (Emergency) White
- Red (Fire) White

j. Signage Manufacture Guidelines

Select the appropriate product for use and location:

- Exterior (normal/severe), exposed or covered.
- Interior use (normal/vandal proof/safety/infection control).
- Accessibility (embossed/Braille/voice).
- Typical materials:
 - Backings – sheet material:
 - Safety glass: Clear, opaque, tinted, coated backing,
 - Acrylic (Perspex etc), Fibreglass,
 - Metal: Aluminium and aluminium composite, steel (coated), brass, bronze etc.
 - Composite boards: Fibreboard (MDF), compressed fibre-cement (CFC), laminates (melamine, other), composite bulletin boards (cork etc).
 - Backings – finishes:
 - Satin, matt, etched, hammered, sand blasted, gloss not recommended.
 - Reflective and phosphorescent material.
 - Frames, end caps, supports:
 - Metal sections extruded or folded, Plastic extruded/moulded, fibreglass moulded,
 - Planks, Inserts:
 - Metal, plastic, fibreglass, paper (requires a cover).
 - Hardware:
 - Locks, hinges, stays, suspension wire, tamper proof screws, lock pins.
 - Graphics:
 - Permanent and non-permanent graphics.
 - For internally illuminated and non-illuminated.
 - Cut and applied – vinyl, acrylic, metal.
 - Transfer tape.
 - Paint – sprayed, screen print, brushed.
 - Positive or negative graphics on clear/opaque backings.
 - Etched, machined or laser/abrasive jet, incised, raised.
 - Reflective and phosphorescent material.
 - Bar code or RFID tagging.
 - Self-illuminated:
 - Backing back or edge lit by light sources (fluorescent), or Neon or LED in graphics.
 - Illuminated:
 - Attached or separate light source.
 - Fixing:
 - Vandal proof.
 - Fasteners, adhesive, magnetic, clip and holding devices.
 - Digital signs:
 - Proprietary variable electronic message display or voice.

- Digital Information Systems
- Proprietary systems with various interfaces and user input or activation systems.
- Visual, voice, phone, Braille, multi-lingual capabilities.

k. Site Traffic Signs

Typical signs for on-site use.

Fig 5a: Parking sign

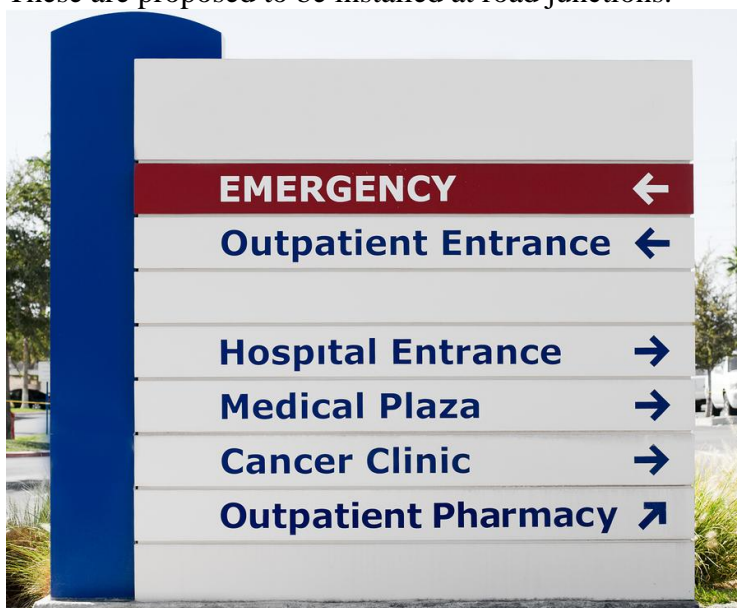


l. General Site Signage

The campus shall have different categories of external signage across the campus

- **Directional Departments Signages**

These are proposed to be installed at road junctions.





(fig: for Hospital Internal Signage at each floor)

- **Free Standing Totems**

These shall provide info to the visitor w.r.t. their location inside the campus. These shall also impart info on departmental/building breakup.

- **Entrance Gate Signage**

Entrance gates shall have bilingual signages provisioned. The signages shall be back lit.

m. Fire Signs

- Fire signs shall be provided for as per NBC 2016. The NBC should be checked for amendments and fire signage.
- proposals should be confirmed or verified with the relevant authorities before implementation.
- Typical recommended sizes (height) 100, 150, 200, 250 mm. Additional background and borders are optional.
- Typical international exit signs - AS/NZS 2293.3: Emergency evacuation lighting for buildings -

Emergency luminaires and exit signs.



Straight on



Left from here



Right from here



Opaque background
(dark preferred)

Typical Fire equipment pictograms.



Fire Hose Reel



Fire Alarm Call Point



Fire fighting Equipment

Fire extinguisher

Fig 5c: Fire sign

n. Illuminated Signs

- The use of internally illuminated signs in healthcare facilities is less common than in other public buildings.
- There are specific areas where the higher attention factor generated by an illuminated sign may be warranted.
- Examples are Emergency department entrances, enquiry counters and outpatient areas.
- The intensity of the internal lighting of pictograms on translucent background material should be controlled to prevent loss of legibility due to halation.
- In areas with low ceiling heights of 2400mm, the height of suspended sign boxes shall be restricted to 300mm in interior corridor locations, permitting only one- or two-line formats.



- Examples of basic formats for one and two line illuminated messages are shown above.

- Where signage is to be integrated into the interior as a built element, for example as a continuous fascia panel above an enquiry counter, the correct letter height to background height ratio should be maintained.
- Expert advice on graphic layouts, illumination levels and sign box construction techniques should be sought for internally illuminated signs.

Token Dispensing Interactive Signages

- Interactive touch screen information display system at visitor centre at gates and entrances of all hospital blocks integrated token dispenser. Minimum 60 such signages shall be installed.

o. Sign Maintenance

- The signages shall be guaranteed to be maintenance free apart from routine cleaning by healthcare facility. The EPC contractor shall provide 3-year onsite maintenance involving repair, replacement or relocation as part of their scope.

An indicative signage schedule suggested for the campus is as follows

S.NO.	DESCRIPTION	UNIT
Providing and fixing of signages, modular curved frame technology, of various widths and lengths, to form suggested usages, made of aluminium extruded sections, duly anodised, all signages shall be provided with 0.6-0.8mm polycarbonate protecting film over the prints, of appropriate size, print shall on 0.6mm coated, approved make, bio gradable sheet printed on HP 4500 UV flatbed printer.		
1	WAY FINDING SIGN	
	Way finding ceiling hung sign (both side) - 1500x210	each
	Way finding ceiling hung sign (both side) - 1000x210	each
2	TOILET	
	Wall Projected (both side) - 250x210	each
	Door mounted for toilet doors - 150x120	each
	cubical door signs, for janitor, change rooms - 150x120	each
3	NAME PLATE	
	Number plate (3 digits) - 150x60	each
	Bed Number plate (3 digits) - 120x60	each
	Room designation - 300x60	each
	Doctor's/ Occupant's name - 300x60	each
	Wall mounted over Door - 600x120	each
	Number directional plate - 600x120	each
	Staircase number plate - 400x120	each
	Staircase Wall Projected (both side) - 250x120	each
	Staircase Door mounted - 120x120	each
	Ward no./Bed nos - 600x120	each
	Department name plate - 800x150	each

	Waiting lounge - 800x 150	each
4	NURSE STATION/ REGISTRATION/MRI/CT SCAN/US ETC.	
	Wall projected (both side) - 250x210	
	Door mounted - 120x120	
	Lifts (Elevators nos.), Dumb Waiters, Drinking water, Electrical/AHU - 400x120	
	Nurse Station / Registration/Reception ceiling hung -600x150	
5	Directory, doctors/services etc	
	Header - 100mm	rmt
	Panels for names/services - 60mm	rmt
	Panels for time/days/charges - 60mm	rmt
	Prohibition	
	Silent Zone - 300x300	each
	No Smoking - 300x300	each
	Restricted area-authorized personnel only - 300x300	each
	Keep your hospital clean. - 300x300	each
	Misc. (As required) - 300x300	each
6	Providing and fixing of Snap fit frames, made of aluminium extruded profiles duly anodized, and shall be also provided with .8mm thick polycarbonate film to protect /hold the insertions. And 8mm thick MDF/PVC FOAM BOARD, as main insertion panel.	
	SNAP FIT FRAMES - 600x450	each
7	Providing & fixing of 1.5mm, polished,304 grade, Stainless steel plate, duly etched and filled with prescribed enamel colours to form an elevator disclaimer of size 250x250mm	
	ELEVATOR DISCLAIMER PLATE - 250x250	each
8	Providing and fixing of edge lit, emergency exit sign with 2 hrs power back up, concealed in false ceiling.	
	LED SIGN (CONCEALED)with 2hr backup – Standard	each
	EXIT LIGHT WITH 2 HR BACKUP (Exit at Stairs entry/ Deptt. Exit) - Standard	each
9	Providing and fixing of Photo luminescent, 1mm rigid pvc based sheet containing Lumigan 3, as base chemical, with high intensity luminous glow capacity. each sign which is required to be mounted on wall surface shall be MOUNTED ON 3MM ROUTER CUT Aluminium composite panel with 25mm boarder all around over the size of photoluminescent sign, ACP shall have rounded corners and fixed on wall surface as per dwg.	
	PHOTOLUMINESCENT, FIRE HOSE - 250x200	each
	PHOTOLUMINESCENT, ESCAPE SIGN - 450x150	each
	PHOTOLUMINESCENT, FLOOR LEVEL - 450x150	each
	PHOTOLUMINESCENT, FIRE ALARM CALL POINT - 250x200	each
	PHOTOLUMINESCENT, EVACUATION PLAN - 300x200	each

	PHOTOLUMINESCENT, PULL AND PUSH - 90mm dia	each
	PHOTOLUMINESCENT SIGNS, ASSORTED - 250x200	each
	PHOTOLUMINESCENT SIGNS, FIRE Extinguishers - 250x200	each
10	Providing and fixing of internally illuminated signage made with CNC cut ACP (aluminium composite panel) with insertions of text and pictogram of 10mm thick laser cut acrylic, duly cladded with electrocut casted 3M vinyl of required colour, illumination by GE or Phillips LED, as per Design.	
	Radiography/MRI/CT scan etc.	
	In use (illuminated) - 400x400	each
11	Providing and fixing of exterior signage, to be fixed with the help of MS framework, Signage to be made of MS pipe frame work, cladded with 3mm Aluminium composite panel, duly cut by CNC router, and the letters to be laser cut, 10mm casted clear acrylic, inserted in a cut out fitted on 4 mm 040 casted acrylic, the letters front to be 3M day and night electrocut vinyl, The signage shall illuminated with back lit LED of at least 5Yrs guarantee, (certificate to be provided, by the makers of LED), complete in all respects. recommended size 8000x1000mm	
	Building Name on Building's Top Wall faces - as per location	sqm.
12	Providing and fixing warning sign measuring 400x400 mm framed with 25mmx25mm MS square pipe covered with 3mm thick ACP on front and edges all-round which is lined with Retroreflective vinyl to its full surface and further lined with Reflective Vinyl duly designed and cut to signage text. Signs are in set of three, depicting pictogram of No smoking, no horn, and Make use dust bin.	
	Warning Signs on Columns in set of three - 400x400	set
13	Providing and fixing Directive Wall signs measuring 400x400 mm of design and specification developed as for WSC as above.	
	Directive wall signs - 400x400	each
14	Providing and fixing Floor Directory (TOTEM) of size measuring 1500mmx3600mm in the main entrance Lobby/ Foyer fabricated with MS rigid sections of allied sizes to approved design.	
	Floor Directory (TOTEM) - as per location	sqmt
15	Providing and fixing Customised signage made of Stainless steel 304 grade Channel letters with 5mm laser cut acrylic of 600mm height, 100 mm in depth with acrylic front with LED (tetra or minimax of GE) internally illumination. The letters shall be mounted on MS framing as per approved design. recommended size 5000x600	
	Main & Emergency Entrances with Logo - as per location	sqmt
16	Providing and fixing of exterior signage, to be fixed with the help of MS framework, Signage to be made of MS pipe frame work, cladded with 3mm Aluminium composite panel, duly cut by CNC router, and the letters to be laser cut, 10mm casted clear acrylic, inserted in a cut out fitted on 4 mm 040 casted acrylic, the letters front to be 3M day and night electrocut vinyl, The signage shall illuminated with back lit LED, of approved make of at least 5Yrs guarantee, (certificate to be provided, by the makers of LED), complete in all respects recommended size 1500x500	
	Subsidiary Entrance Sign - as per location	sqmt
17	Providing and fixing Drive way Sign measuring 600 x 800 mm mounted and fixed to GI round powder coated pipe with customised fixtures as developed. The signs are	

	framed with 25x25 mm MS pipe covered with 3mm thick ACP, Retroreflective vinyl and Reflective Vinyl as for Parking Direction Sign postings.	
	Drive way Sign - 600x800	each
18	Providing and fixing External Signage measuring 4 nos, 1200 mm long, 200 mm high Sign frames made up of 25x 25 mm MS square pipes covered with 3 mm thick ACP, Retroreflective vinyl and Reflective Vinyl as for Parking Direction Sign postings. Framed signs are secured to 2 GI round powder coated pipe poles 1600 mm high with customised fixtures.	
	External Signage - 1250x1600	each
19	Providing and fixing Evacuation floor plans measuring 500mmx 600mm made of 5 mm foam board and 1mm thick rigid plastic photoluminescent printed plans framed into 45mmx 20 mm extruded aluminium tubular frame with necessary holding slots.	
	Evacuation Plans Floor wise - 500x600	each
20	Providing and fixing of exterior signage, to be fixed with the help of MS framework, Signage to be made of MS pipe frame work, clad with 3mm Aluminium composite panel, duly cut by CNC router, and the letters to be laser cut, 10mm casted clear acrylic, inserted in a cut out fitted on 4 mm 040 casted acrylic, the letters front to be 3M day and night electrocut vinyl, The signage shall be illuminated with back lit LED, of approved make of at least 5Yrs guarantee, (certificate to be provided, by the makers of LED), complete in all respects, recommended size, 2100x750	
	Entrance Gate (External Signs) - as per location	sqmt
21	Providing and fixing of TOTEM, stating name of building on both sides, made of 0.8mm thick aluminium sheet duly painted with Polyurethane paint of approved make and shade, aluminium sheet bended to form a curve, and supported by moulded plastic components to hold the curve, the moulded plastic components to be fixed on aluminium rails with clip on arrangement, as per the product design of model: approved make. The Totem shall be mounted over a rectangular base 300 mm high as per design.	
	Building name TOTEM - 830x2400	each
22	Providing and fixing of traffic regulatory signages, made on 3mm aluminium sheet size 500x500, mounted on MS 60x60mm poles, 2400mm high, signage to be made with retroreflective HIP sheet of approved make, and text /pictogram on reflective vinyl. MS pipe to be grouted and painted as per the specs provided in the drg.	
	Traffic regulatory Signages - 500x500	each
23	Providing retro reflective regulatory signboard of size 900mm diameter made out of 2mm aluminium sheet, face to be fully covered with high intensity encapsulated Lense type retro reflective sheeting as approved by engineer in charge. Letter, symbols, borders etc will be as per IRC-67 with required colour scheme on the boards and with the high intensity GRADE A. The aluminium sheet to be riveted to MS frame of angle iron of size 40x40x4 mm. The boards will be fixed to one number 50x50 mm square post made of MS angle made of 50x50x4 mm, 4 mtr long welded to the frame with adequate depth arrangement. Sheetwork to be painted with 2 or more coats of synthetic enamel paint over and under coat (primer) and back side of aluminium sheet to be painted with 2 or more coats of epoxy paint, including appropriate priming coat complete in all respects as per direction of engineer-in-charge.	sqmt

21. ENVIRONMENT IMPACT ASSESSMENT

Common Measures being taken for reducing impact on environment in the proposed campus: -

- i. STP/ETP facility for treatment of liquid waste generated at proposed site.
- ii. Treatment of Solid Waste & Bio Medical waste generated at proposed site.
- iii. Emission of exhaust gases at suitable height from DG sets as per CPCB norms.
- iv. dB level of equipment chosen will be within limits as per relevant norms.
- v. Adequate storage provision for operationalization of Hospital Facilities shall be made.
- vi. Solid waste management techniques shall be segregated in the following heads:
 - Municipal solid waste, organic waste composter, inert waste shall hand over to the authorized municipal waste collector.
 - Biomedical waste to be handed over to the authorized common biomedical waste management facility (approved by UP Pollution Control Board).
 - E-waste shall be handed over to authorized e-waste recycler.
- vii. During construction stage following precautions to be taken.
 - Back filters shall be used for batch mixing plant. All provisions as per CPCB shall be provided.
 - Sprinkling of water to avoid dust pollution shall be ensured during construction.
 - Temporary hutments shall be constructed for accommodation of constructions workers during construction which shall be demolished and cleared off after completion of the project.

22. GRIHA RATING & CERTIFICATION

- **Project Vision**

This project is envisioned to be designed and constructed based on sustainability and green building principles. The vision is to conserve energy & water; reduce waste; renewable energy generation; reduce urban heat island effect and use sustainable materials.
- **Project Approach & Strategies**

Minimum 3-Star GRIHA rating for the below mentioned buildings shall be designed by EPC Contractor with due compliance to various criteria stipulated under GRIHA.

23. AESTHETICS

Aesthetics is of utmost importance to enable a healing environment, this aesthetics is met by providing pleasing architectural elevation features coupled with the use of local materials, creating an enabling environment.

24. ARCHITECTURAL FEATURES OF THE PROJECT

The Architectural features of the project are as follows:

Medical college Site:

- a. Green campus with seamless phasing
- b. Clear structured into zones, teaching, hostels & recreation and residences, maximizing site potential, & connected through a pedestrian spine
- c. Central green area having sports & recreation facilities is easily accessible from teaching & residential complexes.
- d. Orientation is primarily north south and coupled with specific shading of envelop.
- e. Permanent, durable and local materials have been integrated, low heat transmission heat reflective glass towards green building complex.

- f. Windows
- g. The Medical College and Auditorium Building shall be Air-conditioned as detailed in the drawings and are required to satisfy the norms for minimum 3 Star GRIHA Rating.
- h. In other areas such as residential areas viz. Director's Residence, Apartments, Hostels etc., Clear float glass SGU shall be provided. The thickness of float glass shall depend on the size of panel subject to requirements as per CPWD specifications.
- i. Frosted glass shall be used in external windows in toilets and similar areas.

25. DESIGN PHILOSOPHY

The design philosophy takes into account the followings:

- a. To cater for different functional requirements of user with creative indoor spaces, surroundings, better circulation and flexibility in space planning.
- b. Integrated designs of electrical, mechanical and other services with structural system which should be planned with optimum cost, low maintenance and lowest consumption of energy and water.
- c. Climate responsive Architecture with integration of daylight and electric light, thermal comfort, ventilation.
- d. Consideration of green building principles.
- e. Water and solid waste management with waste water recycling, water conservation and rain water harvesting.
- f. Development of surroundings with site terrain consideration, traffic circulation, indigenous vegetation and plantation.
- g. The complex/blocks proposed to be developed should be based on efficient construction technologies for fast track and ease in construction. The buildings can be RCC framed construction.

STRUCTURAL **DESIGN BASIS REPORT**

CONTENTS

1. Introduction
2. Building Configuration
3. Codes & Standards
4. Material
5. Structural Scheme
6. Design Methodology
7. Structural Analysis
8. Codal Compliance
9. Conclusion

1. Introduction

(a) This section outlines the structural engineering scope for the proposed construction of autonomous state medical college Ballia. Upon engagement, the EPC Contractor will be provided with the project's foundational Master Plan and Concept Plan. The Contractor assumes full responsibility for the comprehensive development of all detailed structural designs and working drawings. To ensure the highest standards of structural integrity, all finalized designs must be independently vetted by a premier recognized institution, such as an IIT, NIT, or a designated Government Engineering College.

(b) Furthermore, while the EPC Contractor retains the flexibility to modify the structural framework, including the integration of Pre-Tensioned or Post-Tensioned concrete, Steel Structures, or Pre-Engineered Buildings (PEB) to optimize project delivery, it is expressly understood that such alterations are undertaken at the Contractor's discretion. Consequently, no additional financial claims or cost compensation will be provided for these structural modifications.

1.1. SITE CONDITION

The project site is located in Ballia, Uttar Pradesh. Based on the seismic zoning map of India (as per IS 1893:2016), the site falls under **Seismic Zone IV**, which corresponds to a **severe seismic risk**.

The average ground slope and drainage pattern must be considered in the design. Water table depth has been recorded at approximately 2.5 m.

The structural design must take into account these geotechnical and seismic conditions to ensure safety and

serviceability.

1.2. GEO-TECHNICAL INVESTIGATION

The EPC contractor may carry out additional soil investigations as per codal provisions, although preliminary investigation data is provided.

Medical (Jail Campus)

- The values of net safe bearing capacity for Isolated / R.C.C. Raft foundation below existing ground level are tabulated below: -

S. L. No.	Depth (m)	Type of Foundation	Width of Foundation (m)	Allowable Bearing Capacity (Kg/cm ²)	Allowable Bearing Capacity (T/m ²)
1	1.20	Isolated foundation	1.20	0.919	9.19
2	1.50		1.50	0.928	9.28
3	2.00		2.00	0.988	9.88
4	2.00	R.C.C. Raft foundation	(10.00 x 10.00)	0.893	8.93
5	3.00			0.937	9.37
6	4.50			1.017	10.17
7	6.00			1.125	11.25
8	7.50			1.211	12.11

Hospital Campus

- The values of net safe bearing capacity for Isolated / R.C.C. Raft foundation below existing ground level are tabulated below: -

S. L. No.	Depth (m)	Type of Foundation	Width of Foundation (m)	Allowable Bearing Capacity (Kg/cm ²)	Allowable Bearing Capacity (T/m ²)
1	1.20	Isolated foundation	1.20	1.050	10.50
2	1.50		1.50	1.065	10.65
3	2.00		2.00	1.072	10.72
4	2.00	R.C.C. Raft foundation	(10.00x10.00)	1.007	10.07
5	3.00			1.074	10.74
6	4.50			1.225	12.25
7	6.00			1.627	16.27
8	7.50			1.999	19.99

2. Building Configuration

The following are the different types of buildings

S.No.	Building Name	Nos. of Floor	Plinth Area	Importance Factor
[A]	Medical College Campus			
1	Academic Building	B+G+5	32870.79 Sqm	1.5
2	Administrative Building	B+G+4		1.5
3	Multipurpose Hall (G+1)	G+1	2615.45 Sqm	1.5
4	Guest House (G+1)	G+1	1510.33 Sqm	1
5	Senior Resident Hostel (G+8)	G+8	2905.57 Sqm	1
6	Principal Residence (G)	G	384.25 Sqm	1
7	Junior Resident Hostel -Boys (G+5)	G+5	1606.61 Sqm	1
8	Junior Resident Hostel -Girls (G+3)	G+3	1092.87 Sqm	1
9	U.G. Boys Hostel (G+9)	G+9	6196.61 Sqm	1.2
10	U.G. Girls Hostel (G+7)	G+7	4547.02 Sqm	1.2
11	Intern Boys Hostel (G+6)	G+6	1869.13 Sqm	1
12	Intern Girls Hostel (G+4)	G+4	1371.40 Sqm	1
13	Intern Nurses Hostel (G+5)	G+5	1679.15 Sqm	1
14	Type-II Residence (S+10)	S+10	3065.76 Sqm	1
15	Type-III Residence (S+10)	S+10	3971.22 Sqm	1
16	Type-IV Residence (S+10)	S+10	5423.85 Sqm	1
17	Type-V Residence (S+5)	S+5	3933.18 Sqm	1
18	Electric Sub Station (G)	G	221.00 Sqm	1
[B]	Hospital Campus			
19	Hospital Building (2B+G+10)	2B+G+10	37197.42 Sqm	1.5

3. CODES AND STANDARDS

Specific applicable codes and standards will be identified in the Design Philosophies as appropriate. The latest editions of the Codes and Standards will be used. All design work shall be based on Indian Standards with amendments if any, as on date.

3.1 Loadings

- IS: 875-1987-Code of Practice for Design Loads (Other than Material and Stored Material).
- Part 1 - Dead Loads (IS:875-1987)
- Part 2 - Live loads or Imposed Loads (IS:875 -1987) Part 3 - Wind Loads (IS: 875 -2015)
- Part 4 - Snow Loads (IS:875 -2015)
- Part 5 - Special Loads and Load Combinations (IS:875-1987)

3.2 Design for Earthquake Resistance

- IS 1893(Part-1)-2016-Indian Standard Criteria for Earthquake Resistant Design of Structures
- IS 4326 : 2013-Earthquake resistant design and construction of buildings code of practice.

3.3 Design of Reinforced Concrete Elements

- IS: 456-2000-Code of Practice for Plain and Reinforced Concrete

- IS: 1786-2008-Specification for High Strength Deformed Steel Bars and wires concrete Reinforcement
- SP: 16 Design aid for reinforced concrete to IS:456
- SP: 23 Handbook on concrete mixes
- SP: 24 Explanatory handbooks on code of practice for P.C.C.
- SP: 34 Handbook on Concrete reinforcement and Detailing

3.4 Design of Ductile Detailing

3.4.1 IS:13920-2016-Ductile design & detailing of reinforced concrete structures subjected to seismic forces

3.5 Earthwork

- IS: 1764 Code of safety for Excavation work

3.6 Soil and Foundation

- IS: 8009-1976 Code of practice for calculation of settlements of foundation
- IS: 1904-1986 Indian Standard Code of practice for Design & Construction Foundations in Soil: General Requirements.
- IS: 2950 (Part1)-1981 Indian Standard Code of Practice for Design & Construction of raft foundation - (Part -1) IS: 3170(Part-1)-2009 Concrete Structures for Storage of Liquids-code of Practice

3.7 Fire Safety of Building

- IS: 1642-1989 Indian Standard Code of practice for Fire Safety of Buildings (General): Details of Construction ANSI/UL263 Fire resistance rating

4. MATERIALS

All materials provided shall comply with the most recent edition of the applicable Indian Standards or other recognized standards. Material specifications will encompass provisions for sampling and testing as outlined in the relevant design standards. Comprehensive material specifications will be detailed in the Technical Specification document.

Concrete (As per IS 456:2000 Table 5 and Clause 8.2.4.2)

Concrete Grade	Exposure Condition	Max Water-Cement Ratio	Min Cement Content (kg/m ³)	Reference
M25	Moderate	0.5	300	IS 456:2000 Table 5
M30	Moderate	0.45	320	IS 456:2000 Table 5
M35	Severe	0.45	340	IS 456:2000 Table 5
M40	Severe	0.4	360	IS 456:2000 Table 5
M45	Severe	Mix Design	Mix Design	IS 456:2000 Table 5
M45	Severe	Mix Design	Mix Design	IS 456:2000 Table 5

Minimum Grade of Materials The following minimum grades shall be used for structural design and construction:

Material Type	Minimum Grade	IS Code Reference
Concrete (General RCC)	M30	IS 456:2000, Table 5
Structural Steel	Fe 350	IS 800:2007
Reinforcement Steel	Fe 500D / Fe 550D	IS 1786:2008

Reinforcement Steel

All reinforcement shall comply with IS:1786-2008 and possess a minimum yield strength of 500 N/sq mm (Fe-500D).

Property	Specification	Remarks/Standard
Young's Modulus	$E_s = 5000\sqrt{f_{ck}}$ N/sq mm	As per IS 456:2000
Yield Stress	$f_y = 500$ N/sq mm	Fe 500 (IS 1786:2008)
Diameters [in mm]	8, 10, 12, 16, 20, 25, 32	Standard sizes for reinforcement
Density	78.5 kN/cum	For structural steel

Masonry Wall

The detailing of the masonry walls to the RCC/Steel elements both vertical and horizontal along with RCC bands shall be detailed by architects in drawings. Grade for the masonry shall be specified in architectural drawings. This shall be complying with IS 1905: 1987.

5. Structural Scheme

The structural system of the hospital complex comprises various load-resisting and functional elements designed in accordance with IS 456:2000, IS 13920:2016, and relevant Indian Standards. These include the following:

- Columns:** Columns serve as the principal vertical load-bearing components, effectively transferring axial and lateral loads from beams and slabs to the foundation. They are engineered to withstand combined axial forces and biaxial bending moments in accordance with Limit State Design principles. The minimum specified column dimension is 300 mm.
- Beams:** Beams function as horizontal structural elements, supporting loads from slabs and directing them to columns. Their design encompasses flexural strength, shear capacity, and serviceability considerations. Both continuous and simply supported beam configurations are addressed, with minimum depth and reinforcement requirements conforming to IS 456 and SP 16 standards.
- Slabs:** Reinforced concrete (RCC) slabs are categorized as one-way or two-way based on panel geometry. Cranked reinforcement and torsional bars are incorporated at corners in line with IS 456 Annex D. The minimum slab thickness is 125 mm, with increased thickness determined by span and load conditions.
- Shear Walls:** Shear walls are installed where necessary to improve lateral load resistance, particularly in high-rise structures such as S+10 towers. Their design adheres to IS 13920:2016, ensuring ductility under seismic loading.
- Retaining Walls:** These walls are essential for basement construction and site grading, designed to accommodate active earth pressure, surcharge, and seismic loads as applicable. Where required for basements or boundary conditions, retaining walls are engineered to resist lateral earth pressure and surcharge effects.
- Staircases:** Typically constructed as waist slab types, staircases are designed to sustain live loads and ensure accessibility. Waist slab thickness and reinforcement are calculated based on staircase geometry and intended usage. Minimum reinforcement shall be not less than 12 mm diameter bars in both directions, in compliance with IS 456 Clause 33.
- Water Tanks:** Both overhead and underground water tanks are designed to withstand water load, uplift

pressure, and seismic impact as per IS 3370 specifications.

h. Plinth Beams and Lintels: Provided to control cracking and to support wall loads.

For all buildings conventional beam slab system shall be followed. The layout of columns has to cater to functional requirements of hospital building & other buildings at upper levels. The structure will be designed as per latest IS earthquake code IS: 1893: 2016.

6. DESIGN METHODOLOGY

The design methodology implemented for the proposed hospital structure prioritises safety, serviceability, durability, and cost-efficiency. This process integrates advanced computational modelling, compliance with relevant codes, manual cross-verification, and strict adherence to established performance criteria across various loading scenarios.

Analysis:

- Elastic analysis is conducted to verify serviceability under standard working conditions.
- Limit State analysis ensures structural safety against potential collapse.
- Modal analysis assesses dynamic responses and seismic resilience.
- The analytical results encompass shear forces, bending moments, axial forces, and displacements.

Member Design:

- Structural components such as beams, slabs, columns, shear walls, footings, and other elements are designed according to controlling load combinations.
- Reinforced Concrete (RCC) elements comply with IS 456:2000 utilising Limit State Design principles.
- Seismic detailing adheres to IS 13920:2016 requirements.
- Retaining walls, tanks, staircases, and canopies are specifically engineered for their distinct loading and boundary conditions.

Manual Verification:

- Critical structural members undergo manual verification to ensure accuracy and validate software-generated outcomes.

Foundation Design:

- Foundation type (isolated, raft, or pile) is selected based on geotechnical recommendations and subsequently designed to withstand combined vertical and lateral loads.

Deflection and Crack Control:

- All structural members are reviewed to confirm deflections remain within permissible limits as per IS 456 Clause 23. Serviceability is maintained through controlled crack widths and long-term deflection management.

Expansion and Construction Joints:

- Expansion joints are incorporated in accordance with IS 1893 :2016 for structures exceeding 45 metres in length. Construction joints are coordinated with contractors to mitigate cold joints and shrinkage effects.

Detailing and Documentation:

- Reinforcement detailing aligns with SP 34 and IS 13920, ensuring both ductility and constructability. Bar bending schedules and construction drawings are meticulously prepared and reviewed.

Proof Checking and Review:

- The complete structural design is independently vetted by an accredited third-party institution (IIT/NIT/Government Engineering College) approved by UPPWD or as per special condition of contract. All feedback is thoroughly addressed prior to final submission.
- Elastic and Limit State Analysis
- Load Combinations as per IS 875 & IS 1893
- Manual checks for critical members
- Member design encompasses slabs, beams, columns, footings, lintels, chajja, lofts, staircases, sumps, and retaining structures
- Construction and Expansion Joints according to IS 1893:2016

Ductile detailing & Serviceability

- Ductile detailing complies with IS 13920:2016
- Crack control and deflection limitations meet IS 456:2000 Clause 23 requirements
- Reinforcement detailing conforms to SP 34 and IS 456:2000 standards

7. STRUCTURAL ANALYSIS

- a. Site falls in Zone IV as per IS 1893:2016 of Seismic Zones of India. Type of Structure: RCC framed structure has been proposed for all the structures. But if structure changes to Pre-Tension, Post Tension, Steel Structure, Pre-Engineered Structure or any other type of structure by EPC consultant or requirement of project, no extra claim shall be paid for that.
- b. 3-D Analysis of all the building structures is to be carried out by The EPC Contractor using latest versions of modern software packages such as STAAD Pro/ETabs/SAFE and the results of the analysis shall be used for designing the various elements. All designs shall strictly conform to the standards specified in National Building Code 2016, latest IS codes, etc, and to be proof checked.
- c. **UPPWD reserves the right to conduct third party design validation and the EPC Contractor shall provide all data and carry out all modifications that may be suggested by the third party so appointed.**
- d. **The recommendations of the past Geo Technical investigation as above are indicative. The EPC Contractor shall conduct soil investigations on the own and shall be responsible for the adequacy of the design**
- e. **LOAD PROPERTIES**

Dead Load (DL)

As per IS 875 Part 1:1987

Component	Unit Weight (kN/m ³ or kN/m ²)
RCC (Reinforced Concrete)	25.0
Plain Concrete	24.0
Brick Masonry	19.2
Artificial Ceiling	0.25
Waterproofing (Brick Bat Coba)	9.90
Cement Plaster	20.4
Glass	26.0
Aluminum	27.0
Water	10.0
Granite	27.45
Marble/Sandstone	26.7
Steel	78.5
Vitrified Tiles	24.0

Live Load (LL)

As per IS 875 Part 2:1987 and NBC 2016

Occupancy/Location	UDL (kN/m ²)	Concentrated Load (kN)
Bedrooms/Wards/Lounges	2.0	1.8
Kitchens, Laundries, Laboratories	3.0	4.5

Occupancy/Location	UDL (kN/m ²)	Concentrated Load (kN)
Dining Areas, Restaurants	3.0	2.7
Toilets and Bathrooms	2.0	—
X-Ray Rooms, Operating Theatres	3.0 min	4.5
Offices, OPD Rooms	2.5	2.7
Corridors, Staircases	4.0 min	4.5
Boiler/Plant Rooms	5.0 min	4.5
Parking Areas	6.0	11.0
Balconies	3.0 to 4.0	1.5/m

Wind Load (WL)

As per IS 875 Part 3:2015

Parameter	Value / Reference
Basic Wind Speed (V _b)	47 m/s
Terrain Category	B
Height Range	3–50 m
Structure Size Factor (k ₁)	0.67–1.08
Terrance Roughness and Height Factor (k ₂)	0.8-1.35
Topography Factor (k ₃)	1.0
Importance Factor (k ₄)	1.0
Design Wind Velocity (V _z)	$V_z = V_b \times k_1 \times k_2 \times k_3 \times k_4$
Design Wind Pressure (p _z)	$p_z = 0.6 \times V_z^2$

Seismic Load (EL)

As per IS 1893:2016

Parameter	Value
Seismic Zone	IV
Zone Factor (Z)	0.24
Importance Factor (I)	1.0, 1.2, 1.5
Response Reduction Factor (R)	4.0 & 5.0
Design Horizontal Acceleration Coefficient [A _H]	$A_H = \frac{S_a Z I}{g 2 R}$
Imposed Load (up to 3.0 kN/m ²) % in Seismic Wt	25%
Imposed Load (> 3.0 kN/m ²) % in Seismic Wt	50%

Load Combinations

As per IS 875 and IS 1893

Load Combination	Limit State of Collapse	Limit State of Serviceability
DL + LL	1.5 DL + 1.5 LL	1.0 DL + 1.0 LL
DL + WL	1.5 DL + 1.5 WL	1.0 DL + 1.0 WL
DL + LL + WL	1.2 DL + 1.2 LL + 1.2 WL	1.0 DL + 0.8 LL + 0.8 WL
DL + EL	1.2 DL + 1.2 LL ± 1.2 EL	1.0 DL + 1.0 EL
DL + LL + EL	1.5 DL ± 1.5 EL	1.0 DL + 0.8 LL + 0.8 EL
	0.9 DL ± 1.5 EL	

This value is to be considered when stability against overturning or stress reversal is critical. Wind Load and Earthquake Load are both considered for x and y directions. For non-orthogonal columns, additional combinations shall be as per IS 1893:2016 Clause 6.3.2.2.

f. Dynamic Analysis

Dynamic analysis is being performed by the Response Spectrum Method. The design base shear (VB) shall be compared with a base shear (VBT) calculated using a fundamental period T_a . In case VB is less than VBT, all the response quantities are multiplied by scale factor. Time period shall be as per point 4.10.

8. CODAL COMPLAINTS

➤ Drift & Deflection limits for earthquake and wind

The storey drift in any storey due to the minimum specified design lateral force arrived with fundamental time period with factor of 1.0, shall not exceed 0.004 times the storey height. The deflection at the top shall be limited to $h/250$ for earthquake and $h/500$ for wind forces.

➤ Deflection Criteria As per IS 456:2000 Clause 23.2

Structural Element	Deflection Limit	Reference
Beams and Slabs (Total Deflection)	Span / 250	IS 456:2000 Cl. 23.2
Beams and Slabs (Post-Finish)	Lesser of Span / 350 or 20 mm	IS 456:2000 Cl. 23.2
Cantilever Beams	Span / 125	IS 456:2000 Table 6
Lateral Deflection (overall structure)	Height / 500	IS 456:2000 & 875

➤ Minimum Member Dimensions and Cover Requirements

As per IS 456:2000 and IS 13920:2016 (for 2 Hr. fire rating & severe exposure conditions)

Structural Member	Minimum Size (mm)	Minimum Cover (mm)	Remarks
Column (Fully Exposed)	300	40	As per IS 456 Cl. 21.2 and Table 16
Beam (Continuous)	200	30	-
Beam (Simply Supported)	200	40	-
Slab (Floor or Roof, Continuous)	125	25	Minimum thickness for RCC slab
Slab (Floor or Roof, Simply Supported)	125	35	As per IS 456 Table 16
RCC Wall	200	25	Vertical steel in each face, with edge reinforcements
Staircase Waist Slab	150	25	Based on rise/run and live load
Lintel Beam	150	25	Designed for wall load and chajja
Footing	As per design	50	Based on SBC and axial/moment load
Plinth Beam	230	40 / 50	Based on exposure and service rating

➤ ***Min. percentage, max.& min. spacing of reinforcement in Structural members***

The design shall be as per IS 456 - 2000 and detailing as per IS 13920:2016.

➤ ***Crack width in water retaining structures:***

For water tanks and underground sumps, crack width shall be limited to 0.2 mm and for STP it shall be limited to 0.1mm as per Clause 35.3.2 of IS 456:2000. Minimum Concrete grade shall be M30 for water tanks as well as M30 STP

➤ **Punching shear checks in Isolated Combined Footings:**

It Shall be checked as per clause 31.6 of IS 456:2000.

9. CONCLUSION

All structures are to be designed in accordance with the latest IS codes ensuring safety, stability, and compliance with NBC 2016. All design submissions will be proof-checked by a third-party institute and submitted to PMC for final approval.

Important Note: If the structure is changed to Pre-Tensioned, Post-Tensioned or any other system during execution, it shall be accommodated without any additional cost implication to the client.

CIVIL WORKS & GENERAL
DESIGN BASIS REPORT

1. General

The Construction of Autonomous State Medical College Ballia shall be done on EPC (Design, Engineering, Procurement & Construction) basis and the EPC Contractor shall be responsible for shortfall of any technical propriety and of upholding prevailing standard of Code of Practice according to NBC 2016 and all other relevant IS-Codes on the way to accomplish the work according to requirement. The work shall in general conform to the Latest CPWD Specifications.

The new facilities shall be completed in conformity with high standards of construction and specification. The Architectural finishes shall be of such quality that will ensure better hygienic conditions. The design of building shall ensure control of noise due to walking, movement of trolleys and banging of doors etc. The architectural design should take in to account the requirements of physically challenged patients.

Based on the approved Master Plan & Concept Drawings, the EPC Contractor shall prepare the detailed architectural design and drawing of the Project for approval from the local bodies and statutory authorities. The structural designs of the buildings and structures shall be done by the EPC Contractor and shall be Proof checked/vetted by the IIT/NIT/or any Govt. Engineering College as approved.

2. Site clearance, Excavation & Earth Work:

The EPC contractor shall under take necessary levelling, back filling/ cutting, if required, to maintain the levels as per Master Plan. The EPC contractor shall bring the good earth from outside, if any required, to maintain the required levels and shall ensure proper compaction before the start of any construction activities.

3. Anti-termite treatment:

Anti-termite treatment of all buildings in the campus with Chlorpyrifos 20EC/ Imidacloprid 30.50 SC as specified in IS-6313 (Part-2) 2013 and shall be got done through approved specialized agencies only.

4. Damp-proof course:

The damp-proof course (DPC) shall be laid at plinth level/ or as per requirement in the brick work walls resting on brick foundations, as per approved drawings and as directed of 50mm thickness with cement concrete 1:1.5:3 (1 cement: 1.5 coarse sand: 3graded stone aggregate 20mm nominal size) mixed with water proofing material in cement concrete work in doses by weight of cement as per manufacturer 's specification.

5. Plinth Protection:

Plinth protection with 75 mm thick of cement concrete 1:1.5:3 (1 cement :1.5 coarse sand: 3 graded stone aggregate 20mm nominal size) over 100 mm bed by dry brick ballast/ stone aggregates 40mm nominal size well rammed and consolidated and grouted with fine sand including finishing all around the buildings, as per tender drawings and approval of Engineer-in-charge. The width of the plinth protection shall be 900 mm (Minimum). The required brick toe wall/brick on edge shall be provided as per requirements.

6. Brick Work on External Wall:

- i. The bricks used in the brick work shall be first class, common burnt clay bricks (Red Bricks) conforming to IS: 1077
- ii. Bricks used in the work shall be obtained from approved kilns and shall be best quality bricks. Their characteristic compressive strength shall be in conformity to the provision in Latest CPWD Specifications for works.
- iii. For mortar, use of PP Cement shall be preferred. The mortar shall be as under:
 1. For brick work cement mortar 1:6 (1 cement: 6 coarse sand)
 2. For half brick masonry cement mortar 1:4 (1 cement: 4 coarse sand)
- iv. The half brick masonry shall be provided with 2 Nos. 6mm dia. M.S. bars at every third course of masonry.

- v. RCC Coping of specified thickness and shape of required Concrete Grade /18mm thick Granite to be carried out over Brick Parapet walls etc.

7. Partition/ Internal Wall:

a. Drywall:

Drywall is a high-performance light weight partition system consisting of Aluminium frame encased with bison panel on either side attached through self-drilling drywall screws. The joints are then taped and finished with bison jointing compounds. Bison Panel is a cement bonded particle board made out of 62% cement 28% wood. The wood used is of fast growing species like Eucalyptus and Poplar. Due to adoption of special manufacturing process, the panel acquires the strength, the durability of cement and easy workability of wood - a combination of qualities absent in other boards.

Density 1250 Kgs/m³ (1100 Kgs minimum as per BIS)

Moisture content 9% + 3% at Factory Point.

Modules of Elasticity (bending) 3000 N/mm

Bending strength 9N/mm

Transverse tensile strength (perpendicular to surface) 0.4 N/mm²

Compressive strength (perpendicular to surface) 15 N/mm²

Surface Alkalinity pH Between 11 and 13

Nail holding power perpendicular to surface. 205 Kgs

Screw holding power perpendicular to surface 312 Kgs

b. AAC Blocks:

AAC Block shall conform to IS:2185(Part-III) and shall be of grade-I with minimum compressive strength 4.0 N/sqmm. Providing and laying autoclaved aerated cement blocks masonry with 100 mm/ 200mm/300mm thick AAC blocks in super structure above plinth level up to all level in block laying polymer modified adhesive mortar, with required thickness of RCC at sill level and lintel level or every 1.2m as directed by Engineer-in-charge.

Notes: Brickwork shall be used in Fire staircase, labs, toilet/wet areas, O.T., I.C.U., Blood bank, CSSD & Laundry & Common waiting area as per requirement and approval by Engineer-in-Charge.

Fire Resistance

Bison Panel is highly fire resistant and has been classified as incombustible material in many countries around the globe. Tested in accordance to BS 476, Fire test on building materials and structures - part 6, 7 classified it as class 'O' building board with class 1 surface spread of flame. Bison Panel can be used for the construction of fire-resistant building elements to satisfy the criteria of I.S.O. 834-1975 and I.S. 3809-1979 for 1/2 hour to 4 hours fire rating.

20 mm Bison Panel each side of 70 mm x 32 mm Aluminium studs having thickness of 2 mm at 610 mm centres faced with 100 mm x 20 mm Bison Panel strips with 2 layers of 50 mm thick Rock wool (60 kgs/ 3 m) to cavity:- 2 1/2 hours : 53 dB at 100 - 3150 Hz.

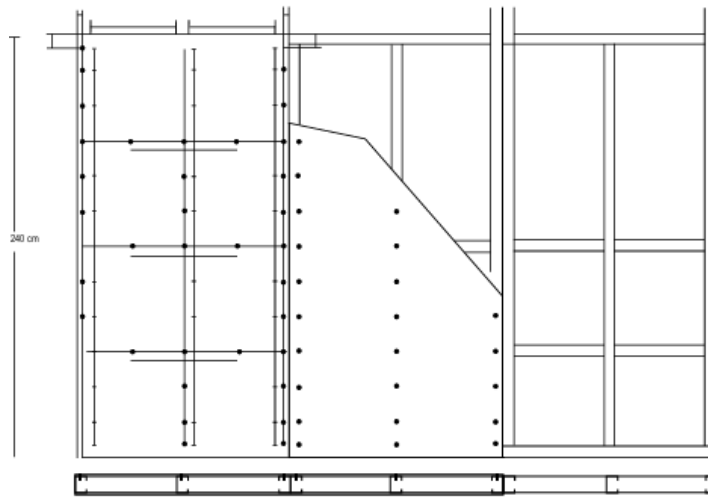


Fig 6a: Dry wall

Notes:

- i. Minimum Thickness of Studs and Track 2 mm
- ii. Double studs at board joints
- iii. Gap between boards 5 to 10 mm
- iv. No gap between double studs
- v. Screws only in vertical direction
- vi. No screws on tracks

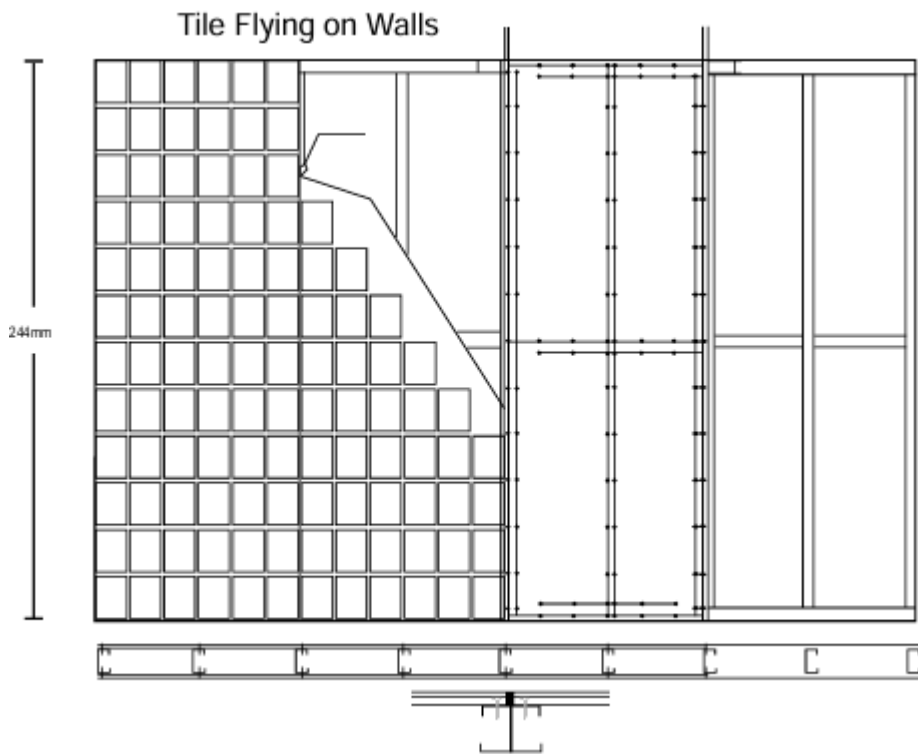


Fig 6b: Tile on dry wall

Notes:

- i. All frame joints are tightly fixed
- ii. Double studs at board joints
- iii. Gap between tiles 1½ to 2mm, fill it with flexible adhesive.
- iv. No tiling on board joints
- v. Provide nominal gap of 1.5 mm between boards

8. Finishing:

The surfaces of brick work, etc. shall be treated and finished with Cement Plaster. The use of PP Cement shall be preferred. The cement plaster shall be provided as under:

- a. Plane wall faces: 12mm thickness (minimum) cement plaster 1:6 (1 cement: 6 Coarse sand).
- b. Rough wall faces: 15mm thickness (minimum) cement plaster 1:6 (1 cement: 6 Coarse sand).
- c. Ceiling and RCC works: 6mm thickness (minimum) cement plaster 1:3 (1 cement: 3 Coarse sand).
In respect of RCC works, in continuation with the brick work, plastering as per brick work shall be continued over RCC works.
- d. All External faces including wall faces behind dry cladding and structural glazing: 18mm thickness (minimum) cement plaster in two coats, under layer 12mm thick cement plaster 1:5 (1 cement: 5 coarse sand) finish with a top layer of 6mm thickness (minimum) cement plaster 1:6 (1 cement: 6 Coarse sand).
- e. The junction of RCC work and brick walls shall be covered with 24-gauge chicken wire mesh fixed with screws/washers to avoid cracks in plaster work. And also where ever cutting of brick work is done for conduits.
- f. The trenches / open drains: 15mm plaster finished with cement plaster 1:4 (1 cement: 4 Coarse sand) with floating coat of neat cement & adding of Water proof compound.
- g. Provide drip course/ groove in plastered surface or moulding to R.C.C. projections.

9. Painting:

The plastered surfaces shall be finished as per the finishing schedule/tender drawings. This shall include Antibacterial Paint/textures paint and other paints as per finishing schedule. The ceiling area below where false ceiling is carried out shall be finished with white wash coat(s) as per requirement. The false ceiling, as required, shall also be finished as per the finishing schedule appended to the tender document.

All paints shall meet the GRIHA requirements for minimum 3 Star Rating. Painting on doors, windows, Grills, MS work, structural steel, rolling shutters, railing and other members requiring painting and polishing etc., wherever required, shall be treated with primer coat and finished with painting/polishing of approved shade and manufacture, as per CPWD Specifications, to meet the functional requirements.

Textured Exterior Paint over Priming coat of Exterior primer over 1 mm Cement based Putty & Structure Glazing with hermetically-sealed 6-12- 6 mm insulated glass (double glazed) and Aluminium Extruded Tubular Sections.

- a. All paint work on concrete and plaster surfaces shall include application of white cement-based putty as base preparation, application of primer in compatibility with the respective type of paint and painting with 2 or more coats of paint as per technical specifications.
- b. All paint work on structural components (excluding Stainless steel) shall include application of primer in compatibility with the respective type of paint and painting with 2 or more coats of paint as per technical specifications.
- c. The interior of hospital buildings, shall be finished with premium acrylic smooth exterior paint with silicone additives of approved shade and make.
- d. The wood work shall be painted / polished (melamine finish) as per requirements.
- e. Premium Acrylic Smooth Exterior Paint over Priming coat of Exterior primer over 1 mm Cement based Putty in other buildings.

10. Door & Windows

The doors and windows shall be provided as per the requirements indicated in the finishing schedules / tender drawings / MOUD Norms for residential buildings and technical specifications. In case of variance, the decision of UPPWD/CONSULTANT shall prevail. However, the various types of Doors and Windows shall be as under:

- **Wooden**

- i. Flush doors- laminated (factory Pressed), veneered, commercial

- ii. Hardware: All hardware for doors and windows shall be of stainless steel or as specified.
- **Aluminium Works**
 - i. Doors, windows, ventilators and partitions with Powder coated aluminium extruded built up standard tubular sections/ appropriate Z sections/built up sections and/or other sections with minimum thickness of powder coating 50 micron of approved make conforming to IS: 733 and IS: 1285 as per CPWD specification.
 - ii. Hardware: All hardware for doors and windows shall be of Powder coated aluminium or as specified.
 - iii. The aluminium sections shall be infilled with hardwood insert.
 - iv. Fly proof SS wire mesh doors/ windows with Aluminium Grill (Outside) for Residential/Hostel etc. units as specified.
 - v. All the aluminium works shall be of 3mm minimum thickness.
- **Rolling Shutter (Powder Coated)**
 - i. With mechanical operation system.
- **Hermetically sealed door**
 - i. Hermetically sealed doors, also known as airtight doors, are specially engineered to create a complete barrier against the passage of air, dust, moisture, and even gases. These doors are crucial in environments where strict hygiene, contamination control, and stable air pressure are paramount. O.T. and I.C.U.
- **IR Sensor Door**

Combining safety, aesthetics, and modern automation, IR sensor operated sliding doors featuring 12mm toughened laminated glass with a frosted film on both sides offer a sophisticated and functional solution for various applications.

 - i. Touchless Operation:
Infrared sensors detect approaching individuals or objects, triggering the doors to open automatically. This hands-free operation enhances convenience and promotes hygiene, especially in high-traffic areas like commercial buildings, hospitals, etc.
 - ii. Safety and Security
 - Toughened Glass: The 12mm toughened (tempered) glass, processed by heating and rapid cooling, offers exceptional strength, thermal resistance, and, upon breakage, shatters into small, blunt pieces, reducing the risk of injury.
 - Laminated Glass: The lamination process, involving a protective interlayer, further enhances safety by preventing the glass from shattering into shards upon impact.
- **Fire Rated Doors and Partition**
 - i. All fire rated door shall be of mild steel.
 - ii. Fire rated doors of 120 minutes fire rating confirming to BS : 476 part 22 & IS : 3614 Part II . These doors shall be provided at all fire exit points, firefighting shafts, Service Duct and shafts. The MV panel room shall be provided with fire resistance wall and doors. The fire doors shall be of Metal (M.S.), as specified. The fittings such as Mortise Lock, Flush Bolts, Automatic Door Closer, Pull Handle, Fire Rated Panic exit device shall also be of 120 minutes fire rating. Smoke Seals, Acoustic Seals shall also be provided.
 - iii. Fire Resistant Glazed Doors, Windows & Partitions, as per requirements, 120 minutes fire rating shall be provided.
 - iv. The shafts and /or ducts, if penetrating multiple floors, shall be of masonry construction with fire damper in connecting ductwork or shall have fire rated ductwork with fire dampers at floor crossing. Alternatively, the duct and equipment shall be installed in room having walls, doors and fire damper in duct existing/entering the room of 120 min fire resistance rating. Such shafts and ducts shall have all passive fire control meeting 120min fire resistance rating requirement to meet the objective of isolation of the floor from spread of fire to upper and lower floors through shaft/duct work.

- v. Frameless toughened Glass Door / partitions of minimum thickness 12mm (with toughened glass) with SS Patch Fittings and fixtures.
- vi. Hermetically Sealed Sliding Lead Door
Approved Make Anti-Radiation Sliding doors are hermetically sealed doors with 2mm lead inside that comply with AERB requirements for X-Ray shielding Doors. Three-sided wall frame consists of 2mm lead lining. These Doors should withstand up to 75 Pa Pressure.

11. External Facade Treatment

a. Structural Glazing System

The structural glazing shall be provided in the Hospital/Academic/Admin Buildings etc. at required locations as per tender drawings. The glazing system shall be provided as per CPWD specifications and shall meet the GRIHA Norms to achieve minimum 3 Star Rating.

b. HPL cladding

The HPL cladding in hospital building at required location as specified in tender drawing/view. The cladding shall be fixed with the help of aluminium frame of thickness 2 mm. The joint shall be sealed with weather sealant. The HPL sheet shall be of 6 mm thickness.

- c. The Ducts shall be of openable louvers.

12. Railing and Grill Work

a. Grill Work

- i. The grills shall be provided in the windows in the hospital, academic, admin, hostels, residential and other units aluminium grill schedule.
- ii. The open drains / channels shall be covered with the MS grill.

b. Railing

The Stainless-Steel railing shall be provided in all Building, and other locations etc. as specified in the tender drawings/ finishing schedule.

13. Structural Steel

MS Ladder: Provision of suitable size MS Ladders finished with Epoxy paint as per CPWD Specification shall be provided for approach to terraces of single Storied Buildings, Munties, Lift Machine Rooms, Water Tanks, Pump Rooms etc. as per requirements.

14. Flooring

- a. In order to keep the floor finish as per Architectural drawings and to provide required thickness of the flooring as per specification, the level of top surface of deck slab shall be accordingly adjusted at the time of its centring, shuttering and casting. Alternatively, for maintaining the floor finish, grading with cement concrete with nominal mix 1:2:4 (1 cement: 2 coarse sands: 4 graded stone aggregate 10mm nominal size) shall be provided.
- b. Protective layer to be provided for all types of flooring, during construction.
- c. The edges of steps in the staircases, counters, kitchen platform, window sills, facias and similar location shall be edge moulded as required. Staircase Tread should have Anti- Skid Grooves as specified in the tender drawing or as directed by Engineer-in charge.
- d. Minimum Bed mortars for various types of flooring
 - i. Chequered tiles/stone flooring/kota stone flooring/granite flooring/ Ceramic glazed floor tile flooring/vitrified flooring - 20mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand).
 - ii. For dado, skirting and risers of steps in Chequered tiles/stone /kota stone /granite / Ceramic glazed floor tile /vitrified tiles- 12mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand).
 - iii. The vertical facia and drops shall be finished with epoxy resin-based adhesive.

e. Types of flooring

The types of flooring shall be as per finishing schedule / tender drawings. However, these are brief as under:

- i. Concrete Flooring
- ii. Kota Stone Flooring
- iii. Granite Flooring
- iv. Vinyl Flooring
- v. Vitrified Tile (Multy-Charged) Flooring
- vi. Anti-conductive and anti-static vinyl flooring
- vii. Flooring for SERVER/ EPABX/ Fire Control/ CCTV Room: - Removable raised/ false access flooring with system and its components of approved make for 300/450 mm height with possible height adjustment conforming to CPWD Specifications.
- viii. 300x300mm Anti-Skid Ceramic Tiles of min 8mm thickness.
- ix. 400x400mm Anti-Skid Pavit Pavement Tile (min 9.8mm thick) and 600x600 tactile tile in two shades (Yellow and Red) as per design
- x. Glazed Vitrified tiles Matt/Antiskid finish of size 600x600 with min thickness of 9mm
- xi. ESD
- xii. ESD Conductive Epoxy Flooring
- xiii. Tactile strips & studs
- xiv. Skirting/Dado:-
 - a. Skirting in respect of above shall be of the same material and specifications and the height as specified.
 - b. The dado work in the toilets/washroom/kitchen/pantry or as specified shall be with ceramic tiles and of height as specified.
 - c. The dado work in the lifts, entrance halls and other similar locations shall be in granite/marble stone as specified.
 - d. The dado work in the corridors of hospitals shall be as specified.



Fig 7a: Tactile Strips & studs



Fig 7b: Guard rail

15. False Ceiling

The types of false ceiling shall be as per finishing schedule / tender drawings. However, these are brief as under:

- False ceiling with Mineral Fiber Ceiling Tile.
- False ceiling with Light Weight Calcium Silicate False Ceiling Tiles.
- False ceiling with Powder coated metal false ceiling tiles (Seamless/ Perforated)
- False ceiling with gypsum board
- Gypsum false ceiling with coves lighting
- Combination of above type of false ceilings
- Under Deck Insulation System - Polystyrene Rigid Insulation Board
- Metal planks 1200x300x8 with wooden finish & strip lighting

16. Roofing

- i. The OTS, covered pathways, as per Tender Drawing, shall be covered by Polycarbonate Sheet Roofing as per requirement & technical specifications. The support structure shall be designed in MS tubular sections with suitable foundation system.
- ii. Heat Resistant Tile Flooring/ Fibre Reinforced elastomeric liquid water proofing membrane with resilient acrylic polymers to be carried on the Terrace slabs as specified

17. Panelling

The panelling shall be as per finishing schedule / tender drawings. The panelling shall be provided in the areas not limited to the following:

- i. Acoustical wall panelling
- ii. Vinyl panelling
- iii. Granite
- iv. Ceramic glazed tiles
- v. Vitrified Tiles

2400 mm high in areas mentioned in finishing schedule / tender drawings.

18. Water Proofing Treatment

- i. All items for water proofing treatment with integral cement-based water proofing treatment for Roof Slab, sunken portion, Basement, Water Tanks shall be guaranteed for TEN YEARS,

- to be reckoned from the date of expiring of the Defect Liability period prescribed in the contract.
- ii. The Water proofing treatment of terrace shall be done with Integral Cement Based water proofing treatment (brick bat coba) as per CPWD specification with Khurras, Golas etc. complete.
 - iii. Integral Cement Based Water Proofing Treatment for Roof /Sunken Floors of W.C'S/ Bathrooms etc. by applying cement slurry mixed with water proofing cement compound consisting of applying:
 - First layer of slurry of cement @ 0.488 kg/sqm mixed with water proofing cement compound @ 0.253 kg/ sqm. This layer will be allowed to air cure for 4 hours.
 - Second layer of slurry of cement @ 0.242 kg/sqm mixed with water proofing cement compound @ 0.126 kg/sqm. This layer will be allowed to air cure for 4 hours followed with water curing for 48 hours. The rate includes preparation of surface, treatment and sealing of all joints, corners, junctions of pipes and masonry with polymer mixed slurry complete as per CPWD Specifications.
 - iv. The water proofing of basement, all tanks, LINAC room, ETP, WTP, STP etc. shall be done by Chemical Injection System (Pre-Construction) as per CPWD Specification or as specified.
 - v. The work shall be got executed from the approved specialized agency.

19. Corner Guard

Corner guards, also known as wall corner trims, are essential for safeguarding vulnerable wall corners from damage caused by everyday traffic, furniture, equipment, and even playful children.

- **Damage Prevention:** Corner guards act as a shield, preventing unsightly chips, dents, scratches, and scrapes on exposed wall corners, extending the lifespan of your walls and reducing repair costs.
- **Safety Enhancement:** They provide a safety buffer, reducing the risk of injury from accidental bumps or collisions with sharp wall edges, especially in high-traffic areas or spaces with children or elderly individuals.
- **Aesthetic Enhancement:** Beyond protection, corner guards can be used as a design element, adding a finishing touch to interiors and enhancing the overall visual appeal of a space. They come in various materials and finishes to complement any decor.



Fig 8a: Corner guard

20. Pavers - Interlocking Pavers

The Interlocking pavers shall be provided in Pathways, roundabout, cycle track of required size and thickness 80 mm thick, factory made of cement concrete mix of M-30 manufactured in joint less moulds on vibrator table finished smooth as per required shape size and pattern, colour and to be laid over sub grade etc. as per the Indian Roads Congress (IRC) SP:63-2018 (or latest amendment) & CPWD specification.

21. Roadwork

All the roads are to be constructed as per IRC code and layout drawings. If any specification not available in IRC code, CPWD specification (up to date correction slip) shall be applicable. The roads shall meet the firefighting norms.

The roads shall be C.C Roads as per as per NBC/ IRC Codes and as per drawings of required width as specified. Service roads of required width from main roads to all round the buildings shall be constructed as per NBC/ IRC Codes.

Design and execution of retaining wall with RCC or Masonry / Stone Pitching shall be done as required to suit site conditions.

The EPC contractor shall provide the required sub grade and level the existing back filled earth along periphery of the plot, in the scope covering the future expansion. The necessary back filling/ cutting, if required, shall be done by the EPC Contractor. The edge slope/ gradient shall be provided as per tender drawings. The compaction of the filled back areas or otherwise shall be as per MORTH Standards and specifications.

All the roads camber, super elevation, semi - circle, circle & gradient etc. are to be kept with respect to road levels decided in road sections and as per IRC code. Wherever cross drainage or for other purposes culverts are required, sufficient levels of road are to be raised with proper gradient to provide the sufficient depth of culvert. The width of W.B.M is to be kept sufficient to rest the kerb stone. Wherever box culverts are required the same shall be designed and provided as per I.R.C code.

Road / Parking marking as per MORTH / IRC standards shall be done. All the road markings etc. shall be provided as per traffic rules.

Footpaths connected to buildings plinths shall be provided with proper gradient, with masonry toe walls and MS/SS bollards as specified. All footpath levels shall be 150 mm higher than road edge/green belt/ cycle track levels or as specified.

22. External Sewer Work

The external sewer line (building sewer) shall be laid from the building to the point of connection with the STP along the shortest practicable route, maintaining proper alignment and gradient so as to achieve self-cleansing velocity. The minimum diameter of the sewer pipe shall generally not be less than 100 mm, and the slope shall be designed based on pipe size and discharge to ensure efficient flow without deposition. The pipes shall be laid on a properly prepared bed with a min. 100 mm thick concrete base of cement mortar of 1:5:10 extending at least 150 mm on either side and Haunching all around the pipes with concrete of cement mortar of 1:5:10. to provide uniform support and protection.

The sewer shall be laid at a sufficient depth to avoid damage from external loads and to match the invert level of the receiving sewer. Inspection chambers or manholes shall be provided at changes in direction, gradient, or at junctions, and at suitable intervals to facilitate maintenance and cleaning. The system shall be constructed using durable, watertight materials conforming to relevant standards, with properly sealed joints to prevent leakage or infiltration. Separate systems shall be provided for sewage and stormwater drainage wherever required, and the connection to the public sewer shall be made in a manner that prevents backflow and ensures smooth discharge.

23. External Water Supply Work

The external water supply line shall be laid from the UGT or distribution main to the building along the shortest practicable and properly planned route, with pipe diameter designed based on peak water demand and pressure requirements, and the pipes shall be of approved, durable, corrosion-resistant and non-toxic materials conforming to relevant Indian Standards, with leak-proof and properly tested joints. The pipeline shall be laid at an adequate depth below ground level to prevent damage from traffic loads and environmental effects, and shall be provided with suitable bedding of a min. 100mm thick concrete

base of cement mortar of 1:5:10 and Haunching all around the pipes with concrete of cement mortar of 1:5:10.

The water supply line shall be laid at a safe horizontal and vertical distance from sewer or drainage lines to prevent contamination, and where crossing is unavoidable, the water pipe shall be laid above the sewer line with adequate protection. Proper valves, such as stop valves, sluice valves, and non-return valves, shall be provided at suitable locations for isolation, control, and maintenance, along with provision for inspection and access. The system shall be designed to maintain adequate pressure and continuous supply, prevent leakage and wastage, and ensure hygienic conditions throughout, including protection against backflow and contamination.

24. Deep Tubewell with Boring

A deep tubewell of 750 mm nominal bore with a minimum depth of 250m shall be constructed by rotary drilling method up to the designed depth tapping a suitable aquifer, using drilling mud to stabilize the bore, after which a well assembly comprising heavy-duty UPVC casing pipes and properly designed slotted screen pipes shall be installed centrally in the borehole, with the screen portion placed against the water-bearing strata; the annular space around the screen shall be packed with properly graded gravel to prevent sand ingress and improve yield, while the upper annular space shall be sealed with clay or cement grout to prevent surface contamination.

The well shall be developed by air-lifting, surging, and pumping until sand-free clear water is obtained and the required discharge is achieved, and it shall be tested to confirm a safe yield of not less than 800 LPM. A suitable submersible pump set of 800 LPM capacity, with appropriate head and efficiency, shall be installed within the well with column pipes, NRV, and necessary electrical controls, ensuring proper alignment and vibration-free operation. The top of the well shall be finished with a sanitary well cap, platform, and drainage arrangement, and the entire system shall include necessary fittings, valves, and protection measures to ensure reliable, hygienic, and continuous water supply for the campus.

25. Barricading Work

Providing and erecting min 4.00-metre-high temporary barricading at site; each panel of size 2.50 m x 2.00 m made of 40x40x6 mm angle iron or 50x50x3 mm hollow MS tube posts/horizontal members/bracings covered with 1.63 mm thick MS sheet. The sheet shall be fixed with 30x5 mm MS flat by suitable welding/riveting. The panels shall be made so that gap of 50cm above the ground is available making overall height as 2.5 m. MS channel ISLC 75 @ 5.70 kg/m, 50 cm long shall be provided at the bottom having oval shaped holes of size 50x25 mm at both ends with 50 cm long MS angle 40x40x6 mm bracing. Suitable arrangement shall be made to fix the barricading to avoid from overturning by providing 250 mm long expansion fasteners at both ends. The work shall be executed as per drawing/direction of Engineer-in-Charge which includes writing and painting, arrangement for traffic diversion such as traffic signals during construction at site for day and night, glow lamps, reflective signs, marking, flags, caution tape as directed by the Engineer-in-Charge. The barricading provided shall be retained in position at site continuously including shifting of barricading from one location to another location as many times as required during the execution of the entire work till its completion. The barricading shall not be removed without prior approval of Engineer-in-Charge.

26. Scaffolding Net

Scaffolding net of required width made of high-density Polyethylene UV stabilized knitted on warp knitting machines having density 100 gram / sqm and shading coefficient minimum 75% shall be provided around the construction site/ for vertical extension as per requirement including fastening/tying with building/scaffolding pipes or with any other fixtures etc. complete as per direction of Engineer-in-Charge.

27. Boom Barrier

The Contractor shall design, supply, install, test, and commission a heavy-duty electromechanical boom barrier system complete with all accessories, suitable for institutional traffic control at entry/exit gates of a medical college campus, ensuring reliable and continuous operation under intensive use.

The boom barrier shall be of electromechanical type with a robust powder-coated or galvanized steel housing, corrosion-resistant and weatherproof construction suitable for outdoor installation, and shall be equipped with an aluminium boom arm of up to 6 metres length, complete with reflective strips and optional LED lighting for enhanced visibility during night and adverse weather conditions.

The system shall be driven by a high-performance motor with integrated gearbox mechanism designed for smooth, noiseless operation and shall be capable of handling high-frequency cycles with a minimum operational life of 1 million cycles. The opening and closing time shall not exceed 3 to 6 seconds, depending on boom length and configuration.

The boom barrier shall operate on 230V $\pm 10\%$, 50 Hz single-phase AC power supply and shall be provided with a microprocessor-based control unit with programmable logic for operational settings. The system shall include essential safety features such as torque adjustment, anti-crush protection, auto-reverse function, and manual override facility for emergency operation during power failure.

The barrier shall be equipped with infrared/photoelectric safety sensors to prevent accidental closure on vehicles or pedestrians, along with LED flashing indicators and audible alarm system during operation.

The scope shall include all necessary accessories such as control panel, mounting accessories, limit switches, safety sensors, signal lights, remote controls, power cables, junction boxes, earthing arrangements, and all required interfacing components for complete functionality.

PLUMBING DESIGN BASIS REPORT

(WATER SUPPLY AND SANITARY INSTALLATION)

1. General

The EPC Contractor shall carry out Design, Engineering, Supply, Installation, testing & commissioning for Plumbing (Hydro pneumatic Water Supply and Sanitary Installation System). The work shall in general conform to the latest CPWD Specifications. The water supply and sewerage demand shall be estimated, based on the population as required by Latest NBC norms, Local bye Laws & statutory norms. The different components related to services are listed as below:

-

1.1. Internal Plumbing Works

- i. Sanitary fixtures, C.P brass fittings & PTMT Fittings.
- ii. Soil, waste & rain water piping system.
- iii. Internal domestic and flushing water supply system.
- iv. Disposal of soil, waste & rain water pipe to 1st manhole/catch basin.

1.2. External Water Supply System

- i. The water supply to the campus shall be met from the local Municipality/Authority and/Tube Wells/ Bore wells or from the STP treated Water Supply (For Flushing & Landscaping only). The tube wells /Bore wells have been provided, meeting the requirements covering the scope of construction, in the scope of work.
- ii. Providing hydro pneumatic water supply distribution network system of the campus.
- iii. Storage of Water
- iv. Hydro pneumatic Distribution System

Note – External water supply pipes shall be laid on a min. 100mm thick concrete base of cement mortar of 1:5:10 and Haunching all around the pipes with concrete of cement mortar of 1:5:10.

1.3. Sewerage System

- i. The sewerage system shall be planned from each & every building up to the sewerage Treatment Plant/Effluent Treatment Plant. Separate system shall be provided for effluent discharge to the Effluent Treatment Plant.
- ii. The sewer generated from the buildings shall be fed into the sewage treatment plant.
- iii. Treated Effluent from Effluent treatment plant will be fed to equalization tank of sewage treatment plant

Note – External Sewerage pipes shall be laid on a min. 100mm thick concrete base of cement mortar of 1:5:10 and Haunching all around the pipes with concrete of cement mortar of 1:5:10.

1.4. Storm Water Drainage System

Collection and conveyance around the proposed buildings & its disposal system.

Note – External Storm Water Drainage Pipes shall be laid on a min. 100mm thick concrete base of cement mortar of 1:5:10 and Haunching all around the pipes with concrete of cement mortar of 1:5:10.

1.5. Garden Hydrant System

External garden hydrant system to supply the water for horticulture purpose to all landscaping/green area around the buildings

2. Basic Objectives

The basic objective is to provide all sanitary engineering services and specification in relation to:

- i. High standards of materials and workmanship.
- ii. Leak proof plumbing.
- iii. Reliable and dependable engineering systems.
- iv. Plan the system in such a way as to minimize the energy requirements.
- v. Create minimum nuisance and disturbance to the environment.

3. List of Codes and Manuals

The following codes of practice and design manuals are being referred for designing the Sanitary Plumbing:

- i. National Building Code 2016 PART-9 (PLUMBING SERVICES, SECTION-1 WATER SUPPLY)
- ii. Hand Book on Water Supply & Drainage (with Special Emphasis on Plumbing), Bureau of Indian Standards SP-35
- iii. Manual on Water Supply & Treatment (Ministry of Urban Development)
- iv. Manual on Sewerage & Sewage Treatment (Ministry of Urban Development)
- v. CPWD Specifications.

4. Design for Water Supply/Waste Water Distribution System

For continuous water supply at adequate pressure, complete water supply system is designed with following type of pipe-lines.

- 4.1.** The main water supply lines from underground tank to the building shall be connected with the designed water supply pipes from the shaft inside the floors, concealed piping and to other end points shall be of CPVC and shall be fixed in clay bricks/fly ash masonry chambers as per specification.
- 4.2.** Water supply pipe from buildings to overhead tanks, ring main at terrace, down take from ring mains (in the shaft) up to the entry into the floors shall be with CPVC. The water supply pipes from the shaft inside the floors, concealed piping and to other end points shall be of CPVC. To regulate the water supply, valves and fittings, at required places, shall be fixed as per specification.
 - Lavatory Basins available in all size and shapes including wall hung, over or under counter types etc. as per IS: 2256 (Part 7) 1995.
 - Urinals shall be provided as per IS: 2556 (Part 7) 1995.
 - Laying of these pipe lines up to building shafts shall be underground and in shafts, supported with standard clamps up to the overhead's tanks complete as per specification.
- 4.2.** Storm water pipe/Rain water pipe from inside the building to the 1st manhole outside the building shall be of UPVC of required grade/class, 6kg/sq.cm pressure rating conforming to relevant IS codes. The network system from 1st manhole onwards shall be NP2 pipes as required.
- 4.3.** Irrigation water pipe shall be of CPVC for any dia/size.
- 4.4.** Soil/ Waste water pipe from building to 1st manhole shall be UPVC SWR pipes. From 1st manhole till STP, pipe shall be of NP-2 Pipe of required grade and class.

5. SANITARY WORKS

- 5.1.** Sanitary Fixtures, C.P Brass & SS Fittings, & PTMT Fittings Plumbing fixtures, Chrome Fittings and accessories will be as per IS: 781-1984 & IS: 763:2000

Soil, Waste Pipe System

1. General: -

- Above ground piping shall be designed on the basis of two pipe system as recommended in code of practice for soil and waste. Soil pipes shall carry the wastes from WC's & urinals etc. Soil pipes

shall connect directly to the 1st manhole outside the building.

- All vertical stacks will be installed in pipe shafts on the external face of the buildings or in internal shafts within the building according to the architectural planning of the toilets.
- Provision has been made to provide cleanout doors and plugs for Roding and maintenance where necessary and required.
- All shafts / ducts carrying service lines shall be provided with access platforms / ladders for easy maintenance.

Materials for Soil, Waste & Vent Pipe System

Pipes used for Soil, Waste and Vent system shall be **110mm dia UPVC (SWR)** pipes single socketed with necessary fittings like bends, shoes, offsets etc., and fixtures like clamps hook etc., the pipes are laid in trenches/floors/walls etc., complete.

6. Sewerage System

6.1 Design Parameters

a) Velocity		
Minimum velocity at peak	=	0.61 m/sec
Maximum velocity at peak	=	2.40 m/sec
b) Peak Factor	=	3 times the average flow
c) Interception factor	=	0.80
d) Manning Constant	=	0.010 (for C.I. Pipes) 0.011 (for Plastic pipes)
e) Design Equation	=	Manning Equation
6.1.1.Flow conditions in pipe		
Pipes up to 300 mm dia	=	50% full running
Pipes from 400-900 mm dia	=	67% full running
6.1.2.Min. depth for sewers		
For branches	=	1 M
For lateral, main & trunk sewers		

a) Type of Distribution

Sewer flow shall be by gravity up to the final disposal point. The external sewer shall be connected to centralized sewage treatment plant.

b) Kitchen Effluent

Kitchen waste shall be passed through grease trap / oil separator before discharging in to the external sewer line.

c) Manholes

The manholes are to be constructed with brick masonry as per standard specifications of NBC 2016 and shall have details as follows:

- Rectangular manhole of size 900 x 800 mm upto 0.89 mtr depth.
- Rectangular manhole of size 1200 x 900 mm from depth upto 0.9mtr to 2.5mtr depth.
- Circular manhole of size 900 mm dia for 0.9 to 1.65 mtr depth.
- Circular manhole of size 1200 mm dia for above 1.65 to 2.30 mtr depth
- Circular manhole of size 1500 mm dia for above 2.3 mtr depth.

The pipe of manhole to S.T.P shall be NP-2 pipe network, as per requirements.

d) Spacing of Manholes

- Manhole shall be provided with all the junctions, change of directions, change in diameters and as per connection requirement from every unit.
- A distance of 20 meters (maximum) on the main sewer line depending on dia of pipes and local conditions.

a. Manholes Covers

- Medium duty S.F.R.C. manhole covers for manholes on service roads, gully traps and manholes / chambers not following in the road / pedestrian ways/side berms / lawn area.
- Heavy duty S.F.R.C. manhole covers for manholes /service chambers / gully traps falling on main roads & service roads.
- Shape and dimensions of Manhole covers shall conform to CPWD specifications & IS 12592

b. Treatment of Sewage

Treatment of sewage shall be through the sewage treatment plant, the details for the same are specifically indicated hereinafter.

7. Storm Water Drainage System**7.1. Planning of Storm Water Drainage System**

- The rainwater from the open surface areas, as per design, shall be collected in the clay brick masonry chambers, collection chambers and shall be taken through the internal rain water system (UPVC Pipe) & ultimately connected to the main storm-water open drainage system along the periphery and finally dispose to Local Municipal Drain.
- The network of storm water system shall be mostly catch basins and RCC NP2 Pipes / uPVC pipe network, as per requirements.
- All paved/road/green areas, the run off shall directly connected to the main storm water drains. Irrigation system for lawns and gardens
- The rainwater from the terraces of building shall be collected in catch basin and to be disposed of in Rainwater Harvesting Pits.

7.2. Design Parameters

- The rainfall intensity of 100 mm/ hr is considered for designing of system for Rain Water Harvesting Recharge Pits.
- Minimum Pipe diameters for Rain Water Pipes from Terraces shall be 110 mm and 75mm diameter Pipes for Balcony Rain Water.
- Min. Pipe diameters for main storm water drain will be 150 mm dia in line with local authority

requirements.

- All construction specifications with respect to the manhole sizes etc. will be respected and followed and as per CPWD specification, NBC-2016 Part 9 (Plumbing Services) and Hand Book on Water Supply & Drainage (with Special Emphasis on Plumbing), Bureau of Indian Standards SP-35.
- The complete campus storm water drainage system for UPPWD / CONSULTANT designed with uPVC pipes, RCC open drain with cover system, clay brick masonry chambers and manholes etc.

8. Irrigation system for lawns and gardens

Gardens and **lawns** shall be irrigated in combination of Garden Hydrant System and Sprinkler Irrigation System.

8.1. Garden Hydrant System, Network System

- It is proposed to provide a separate and independent captive garden hydrant system to supply water for horticultural operations to all landscaped areas.
- The distribution grid for garden mains will be by a separate grid of G.I. pipes and connected to a separate pumping set obtaining its water supply from STP.
- The all the piping for garden hydrant shall be with G.I. pipes.
- Garden hydrant points will be of 25 mm outlets and located approximately 45-50 m apart.
- The garden hydrant pumping system is proposed to be planned so that the grid is sized to cater for a maximum of 6 outlets operated at the same time.

8.2. Sprinkler Irrigation System, Network System

- Sprinkler Irrigation is a method of applying irrigation water which is similar to rainfall. Water is distributed through a system of pipes usually by pumping. It is then sprayed into the air and irrigated entire soil surface through spray heads so that it breaks up into small water drops which fall to the ground.
- Sprinklers provide efficient coverage for small to large areas and are suitable for use on all types of properties.
- It shall be designed to ensure maximum water saving, combining high quality, affordability and ease of installation. All the products are made out of high strength & chemical resistance engineering plastics to achieve functional satisfaction and to maintain cost economics.
- All sprinklers undergo extensive quality testing in our well-equipped state of the art lab. Performances of the products shall also be tested, as per relevant specifications, in the field to ensure uniform water distribution and higher efficiency.

9. Tube-well/Bore well Pump and Pumping System

- The pumps shall be vertical, submersible, multistage centrifugal, stainless steel (304) casing, Bronze impeller, stainless steel (316) shaft, ceramic bearings, tungsten carbide shaft protection bushes and mechanical seal driven suitable rated motor with 1500/2900 RPM, $415 \pm 10\%$ Volts, 50 Cycles, AC 3 –phase Each pump shall be capable of operating within a performance pressure characteristic range sufficient below and above the required working pressure.
- The Pump shall conform to Indian standard IS: 8034.
- Pumps and motors shall be mounts on a common MS structural base plate.
- The pump shall be water cooled coupled to induction motor of suitable H.P and R.P.M specified in schedule of quantities.
- Pumping set shall be provided with a Gun Metal “Burden” type pressure gauge with gunmetal isolation cock and connecting piping.

- The pump set shall be provided with gun metal gate valve of appropriate sizes on delivery. & non-return valve of appropriate size and a pressure gauge with cock shall be provided on the delivery line.

10.Under Ground/Overhead Water Storage: -

The storage capacity of Underground water tanks shall be equal to minimum one day requirement in the case of Domestic/ Irrigation Water Tank. The Over Head Tanks at Terrace level shall be one day / half day capacity. The storage capacity of firefighting tanks shall be as per NBC Code or as per specific provisions of this DBR in the respective head. Internal walls and floors of all underground and overhead water storage tanks are to be finished with Kota Waterproofing Tiles.

Source of Water supply

- The main sources of raw water are from the Municipal Supply/Bore wells. From the surrounding environment it is noted that the bore-wells shall, generally be more than 60 meters in depth with blind and strainer pipes as per CPWD specifications. The yield shall be minimum 80,000 liters per day (considering 10 hrs. operation per day) per bore well. Accordingly, 2 nos. bore wells are sufficient (01 Bore well for Medical College Campus & 01 Bore well for Hospital Campus). These shall be as per detailed design distribution and requirement at different Zones at the location of bore wells as marked in Layout Plan subject to the confirmation by CGWB by the Contractor at his own cost. MS Pipes & fittings are to be used in bore well as per CPWD specifications and G.I. pipes / CPVC Water supply pipes & fittings with necessary gate valves area to be provided as per requirements from bore wells to the partially over/underground tanks.

Pumps & Water Treatment Equipment

- It is proposed to provide all type of pumps including that for filter feed pumps, domestic water supply pumps, flushing water supply pumps (For flushing pumps will be installed in STP), make up pump to STP treated tank from raw water (in case of failure/maintenance of STP), Plant Room Sump Pump etc. catering to All Buildings.
- Suitable size Sumps with sufficient sized submersible pumps & level indicators to be considered in plant room for drainage. Also, proper slope to be provided in Water Treatment Pump room so that there is no stagnancy of water during any leakage & it is properly channelized to nearest drainage sump.
- Sumps with sufficient sized submersible pumps & level indicators to be considered in basement (Court Building) for drainage. Also, proper slope to be provided in Basement (Cour Building) so that there is no stagnancy of water during any leakage & it is properly channelized to nearest drainage sump.

Water Supply System

Water requirements has been estimated on the basis of present acceptable standards, References from various sources such the National Building 2016 Code of India, Public Health Manuals, Ministry of Environment, Forests Guidelines, and CPWD Specifications etc.

Water Demand Projection

Water estimation, storage, distribution shall be considered only for the buildings/developments under the scope of work and not for buildings planned for future expansion.

As per the estimated population and water demand norms discussed above, Total water demand for Construction of Autonomous State Medical College Ballia has been estimated as below

Medical College Campus-

- 400 KLD UG TANK (100 KLD for Fire & 300 KLD for domestic use)
- 250 KLD STP

Hospital Campus-

- 300 KLD UG TANK (200 KLD for Fire & 100 KLD for domestic use)
- 100 KLD STP
- 30 KLD ETP

It may be noted that the loads and demands are indicative only and may vary as per actual requirements.

STP Treated Water shall be use for gardening.

The Tank Details (OHT & UG sumps) & capacity given as above & elsewhere in Tender documents are minimum to be provided by the EPC Contractor. During detailed designing, if required and found necessary, the capacity / rating of the equipment/tank may be upgraded subject to concurrence of Engineer-In-Charge.

Water meters for measuring water consumption for various purposes like irrigation, flushing, at source, to make up water etc. needs to provided I line with GRIHA requirements & as per directions of E-I-C.

Pump/ Motor placed on Terrace /open area should be weather proof type & required size of canopy also needs to be provided.

All pipes should be placed at fixed support. Pedestals at suitable distance to be provided as per requirements & directions of E-I-C.

Level sensors /switches to be provided for UG sumps/O.H.T.s & to be hooked up to BMS as per requirements & directions of E-I-C.

Sizing of Pumps: -

The Flow Rate of Pumps shall be suitably selected to meet each building's water demand & of Sufficient Head depending upon Building Height, Pipe Friction losses, Bends etc. and other relevant Site Conditions. One Standby Pump to be considered in each & every variant. The Pumps shall be sized so as to ensure approximately 4 hours (2 hrs Morning & 2 hrs Evening) of operation time (approx.) to fill the overhead tanks.

11. SEWAGE TREATMENT PLANT (MBR Technology):

Sewage Treatment Plant of **350 M³/day (Medical College Campus - 250 M³/day + Hospital Campus - 100 M³/day)** shall be provided.

INFLUENT /TREATED EFFLUENT CHARACTERISTICS:

a) Raw Sewage (Before Treatment) Characteristic/Parameter (Assumed)		
PH	:	6.5 – 8.5
BOD5	:	250 – 300 mg/l
S. Solids	:	200 – 250 mg/l

COD	:	600 – 700 mg/l
Oil and Grease	:	Up to 50 mg/l
b) Treated Effluent (Before ultrafiltration treatment) Characteristic/Parameter		
PH	:	6.0 – 8.5
BOD5	:	Less than 10 mg/l
S. Solids	:	Less than 10 mg/l
COD	:	Less than 60 mg/l
Oil and Grease	:	Less than 2 mg/l
c) Effluent Discharge Standard after ultrafiltration treatment		
PH	:	6.0 – 8.5
BOD5	:	Less than 5 mg/l
S. Solids	:	Less than 2 mg/l
COD	:	Less than 30 mg/l
Oil and Grease	:	Less than 2 mg/l

The Waste Water Treatment System will be treated using an Extended Aeration with activated sludge process/technology followed by Ultrafiltration System consisting of following components:

Component – I [Pre-Treatment]

- a) Screen Chambers.
- b) Oil & Grease Removal Chamber
- c) Collection cum Equalization Tank
- d) Non-clog type submersible sewage transfer pumps
- e) Waste water transfer pump (Bypass Pump) from Equalization tank to municipal sewer in case of Maintenance of STP
- f) Distribution Box.

Component – II [Secondary / Biological Treatment]:

- a) Bio reactor
- b) Settling Tank
- c) Treated Effluent Tank cum Filer feed tank
- d) Sludge Disposal Tank
- e) Centrifuge Feed Pumps
- f) Centrifuge

Component – III [Tertiary Treatment]:

- a) Filter Feed pump
- b) Multigrade Pressure Sand Filter
- c) Softener Feed Pump
- d) Water Softener and brine tank
- e) Irrigation Water Storage cum Flushing water storage Tank
- f) Irrigation Water Transfer Pumps (VFD Based)

- g) Flushing water lifting pump (VFD Based)
- h) Ultrafiltration system complete with U/F Feed Pumps, U/F Backwash Pumps, Cartridge Filter, U/F Modules
- i) Soft Water Storage Tank
- j) Soft Water Lifting Pumps

12. WATER DEMAD CALCULATION:

S.No.	Building Name	Unit	Occupancy	LPD	Domestic	Fire
I	MEDICAL COLLEGE CAMPUS					
1	Academic Building (B+G+6)	1	500	45	22,500.00	50,000.00
2	Administrative Building (B+G+4)	1	500	45	22,500.00	1,00,000.00
3	Multipurpose Hall (G+1)	1	525	45	23,625.00	1,00,000.00
4	Guest House (G+1)	1	40	135	5,400.00	
5	Senior Resident Hostel (G+8)	1	55	135	7,425.00	
6	Principal Residence (G)	1	7	135	945.00	
7	Junior Resident Hostel - Boys (G+5)	1	35	135	4,725.00	
8	Junior Resident Hostel -Girls (G+3)	1	25	135	3,375.00	
9	U.G. Boys Hostel (G+9)	1	310	135	41,850.00	
10	U.G. Girls Hostel (G+7)	1	190	135	25,650.00	
11	Intern Boys Hostel (G+6)	1	70	135	9,450.00	
12	Intern Girls Hostel (G+4)	1	50	135	6,750.00	
13	Intern Nurses Hostel (G+5)	1	60	135	8,100.00	
14	Type-II Residence (S+10)	40	5	135	27,000.00	
15	Type-III Residence (S+10)	40	5	135	27,000.00	
16	Type-IV Residence (S+10)	20	6	135	16,200.00	
17	Type-V Residence (S+5)	10	6	135	8,100.00	
18	Electric Sub Station (G)	1	1		500.00	
					2,61,095.00	1,00,000.00
	Add 10% for future load				26,109.50	
	Total Water Demand				2,87,204.50	
[A]	UGT REQUIRED			SAY	3,00,000.00	1,00,000.00
				SAY	400 KL (300 KL for Domestic + 100 KL for Fire)	
[B]	STP					
	85% of Total Water Demand				2,44,123.83	
				SAY	2,50,000.00	
				SAY	250 KLD	

II	HOSPITAL CAMPUS					
1	Hospital Building (2B+G+10)	1	220	450	99,000.00	2,00,000.00
	Total				99,000.00	2,00,000.00
[A]	UGT REQUIRED			SAY	1,00,000.00	2,00,000.00
				SAY	300 KL (100 KL for Domestic + 200 KL for Fire)	
[B]	STP					
	85% of Total Water Demand				84,150.00	
				SAY	1,00,000.00	
				SAY	100 KLD	

SERVICES DESIGN BASIS REPORT

- ELECTRICAL-HT, LT
- EXTRA LOW VOLTAGE(ELV) SYSTEM
- AIR CONDITIONING SYSTEM
- LIFT
- PRESSURIZATION AND MECHANICAL VENTILLATION
- EMERGENCY LIGHTING AND SIGNAGES
- FIRE FIHTING DETECTION AND ALARM
- MODULAR OPERATION THEATRE
- MEDICAL GAS PIPELINE
- CSSD & LAUNDRY EQUIPMENTS

ELECTRICAL & ELV DBR COVERS:

1. GENERAL
2. SCOPE OF WORK
3. ELECTRICAL POWER REQUIREMENT
4. SOURCE OF POWER SUPPLY SOURCE
5. ELECTRICAL SAFETY
6. ELECTRICAL POWER DISTRIBUTION
7. GAS SUPPRESSION SYSTEM
8. EARTHING NETWORK
9. LIGHTNING PROTECTION SYSTEM
10. INTERNAL ELECTRIFICATION, LV & ALLIED WORKS

EXTRA LOW VOLTAGE

- 1.AUDIO VIDEO SYSTEM
- 2.COMPUTER LAN DATA NETWORKING & WIFI SYSTEM
- 3.IPBAX SYSTEM
- 4.SECURITY AND SURVILLANCE SYSTEM
- 5.INTEGRATED BUILDING MANAGEMENT SYSTEM

ELECTRICAL

1. GENERAL

The EPC Contractor shall carry out Design, Supply, Installation, Testing & Commissioning of complete Internal & External Electrification works including Low Voltage (LV) and other works as required for smooth functioning of the Autonomous State Medical College Ballia U.P. All Electrical & LV works shall be executed as per latest codes of practice for Electrical installations and meeting the requirements of Indian Electricity Rules/Act, applicable I.S. Codes/ Rules and relevant IS, CPW& NBC Specifications, and special requirements, if any latest up to date.

The rating and capacity of equipment indicated herein below are minimum to be provided. However, during detailed designing, if required and found necessary, the capacity / rating of the equipment may be upgraded by the EPC Contractor& CPWD specifications.

2. SCOPE OF WORK:

- Electrical & Allied Services required for proposed Autonomous State Medical College Ballia U.P covers
- Electric Sub Stations,
- DG Set Installation work,
- Internal Electrical Installations,
- HT/ LT Panels, Distribution Boards,
- External Electrical Installations,
- 33 kV/ 0.433 kV Substation,
- HT and LT Cables,
- Road/ Compound/ Facade Lighting, Solar Lighting Poles,
- Emergency Lighting & Illuminated Signages,
- UPS system,
- Internal & External Electrical Distribution work.
- Solar PV generation station,
- IP-based Telephones System (IPBAX),
- LAN Networking & Wi-Fi System,
- CCTV System (Internal & External),
- Integrated Building Management System
- Fire Alarm System,
- IP Based Public Address System,
- VRV/VRF System,
- Lifts,
- Audio Visual System
- Modular Operation Theatre
- Medical Gas Pipeline
- Nurse Calling System
- CSSD
- Laundry Equipment's
- Pressurized Mechanical Ventilation and Fresh Air System
- STP, ETP, WTP, Pumps
- EPC contractor has to provide 5% of EV fast charging station/ suitable rated Industrial sockets for EV charging of total parking in parking area as per GRIHA-3 Star minimum. Etc. all other necessary services to run smoothly a medical college including hospital

3. ELECTRICAL POWER REQUIREMENT:

- The Electrical Load requirement has been calculated on the basis of covered area/ actual requirements of various areas as per NBC 2016.
However, loads for the VRF System, Lifts, Pumps, External Lightning, STP, and WTP etc. has also been taken in to account.
Thus, Calculated Electrical Demanded Load shall be 6500 KVA Approx. for both campuses approx.

4. SOURCE OF ELECTRICAL POWER SUPPLY:

The State Govt. DISCOM shall provide electric supply on 33 KV for meeting electrical load requirements of proposed campuses separately from nearby Grid Substations with 2 no. 33 KV Independent Feeder Lines. 33 KV power shall be stepped down to 433V and distributed through MV panel to various Loads.

5. ELECTRICAL SAFETY: -

The EPC Contractor shall have to insure and required to execute the entire Electrical & Allied Services confirming BIS Code No. 5216: 1982 (Code of Safety Procedures and Practices in Electrical Works).

6. ELECTRIC POWER DISTRIBUTION

The Electrical Power Distribution for electric supply shall be as detailed below.

- General Wiring & Conduiting - PVC Conduits HMS IS: 9537: PART 3, ELV- M.S. for ELV.
- Indoor/Outdoor type Compact Aluminium Sandwich Bus Duct of suitable capacity with 2 Run earth strips shall be provided from Transformers and DG Sets to Main LT Panels, Capacitor Panels & Other Panels in ESS Room.
- Adequate runs of XLPE insulated Armoured Aluminium/Copper conductor cables shall be laid from Main LT Panel to LT Panels and feeder pillar of individual buildings & blocks.
- Each distribution system shall be with Electrical panels, sandwich Rising Mains, Floor panels, Double door MCB Type DB's, VTPN DBs etc.
- Various LT Panels & UPS panels shall be interconnected with each other with suitable change over switches / Bus coupler etc.
- Various buildings as required shall have a LT room/space to receive power from the substation through armoured cable and distribute power to the entire building through a Main LT Panel located in the LT room.
- Each building shall have suitable Nos. of Ducts for Rising Mains catering to loads of Lighting, VRF equipment, Power, Medical Equipment, and UPS etc. connected to Main LT Panel, as applicable.
- Each Rising main will have Tap off at every floor, feeding the floor panels with incoming & outgoing MCCBs of required capacities and numbers feeding the double door DBs/VTPN dbs. Each Rising Mains must have double Earth Strip running from bottom to top.
- Sub mains from floor panel to DBs shall be connected with armoured cable on surface/cable tray.
- Hot Dip Galvanized Perforated Type / Ladder Type Cable trays of suitable size with perforation not more than 17% shall be provided as required in all the buildings.
- The power cabling shall be sized so that the distribution losses do not exceed 3% (in terms of %voltage drop) of the total power usage in buildings. Voltage drop for feeders shall not exceed 2% at design load and for branch circuit; it shall not exceed 3% at design load as per ECBC norms.
- All Outgoing in main LT, HT and Bundling Panel must have Multifunction meter with CL 1.0 CT and indication lamp.
- Gas Based fire suppression system shall be provided in main LT, HT, Lifts, Server, Record Room, UPS& FAP Panel.
- All LT Panel shall be compatible for Grid Connected Roof Top Solar System.

SUB-STATION, 33/ 0.433 kV- 2 Nos.

MAJOR ELECTRIC SUB-STATIONS EQUIPMENTS FOR EACH ESS

- a) 5 Nos. 1250 KVA 33 /0.433 KV Transformers with coupling of existing transformer of existing substation.
- b) 3 Nos. 750 KVA 433 V Prime Power DG Sets CPCB-IV + synchronization with existing DG.
- c) UPS 760 KVA (200+50+350+160) (K-13 Isolation Transformer cu.) Modular System with 30 Min Backup.
- d) Solar Photovoltaic Power System 330 Kwp. with SCADA, Workstation & Weather Monitoring System.

Two Nos. Electrical Sub-station for Academic Campus and Hospital Campus will be separately provided to meet all power requirement.

Electric Sub Station shall be provided with Indoor Type HT & LT Switchgears & Outdoor Type Transformers and will consist of 33 KV Panel Board (Indoor), Oil Filled Distribution Transformers, 5 X 1250 KVA – Outdoor type, 415 V DG Sets (Outdoor), indoor/ outdoor Sandwich bus-ducts, LT Switch Board, DG load sharing Panel, Hybrid Capacitor-cum-Harmonic Panels, HT/LT power cables, control cables and all other items/accessories as required. DG Sets shall be of capacity 3 X 750 KVA. DG Sets shall be 415 V, Radiator Cooled Silent type housed in weather proof acoustic enclosure. The Transformers shall be connected to Main LT Panel through suitable size indoor/outdoor sandwich bus ducts in the substation. DG Sets shall be connected to DG load sharing Panel through suitable size indoor/outdoor sandwich bus ducts. Further DG load sharing Panel shall be connected to Main LT Panel through suitable size indoor/outdoor sandwich bus ducts. All outdoor sandwich bus ducts shall be minimum IP-54, weather proof with suitable canopy. DG load sharing Panel shall have suitable control relays for auto/manual start stop, auto load management and auto load sharing. Main LT Panel shall have suitable relay for auto changeover. Also, DG Sets shall have DG controller of latest version for auto & manual start/ stop, auto changeover, auto load management and DG PLC based load sharing etc. For this purpose, suitable armoured copper control cables shall be provided between Main LT Panel, DG load sharing Panel & DG Sets.

The losses of the 33/0.433 kV Transformer shall be as per latest ECBC Norms for achieving minimum GRIHA 3-star rating.

33 KV HT Panel shall have suitable No Incomers, 1 No Bus coupler and suitable Outgoing Feeders. 33 KV HT Panel shall be provided with suitable VCB mounting trolley (1 No) for service and maintenance purpose. one HT Outgoing will be given extra as spare in each ESS.

33 kV Panels will be provided with tinned Copper material bus bar.

EPC contractor shall conduct fault calculation study for the project and determine the fault rating at different levels, i.e., at 33kV Panel in substation, at 415 side of transformer, at LT panel incoming & outgoings, at incoming panels of various buildings etc.

All necessary Electrical parameters of Multifunction Meters (i.e. Voltage, current, Frequency, KWH, KVA etc.) and status of Numerical Relays provided in 33 KV HT panel, Main LT Panel, Hybrid Capacitor Panels, HVAC Panels and main LT Panels of all buildings. Necessary control, communication cables for this purpose shall be provided.

HT Panel shall conform to be as per IEC-62271.

Panel Bus Bar current rating shall be provided at 25% higher current rating (minimum) of the highest current rating of Incomer Breaker of the panel.

20% spare terminal blocks shall be provided for motor starter feeders and control wiring purpose in the panel.

Electrical Panel Rooms, Battery Room, Control Room and civil foundations & structures for all the equipment, as required shall be constructed by EPC Contractor in 33/0.433 kV Substation.

In order to prevent storm water entering the ESS Buildings and DG Set area through the soak-pits, the floor level of the substation area /ESS buildings/ DG Set area shall be at suitable height above the highest flood water level that may be anticipated in the locality or as directed by Engineer in charge.

33/ 0.433 KV ESS shall meet the electrical load requirements of entire campus. Oil Type Transformers with On-Load Taps Changer (+15% to -15% in steps of 2.5%) of capacity 3 X 1250 KVA (2W+1S) for ESS-01 & 2 X 1250 KVA (1W+1S) FOR ESS-02 shall be provided.

Layout shall contain details of 33 kV/0.433kV Oil type transformers, 33kV indoor panel, LT panel, Hybrid capacitor panel, other utility panels etc including spatial requirements, statutory clearances required inside substation, details of RCC trench, details of hume pipes, cable tray arrangement, earthing system layout etc. Barricading around substation (3 mtr.) with suitable size honey mesh jali must have 2 gate separately for HT & LT side complete in all respect. ***Capacity of the transformer, DG, UPS, Solar in one campus may differs as per the load requirement but combined capacity should not be less than the mentioned above from point a) to d).***

250mm thick Trenches with suitable width & depth shall be provided for installation of HT/LT/ APFC Panels etc. and for Laying of HT/LT Power cables & Control Cables. Substation shall comprise of all ancillary equipment like Battery Charger etc.

Suitable size MS Chequer Plates, minimum thickness 12 mm, duly painted shall be provided for trenches

inside the panel room as required. Hot Dip Galvanized Cable trays of suitable size shall be used as required.

All armored HT/LT power cables, control cables, telephone cables, signal cables etc. shall be laid under Ground preferably along the roads & pathways at suitable depth as per CPWD specifications. Adequate no. of Hume pipes/ DWC HDPE Pipes having suitable diameter with spare shall be laid across the Roads/Pathways etc. All cables for UPS Incoming and outgoing must be copper cable.

Maximum allowable transformer losses at 50% & 100% load shall comply with Latest (IS: 1180- Level-2- (Minimum 3 Star) as per ECBC latest amendment.

All Substation/HT/LT Panel Rooms/Floor panel Rooms shall be provided with safety equipment/items ex. Suitable elastomeric mat (as per relevant IS codes), fire buckets, fire extinguishers (trolley mounted), hand gloves, danger Plates (HT/LT rating), safety charts, framed Schematic/SLD etc. Suitable civil foundation/ trenches etc. for all substation equipment shall be provided as per design load of respective equipment.

All LT Panels shall have more than 20% spare outgoing of different rating and Min.1 outgoing should be of higher rating. To prevent storm water entering the transformer and switch rooms through the soak-pits, the floor level of the Sub-Station/ switch room shall be at least 600 mm above the highest flood water level that may be anticipated in the locality or as directed by Engineer in charge.

The accuracy class of CT & PT, CT & PT ratio of metering panel and as per the state Electricity Board/ CEIG/CEA requirements.

HT PANEL BOARD:

The Indoor Type 33 KV VCB Panel with RMU/RMG panel with 2 nos. incoming 800-amp load break switch, suitable outgoing 800 Amp load break and a spare in both VCB and LBS panel load break switch complete in all respect shall be given for receiving incoming HT supply from nearby Grid Substations in each Sub-Station.

The Indoor Type 33 KV, 800A 25KA / 3 Sec. VCB, Indoor type, must have over load, high voltage, under voltage, earth fault, differential Protection requirement, Ammeter, Voltmeter, power factor meter, Kwh. meter of rating 630 A with suitable no. of incomer and a spare outgoing complete in all respect including HV termination box, air filled cable box suitable for 33 KV 2 Run 3 Core 240 Sq. mm XLPE cable in both ends etc. as required. VCB and Load break switch shall be motorized. 230 VAC supply shall be provided by the customer. HT panel with 9 Tank Process will be given.

The Indoor type 33 KV, VCB Breaker Panel shall be provided with adequate protective device like Multifunction Relay (50,50N, 51, 51N, 86), IDMT relay & instantaneous protection relay, Short Circuit Protection & Earth Fault Protection with instantaneous protection. The auxiliary relay for connectivity of transformer safety devices (OTI, WTI, Buchholz Relay, PRV, MOLG, Differential Protection etc. with their control cabling) to be provided in each outgoing feeder of H.T. Panel. Each panel board shall have adequate Surge Protection Device.

(Min one spare outgoing complete in all respect shall be provided in H.T Panel board.)

Following points shall be applicable for all metal enclosed switch board:

- EPDM Gasket or its higher substitute shall be used to make panel dust free.
- Bus Bar shall be Copper material in HT panel & Aluminium in LT Panel.
- All Incoming and Outgoing must have Multifunction Meter.
- Power pack and Heater in incoming section shall be provided 1 no. working & 1 no standby.
- Suitable size Space Heater shall be provided in main HT & LT panels to avoid any moistures inside the panel.
- FRLS wire needs to be given for panel internal wiring.
- Suitable size ups for Auxiliary supply and power need shall be provided separately in sub-station.
- CT shall be Class F Insulation.
- Min. IP 43 degree of protection shall be for all indoor panels and IP 65 for outdoor Panels.
- All panels shall be based on internal arc test as per IEC-62271.
- From transformer to Main HT Panel will laid suitable size 2 Run 33 Kv. Cable.
- All around area area Lighting on the sub-station terrace needs to be given.

Transformer (5X1250 KVA):

Transformer (as per latest GRIHA -3 Star Norms) of the reputed Brand shall be copper wound outdoor Oil Cooled OLTC Dyn11(30deg. Lagging) with RTCC AVR. Losses of the Transformer shall be as per IS-1180 & 2026 & equipped with all basic protection like WTI, OTI, BR, PRV, MOLG, GOR, Differential Protection etc.

OTI, WTI, Buchholz Relay, PRV, MOLG etc. with their control cabling given upto marshalling box in MS conduits.

RCC foundation for each transformer shall be provided as per requirement.

and must have good track record in UP PWD projects.

Transformer Basic Features

- **Transformer Oil:**

Mineral PCB free no inhibitors use in oil (IS 335) or better.

- **Core:**

M4 Grade or better Double wound core with low loss non-ageing, high permeability, Prime Grade, CRGO.

- **Losses:**

Maximum transformer losses at 50% & 100% load shall comply with Latest (IS: 1180- Level-2 or as per the latest Griha & ECBC Norms latest amendment.

DG Set for Backup Supply (750Kva X 3=2250Kva)

All Prime Power DG (AMF Cum PLC based Sync.) Sets shall be outdoor type with Hospital Type Silencer and acoustic enclosure as per CPCB+ and other relevant norms. All DG Sets shall be provided with adequate shading with Galvalume or GI sheets (1.6 mm thick) supported with robust MS structures. Stack height and extra day tank (for 24 Hour Running) will be given as per the latest CPWD norms.

Provision of DG Back up supply shall be as following:

1. Hospital Lighting Load - 100 % Load
2. Hospital emergency lighting & power (UPS points) Load - 100 % Load
3. Hospital HVAC Load - OT Load only.
4. Hospital mechanical ventilation, medical equipment, Lift load etc.
5. Hospital services building- lift load.
6. Academic & Admin Load -100% Lighting and Power Load
7. Hostels -100% Lighting, Fan, Lift Load & Essential Load
8. Residential -100% Essential, Common Area Load
9. Electrical Substation - 100% Load
10. Fire Pump /Domestic Water Pump Complete Load. -100 % Load
11. Street Light & external lighting -100 % Load
12. STP -100 % Load
13. All essential (Ex. Lift, Fire Pump, Fire Alarm, Ventilation System, PA Talk Back Fire Command Centre Er. Lighting Signages and other lifesaving Equipment's Loads) and critical loads -100%.

UPS (760 Kva)

- Academic & Admin Building – 200 Kva
- MP Hall – 50 Kva
- Hospital Building – 350 Kva
- Miscellaneous Loads – 160 Kva

UPS units suitable for 3-Phase, 50 Hz power supply shall be provided. Suitable capacity of UPS, hot swappable shall be installed for computers, and other essential lighting loads as required & other buildings of campus. Microprocessor Based True Online Double conversion UPS with latest IGBT technology shall be provided for uninterrupted power supply for all emergency power requirements. UPS with separate Power distribution system (comprising of distribution panels, distribution boards, incoming isolators etc.) shall be provided. The UPS System shall have minimum efficiency as per ECBC.

UPS room of suitable size with suitable air conditioning shall be provided. UPS Battery room shall be suitable ventilated.

The UPS System shall be for 30 Min Backup with Maintenance Free batteries and Bypass system. The system shall have the incoming and outgoing switchgear panel. The system shall include the interconnection of UPS Input/output power supply Panels & UPS units, UPS & Batteries through flexible copper cables of suitable size. Given UPS quantity is bare minimum, EPC contractor recalculate UPS requirement and approved by EIC.

SOLAR PHOTOVOLTAIC POWER SYSTEM (330 Kwp):

- Academic & Admin Building – 50 Kwp
- MP Hall – 20 Kwp.
- Sr. Resident Hostel -15 Kwp
- Jr. Resident Hostel Boys -15 Kwp
- Jr. Resident Hostel Girls -15 Kwp
- UG Boys Hostel– 20 Kwp
- UG Girls Hostel– 20 Kwp
- Interns Boys Hostel– 15 Kwp
- Interns Girls Hostel– 15 Kwp
- Interns Nurses Hostel– 15 Kwp
- Type-II Residence -20 Kwp
- Type-III Residence -20 Kwp
- Type-IV Residence -20 Kwp
- Type-V Residence -20 Kwp
- Hospital Building-50Kwp

The EPC Contractor shall carry out supply, installation, testing & commissioning of Direct Online Grid connected Solar Photo Voltaic Power system 330 kWp as per GRIHA ECBC/NBC 2016 norms with WMS, SCADA. The generated power will be directly connected to the Power grid/Distribution Panel of respective Building/ Block for load sharing during day time. The average area requirement per kWp will be 10 sq. Mtr on roof top. The Solar Photo Voltaic Power System shall be provided at terraces/ roof top of outdoor parking area. We have other area also for future like Dispensary Building, Residential Buildings, other Services Buildings and other suitable areas in order to obtain minimum GRIHA 3-star Rating certification for the project. Solar cables shall be used for interconnection of equipment like Solar PV Panels and Inverter etc. Solar cables shall be suitable for outdoor installations. Given Solar quantity is bare minimum, EPC contractor recalculate solar requirement and approved by EIC as per GRIHA 3 star minimum.

A Grid Tied Solar Rooftop Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCUs) consisting of Maximum Power Point Tracker (MPPT), Inverter, and Controls & Protections, interconnect cables, Junction boxes, Distribution boxes and switches etc. should conform to the BIS or IEC or international specifications.

The EPC Contractor shall use only the PV modules that are empanelled to the OEM empanelment. The total Solar PV array capacity shall be assembled with minimum 500 Wp (with minimum of 24V) Mono Crystalline MNRE approved solar modules with 60/72 cells with minimum 15% Module Efficiency. The modules should be tested and certified as per relevant IEC standard as per MNRE guidelines and also offered module shall have a power output warranty of 90% of the rated power for 10 years.

EPC contractor shall submit following to EIC for approval:

- Solar PV station calculator as per Green building requirement.
- Solar PV module arrangement on the terrace of each building
- Schematic diagram mentioning PV modules, DC cable, AC cable, MPPT controller, Inverter, AC/DC DBs, Solar meter & Net meter details, Evacuation panel, protection scheme, earthing & LPS diagrams. Statutory norms shall also be considered while preparing the scheme

POWER FACTOR IMPROVEMENT & HARMONICS SUPPRESSION:

Real time Automatic power factor control panels with ultra-heavy-duty capacitors, Thyristor switched, Hybrid harmonic filters (Active & Passive) are proposed to be provided in the substations to achieve overall power factor between 0.97 to .98 near to unity (lagging) from existing Power Factor, as per ECBC with operation in both Auto and Manual mode. Power factor Correction Panel shall be BMS

Compatible. Multiple capacitor units with real time automatic power factor compensating relay panel shall be provided. The capacitor panels with Hybrid Harmonic filters shall be provided in each substation to achieve THD less than 5%. Connection from Main LT Panel to Capacitor Panel is to be provided through Aluminium sandwich bus duct. Automatic switching off of Capacitor Panel is to be considered during Power supply availability from DG Sets. Main LT Panel of each substation shall be provided with Harmonic analyser as well. However, Harmonic Analyzer device shall be provided as in-built feature in multi-function meters of Main LT Panel of each Substation or as a separate device.

EPC contractor shall submit APFC capacitor panel calculation sheet mentioning initial power factor, required power factor as per statutory requirement, harmonic study to arrive at the capacity of detuned reactors etc. Schematic diagram and SLD of APFC cum reactor panel shall be developed then and to be submitted to EIC for approval.

EPC contractor shall prepare Main single line diagram of 33kV power supply from point of supply till the outgoing feeders of main LT panel to EIC for approval.

Main SLD shall contain, details of 33kV metering, 33kV cable from metering point to 33 kv substation, I/C & O/G details of indoor 33kV panel, 33kV transformers, Main LT cum AMF panel, APFC cum hybrid harmonic panel, other utility panels inside substation, DG sets, GCPs, busduct from Transformers & DG set to Main LT panel, outgoing feeders of main LT panel, cable details etc.

Other documents supporting SLD shall also be submitted such as cable sizing calculation sheets including voltage drop calculation, fault calculation sheets, earthing sizing calculator sheets, busduct sizing & temperature rise calculation sheet.

ENERGY METERING

The EPC Contractor will provide sub-metering for at least below of the following energy use applications, as applicable:

- Interior & Common area lighting
- Exterior area lighting
- Water pumping
- Ground water pumping
- Treated waste water pumping
- Renewable energy generation
- Power backup systems (Generators sets etc.,)
- Elevators, Escalators, etc.,
- Separate Electrical Energy Metering for Residential buildings,
- Any other energy consuming equipment and systems as per GRIHA 3-star.

LT SWITCH BOARD:

DG & LT Panels with incomers 630A or more shall be as per **IEC 61439-1 & 2** and internal arc tests as per **IEC 61641 V2**, 36/50/65kA for 0.5 sec. Panel shall be **form 4b** design and shall be (**Type Tested assembly –TTA**) CPRI/ERDA/Independent international test house tested for all the tests and as per technical specifications. All tested assemblies shall be smart type having switchgears (ACB, MCCB) communicating their release data over Ethernet/Modbus. All Panels should be Ethernet/Modbus ready for suitable for monitoring and control with BMS system Provisions. Suitable BMS integration cards shall be provided to achieve BMS compatibility of HT & LT Panels.

All LT Panels shall have 20% spare outgoing feeders of different rating and Min.1 outgoing should be of higher rating. To prevent storm water entering the transformer and switch rooms through the soak-pits, the floor level of the Sub-Station/ switch room shall be at least 600 mm above the highest flood water level that may be anticipated in the locality or as directed by Engineer in charge.

All Substation Main LT Panels shall have more than 20% spare outgoing feeders of different rating and Min.1 outgoing should be of higher rating. All Substation/HT/LT Panel Rooms/Floor panel Rooms shall be provided with safety equipment/items like Suitable elastomeric mat (as per relevant IS codes), fire buckets, fire extinguishers, hand gloves, danger Plates (HT/LT rating), safety charts, framed Schematic/SLD etc. Suitable civil foundation/ trenches etc. for all substation equipment shall be provided as per design load of respective equipment.

Provision for 1 No. Extra (Selective System) transformer arrangement shall be given in Main LT Panel.

LT PANEL FEATURES

- The Main LT, Main Emergency & Panel above 630 Amp TTA -Type Tested Assembly type and other panel will be PTTA Type.
- Panel fabrication shall be done with 1.6 to 2mm CRCA sheet steel for outer body and 3mm thick structure part.
- Breakers (VCB, ACB, MCCB, MCB etc.) specification shall have to comply breakers specification mentioned in “Technical Specification for Electrical works” Medium voltage panels for all TTA and Non-TTA panels along with VTPN DB & Rising Mains Incomer.
- All outgoing will have multifunction meter and class 1.0 CT.
- Gland plates shall be 3mm thick. The gland plates shall have knock able type holes of suitable diameter of cable glands. Minimum 30% extra knock able holes shall be provided on each gland plate. Non-magnetic gland plates shall be used where single core cables are used for three-phase supply.
- The enclosure shall confirm to IP65 protection for outdoor panels and IP43 for indoor panels.
- The Panel shall be dust, vermin, corrosion proof and shall be mechanically stable to take the mechanical load of complete assembly with all fixed and moving components.
- The panel shall have appropriate protection against mechanical impact of rating IK 9 or better.
- The panel shall be extendable from both sides.
- The terminal blocks shall be provided at convenient location for cable termination. The distance between the terminal strip and gland plate shall be kept in such a way that the cables can be properly dressed & no cable tension is transferred on the terminal strip /or equipment.
- Proper grouting arrangement shall be made in panel for installation of panel in accordance with seismic requirement.
- Complete panel assembly shall be fixed on ISMC-100.
- The design shall ensure generous availability of space for ease of installation and maintenance of cabling, and adequate safety for working in one vertical section without coming into accidental contact with live parts.
- Front and rear doors should be fitted with synthetic rubber or neoprene gaskets with fasteners designed to ensure proper compression of gaskets.
- All sheet steel work forming the exterior of switch boards shall be smoothly finished, levelled and free from flaws. The corners should be rounded. The apparatus and circuits in the panels shall be so arranged as to facilitate their operation and maintenance and at the same time to ensure the necessary degree of safety.
- Panel shall be constructed in Form-4a for main LT & DG Panel & Form-3b for another panel.
- All sheet steel work used in construction of panels shall be given for proper shot blasting/surface finish to make it free from all rusts/impurities/deposits.
- It shall be then provided with two primer coat and then/powder coated (electro-statically) with final paint shade RAL7032 as per IS – 5.
- Powder Coating with suitable primer and having total coating thickness of 85-100 micron in all panel. Sheet Steel shall be given for proper shot blasting / surface finish to make it free from all impurities.
- EPDM Gasket or its higher substitute shall be used to make panel & DB dust free.
- Bus Bar shall be Aluminium/Copper material as prescribed above.
- 17 AH Power pack and space heater shall be provided 1 no. working & 1 no standby.
- Suitable size Space Heater and ups shall be provided in main HT & LT panels to avoid any moistures inside the panel.
- HFFR wire shall be used for internal wiring.
- All panel shall have multi-function meter in incoming and outgoing and indication lamp shall be LED type.
- Current transformer shall cast epoxy / resin type with copper windings and good quality ferromagnetic core.
- CT Class shall be 1 for protection & .5 for metering & Burden shall be 15 VA.
- CT shall be Class F Insulation.
- ACB shall be EDO & communicational type other specification as per the Technical Specification of the Electrical Works.
- All panel shall be equipped with station class SPD (surge protection device).

- Min. IP 43 degree of protection shall be for all indoor panels.
- All panels shall be based on internal arc test at .1 sec as per IEC-62271.
- Danger sign board shall be there in front door of panel.
- All sheet steel work used in construction of panels should have undergone a rigorous metal treatment 9 tank process or better as mentioned below.
- All tested assemblies shall be smart type having switchgears (ACB, MCCB) communicating their release data over Ethernet/Modbus. All Panels should be Ethernet/Modbus ready for suitable for monitoring and control with BMS system Provisions. Suitable BMS integration cards shall be provided to achieve BMS compatibility of LT Panels.
- Suitable capacity of separate UPS is to be installed for substation critical and auxiliary load requirement.
- All armoured LT power cables, control cables, telephone cables, signal cables etc. shall be laid under Ground preferably along the roads & pathways at suitable depth as per CPWD specifications. Adequate no. of Hume pipes/ DWC HDPE Pipes having suitable diameter with spare shall be laid across the Roads/Pathways etc. All cables for UPS Incoming and outgoing must be copper cable.
- Panel Rooms shall be provided with safety equipment/items like Suitable elastomeric mat (as per relevant IS codes) hand gloves, danger Plates (LT rating), safety charts, framed Schematic/SLD etc.

7. GAS SUPPRESSION SYSTEM

Electrical Panel Protection System: This includes Supply, Installation, Testing and Commissioning of FK-5-1-12 (Dodecafluoro-2-Methylpentan-3-one) / Novec-1230 gas Suppression system in accordance with the Contract Documents. Gas suppression system shall be required in substation panels, Server Room, Record Room, Fire Control Room Etc.

8. EARTHING NETWORK:

Earthing with GI Plate Earthing System & Copper Plate Earthing system (only), as required, shall be provided for earthing of sub stations equipment's, Electrical Panel Boards, UPS, LPS (Lightning Protection System) and other Equipment /installations in each building. Earthing shall be in conformity with provisions of Indian Electricity Rules 1956 & as per IS-3043 & IEEE 80 as amended up to date. Copper/GI earth strips shall be used for connecting the Electrical equipment's with Earth pits as per prevalent norms. Earth Leakage circuit breakers/RCBO shall be provided in the DBs for individual units.

Copper Earth strips and Copper Electrode Earth Pits shall be provided for Body & Neutral Earthing of all electrical equipment in the Substation area as per CPWD Specifications. Copper Earth strips and Copper Electrode Earth Pits shall also be provided for all Equipment or as per OEM recommendations.

Earthing shall be carried out for all power distribution system and effectively bonding the equipment. Separate and dedicated earthing (2 Nos.) with copper electrode earth pits and suitable size copper earthing strips (as recommended by OEM) shall be provided for Lightning Protection System.

Dedicated earth pits and earthing with copper/Aluminum electrode & AL, Copper earth strips shall be provided for the following:

- HT Panels- Copper Earthing
- UPS system Earthing- GI Earthing
- Lightning Arrestor - GI Earthing
- Transformers - Neutral - Copper Earthing
- DG Sets - Neutral- Copper Earthing
- Any other Major equipment as required

However, GI strip earthing with GI electrode earth pit shall be provided for Electrical Floor panels located in various buildings, DG Body, DG Exhaust Stack, Lifts, VRF Unit & for all other equipment's. Suitable sized Elastomeric Safety Mats with suitable thickness shall be provided for all HT & LT Panels installed in the substations and all buildings, as required.

All three phase electrical installations shall be provided with double Earth connection and single-phase electrical installations with one Earth connection as per CPWD specifications & NBC 2016.

9. LIGHTNING PROTECTION SYSTEM:

Lighting protection of various buildings shall be provided as per IS/ IEC-62305- 1:2010 (latest as amended), CPWD Specifications and NBC 2016 norms. The main and most effective measure for protection of structures against physical damage is considered to be the lightning protection system (LPS). An external LPS which consists of air- termination system, down-conductor system and earthing system is intended to:

- a) Intercept a lightning flash to the structure (with an air-termination system),
- b) Conduct the lightning current safely towards earth (using a cu. down- conductor system)
- c) Disperse the lightning current into the earth (using an earth-termination system).

Accordingly, a standard lightning protection system will be provided in all the buildings as per NBC 2016 Standards, using single prone finials, horizontal and down comer Copper earthing strips of suitable size, terminating in the Copper Plate Earth Pits. Aviation Obstruction Light (AOL) shall be provided in buildings where it's required as per Civil Aviation regulations, NBC norms & CPWD Specifications as applicable.

SNMP (Simple Network Management protocol) compatibility and BMS Compatible.

10. INTERNAL & EXTERNAL ELEC. WORKS

Following works shall be carried out in coordination with the civil work within the buildings complete in all respects as per latest IS Codes and CPWD Specifications.

- Cat AAA LED Light fixtures, minimum BEE-5 Star rated Fans (BLDC) will be given.
- Fans shall be provided with remote control in higher official room, Meeting rooms, seminar hall etc.
- 6A Light Point, UPS Modular Switch & Socket antibacterial Outlets.
- 16A/ 20A Power, UPS Modular Switch & Socket antibacterial Outlets
- L.T. Cables and Sub main wiring, circuit wiring.
- GI perforated/ ladder Cable Trays
- Floor Panels, Distribution Boards & VTPN DB's. shall have double Earthing.
- Extra Low Voltage system like Telephone (for all buildings) /IPBAX, LAN & Wi-Fi, CCTV System, Public Address System, etc.
- Any other system as required.
- All cables /Wires used in Emergency Lighting, Lifts, Fire Alarm and PA System etc shall be Fire Survival Cable.
- Internal electrification covers all Electrical, ELV works/activities up to 1 meter outside of the building works.
- External electrification covers all Electrical, ELV works/activities of entire campus except inside the buildings works.
-
- Following points shall be generally followed for internal and external electrification of various areas:
 - Internal areas like rooms, corridors, lobbies, staircases, terraces, washrooms etc. of all buildings and blocks shall be adequately illuminated conforming to provisions stipulated in NBC 2016,
 - All the common area e.g., Lifts & Staircases, lobbies, connecting corridors etc. shall have lighting arrangement along with light fixtures to meet minimum Req'd. Illumination Lux level as per NBC 2016.
 - and ECBC. Only LED Light fixtures shall be provided with UPPWD CAT AAA. 6/16A power point to be provided in corridor at every 10 meters for general cleaning purpose. General - Concealed HMS PVC conduit with HFFR insulated copper conductor.
 - All Fans shall be minimum BEE 5 Star rated (BLDC motor).
 - 20% of Overall Lighting shall be connected from UPS for Emergency Lighting in all Non-Residential and Residential Common area Loads.
 - Wiring in passage, common area will be executed with fire survival cable.
 - ECBC and CPWD technical specifications (TABLE 11, recommended Values of illumination as per BIS: 3646 Part-II) maintaining the indicated Lux levels and Light Power Density.
 - The maximum number of PVC insulated aluminium /copper conductor cable of 650/1100 volt grade can be drawn in one conduit of various size shall be as per Table Number 4.1 under clause 4.3.1 © CPWD General Specifications or Electrical Works Internal Part -1 2023.
 - Saddles for fixing conduits shall be heavy gauge its width and thickness/Diameter shall be as per Table number 5.1, 5.2 CPWD PART -1 Electrical.
 - All accessories shall be ISI marked only and shall confirm IS 3419 :1988
 - The Internal Electrification work shall be carried out with HMS PVC conduits when recessed & with heavy gauge MS conduit when laid in surface. The Internal Electrification work shall be carried out in accordance with CPWD General Specifications for Electrical Works Part-I (Internal) -2023 and Part-II (External) with up-to-date amendments.

- ELV shall be executed in MS conduit only.
- PVC Conduits shall be surface mounted or laid on GI angle/channels with suitable hanging GI supports in areas wherever there is false ceiling provision. In case there is no provision for false ceiling, PVC Conduits shall be concealed in concrete during slab casting. Wiring for lighting/power shall be generally done in PVC Conduits whereas wiring for LV works shall be generally done in PVC conduits unless stated otherwise.
- HFFR insulated Copper conductor wires will be used for Points, Circuit & Sub- main wiring conforming to relevant IS- Codes / CPWD Part-I. Wiring shall be carried out with following sizes of PVC insulated HFFR multiple stranded single core class -2 copper conductor wire.

- A. Light Point - 1.5 sq.mm
- B. Ceiling /Cabin/Exhaust Fan Point - 1.5 sq.mm
- C. Call Bell Point - 1.5 sq.mm
- D. 6A Plug Point/ UPS Computer outlets (up to 3 outlets on one circuit.) - 4 sq.mm
- E. Circuit Wiring - 2.5 sq.mm
- F. General Power Point - 4 sq.mm
- G. Industrial Socket with 20A DP MCB for Geysers - 6 Sq.mm
- H. 20A Industrial Socket Outlet - 6 Sq.mm
- I. Special Power Point - 6 Sq.mm
- J. A/C Industrial Socket with 32A DP MCB - 6 Sq.mm
- K. All earthing wire and cable shall be double Run (unless otherwise specified) and in same size of phase conductor.

L. Sub Main wiring from VTPNDB/ Floor Panel to DB: -

- For DB Incomer Size 25 A DP - 2RX6 Sq.mm + 1R X6 Sq.mm
- For DB Incomer Size 32/40 A DP - 2RX10 Sq.mm + 1R X10 Sq.mm
- For DB Incomer Size 63 A DP - 2RX16 Sq.mm + 1R X16 Sq.mm
- For DB Incomer Size 25 A 4 Pole - 4RX6 Sq.mm + 2R X6 Sq.mm / 4C X 6 sq.mm XLPE insulated copper cable
- For DB Incomer Size 32/40 A 4 Pole - 4RX10 Sq.mm + 2R X10 Sq.mm / 4C X 10 sq.mm XLPE insulated copper cable
- For DB Incomer Size 63 A 4 Pole - 4RX16 Sq.mm + 2R X16 Sq.mm / 4C X 10 sq.mm XLPE insulated copper cable
- Cable size upto 16 sq mm shall be of copper material whereas above 16 sq mm Aluminium conductor shall be provided.
- TV Outlet point wiring shall be terminated in suitable size of G.I. box along with splitter boxes at every floor. The interconnections of all splitter boxes fixed at all floors shall be done properly with conduits to form proper distribution system with the prior approval of Engineer-in- charge.
- However, Ceiling Fans/ Wall Fans shall be provided in all Block, Electrical Substations, and its common areas (in addition to air- conditioning/ ventilation provision) as directed by Engineer-In-Charge. - Services (Electrical & Miscellaneous) Minimum Points Requirements for Engineering Design)
- Separate shafts shall be provided for laying of pipes for Electrical, ELV, Mechanical and Fire Services.
- Laying of DWC HDPE / Hume pipes for road crossing or in pucca portion & CC path etc. for electric / telephone / LAN/ street lighting cables complete with adequate number of cable chambers shall be provided by the agency.
- After completing the work, necessary test results as in latest CPWD General Specifications Part-I (Internal) & Indian Electricity Rules, shall be recorded and submitted. The results shall be within the permissible limits.
- Aviation Lights (LED Type) shall be provided on buildings and structures as per prevalent norms & IS-& Civil Aviation Codes.

- PVC Raceways (SS 304 or SS 316) with all accessories shall be provided in DATA Server room, ELV Rooms of various buildings as per requirements.
- Suitable illumination with LED light fixture shall be provided on terraces of Building.
- Power Points, LAN points, UPS power points, Telephone Points (with telephone instrument as required) shall be provided for all work station.
- All switches, sockets and its accessories shall be antibacterial type.
- Requisite size of Raceways/ PVC conduit shall be provided in slabs with suitable size Junction boxes with SS cover plate, fillers, wherever required for drawing the wires and cables (Data / Telephone / Power Points) for the work stations.
- For areas having grid type false ceiling, recessed type LED Light Fixtures of size 600 mm X 600 mm / down lighter fixtures of suitable size shall be provided as per directions of Engineer-In Charge unless otherwise stated. For areas having false ceiling with Gypsum board, Down Lighter type fixtures of suitable size shall be provided as per directions of Engineer-In-Charge unless otherwise stated. Surface mounted/wall mounted Light Fixtures shall be provided in the areas without False Ceiling.
- Industrial weather proof sockets (single phase and three phase) shall be provided in the dampness/moisture walls.
- All shafts / ducts carrying service lines shall be provided with access platforms / ladders for easy maintenance.
- Building shall have suitable Nos. of rising mains for catering to loads of Lighting, VRF equipment, Power, UPS etc. connected to Main LT Panel, as applicable.
- Rising main shall be sandwich type and have Tap off at every floor, feeding the floor panels / DBs/VTPV DBs with incoming & outgoing MCCBs of required capacities and number feeding the double door DBs/VTPN DB's.
- All distribution boards shall be made of GI sheet of minimum thickness of 1.2 to 2 mm.
- Sub mains from panel to DBs shall be connected with armoured cable on surface / cable tray.
- Hot Dip Galvanized Perforated Type / Ladder Type Cable trays of suitable size with perforation not more than 17% shall be provided as required in the building.
- The power cabling shall be sized so that the distribution losses do not exceed 3% of the total power usage in buildings. Voltage drop for feeders shall not exceed 2% at design load and for branch circuit; it shall not exceed 3% at design load as per ECBC norms.
- Meter Box with energy meters (single / double source) shall be provided.

CAPACITY OF LIGHT POWER CIRCUITS:

- Lighting circuit shall feed light/fan/call bell points. Each circuit shall not have more than 800 watt connected load or more than 20 points whichever is less. Power circuit in non-residential building will have only one outlet per circuit.
- Each power circuit in residential building can feed following outlet as per CPWD specification: -
 - (a) Not more than 2 Nos. 16A outlets.
 - (b) Not more than 3 Nos. 6A outlets.
 - (c) Not more than 1 No.16A and 2 Nos. 6A outlets.
 - (d) Load more than 1 KW shall be controlled by suitable MCB.

SWITCH BOX & COVER:

- Modular Switch box shall be hot dip galvanized, 1.6 mm thick factory fabricated, suitable in size for surface/recess mounting and suitable in size accommodating the required number of switches and accessories (where required to be used for application other than modular switches/ sockets).
- Switch box also can be of non-metallic material. The technical sanctioning authority will approve specified makes of reputed quality and specifications.
- Switch place finish shall be hospital class.

CEILING ROSE:

- A ceiling rose shall not be used on a circuit, the voltage of which normally exceeds 250V.
- Only one flexible cord shall be connected to a ceiling rose. Specially designed ceiling roses shall be used for multiple pendants.
- A ceiling rose shall not embody fuse terminal as an integral part of it.

EXTERNAL/STREET LIGHTING:

External Street Lighting (Total 111 Nos with specific height as per the tender drawings) shall be provided for all external areas including approach roads, building surroundings, parking areas, landscaping & horticultural areas, roads, walkways, pathways, entrance gates etc. being developed presently. Street Light Poles shall be made out of Galvanized Iron inner and outer both side (GI) Octagonal tubes. Poles will be suitable for single / double side arms or as required. Poles shall have a service window at the bottom comprising connector terminal & MCB. Poles can be mounted on foundation with Anchor bolts of suitable size & quantity. The height & spacing of the street light poles pole will be designed to achieve illumination Lux levels. The height & spacing of pole and illumination Lux level should be as per latest CPWD Specifications, NBC 2016 and other relevant norms. High Mast Lighting Towers-(As per requirement) shall be provided for external lighting of large open areas as per approved layouts. LED lighting fixtures (CAT AAA) -color temperature – cool white shall be provided for external road lighting, compound/landscape lighting including Solar Street Lighting. The lighting control /operation for external Lighting shall be automatically controlled with digital timer control switch through outdoor type Feeder Panels.

External Lighting proposed shall be the combination of conventional wired external lighting Poles & Solar lighting poles with solar panels an. shall cover the entire plot including areas to be developed as future expansion.

Road / Compound Lighting / Landscape Lighting / Facade Lighting shall be designed as per NBC & ECBC Codes. Road / compound lighting shall be provided with outdoor type light fittings (IP-66).

Post Top Light: (10 Nos.)

Supply and fixing of decorative 40 Watt to 45-Watt LED post top indirect light luminaire having Pressure die cast aluminum body and UV stabilized PC Clear/frosted glass cover, with driver set, confirming to IP 66, and IK08 protection, potted driver (not circuitry) complete in all respects.

Luminaire Description

4800-5400 system lumens, >120 lm/W, PF>.95, THD<10%, at full load, CRI>70, >300V Over Voltage protection and auto restart feature, 4 KV internal Surge protection with 5 years Warrantee. **CAT. - AAA**

Bollard Light: (24 Nos.)

Supply and fixing of decorative 8 to 16-Watt LED bollard luminaire with base plate made of power coated die cast aluminium and extruded Al. housing with UV stabilised PC diffuser, SMD LEDs, Electronic driver set, Confirming to IP65/ 66, and IK07 an above protection, 600-800mm height, complete in all respects.

Luminaire Description

960-1920 system lumens, >120 lm/W, PF>.95, THD<10%, at full load, >300V Over Voltage protection, 4 KV internal Surge protection with 5 years Warrantee. **CAT. - AAA**

.CAT. - AAA

CABLES:

Supply, installation, storing, laying, fixing, jointing / termination, testing and commissioning of Medium Voltage XLPE insulated extruded PVC inner sheathed PVC overall Sheathed armored aluminum/ copper conductor cables laid inbuilt up RCC trenches, directly buried underground, on wire Mesh G.I. cable trays, in pipes, clamped directly to wall or Structures etc. as called for in the drawing. All sizes of Cable & wire testing will be done twice in presence of department & consulting agency in govt. lab as per the Relevant IS Code and the cost for the testing purpose will bear by contractor the contractor will be allowed to install only after getting satisfactory reports. (Sample shall be taken randomly from the Lots.)

CABLE LAYING:

All LT cable in substation shall be in RCC trench provided with metal branches for laying cables.

RCC trench shall be sized to accommodate cables. Laying of cable in the campus shall be as per “CPWD GENERAL SPECIFICATIONS FOR ELECTRICAL WORKS PART-2 EXTERNAL”.

LT cable in the campus shall be underground directly buried in ground or directed by Engineer IN-Charge.

Medium voltage cables shall be circular, multi core annealed copper or aluminum conductor, XLPE insulated, PVC extended inner sheathed an PVC overall sheathed and steel wire armored or steel tape armored construction or unarmored. The conductors of cable shall be stranded. Sector shaped stranded conductors shall be used for cables of 50 sqm size and above. The cables shall conform to IS: 1554 Part-I in all respects.

MV/LV power cables shall be 2, 3, 3.5 or 4 cores, as required and shall have conductors made from electrical purity aluminum conductors conforming to **IS: 8130-84**.

Conductors shall be insulated with high quality PVC base compound. Insulation and outer sheathing compounds shall conform to **IS: 5831 - 84**.

A common covering shall be applied over the laid-up cores by an extruded sheath of un-vulcanized rubber compound.

Armoring of galvanized round steel wires or galvanized flat steel strips shall be provided over the inner sheath. Outer sheath of PVC shall be extruded over the armoring cables shall be manufactured and tested in accordance with **IS 1554 Part I**. Unless otherwise specified, all control cables shall be multi core, 1100V grade PVC insulated, armored and overall PVC sheathed with stranded copper conductors of 2.5 sq.mm, conforming to IS 1554 Part I. Cores shall be identified by color scheme of PVC insulation.

a) Rating: -The cables shall be rated for a voltage of **1100 Volts**.

Core Identifications:

Cores shall be provided with the following color scheme of PVC insulation

Single Core : Green yellow for earthing.

Two Cores : Red and Black, Blue & Black, Yellow & Black.

Three Cores : Red, Yellow & Blue

Four Cores : Red, Yellow, Blue & Black

Selection of Cable:

Cables sizes shall be selected considering the current carrying capacity, voltage drop, maximum short circuit duty and the period of short circuit to meet the present and future anticipated loads.

While deciding cable sizes, the de-rating factors for type and depth of laying, grouping, ambient temperature, ground temperature and soil resistivity shall be taken into account.

STANDARDS: -

The following standards and rules shall be applicable: -

IS 1554: - PVC insulated (heavy duty) electric cables Part I for working voltages up to and including 1100 V.

IS 8130: - Conductors for insulated electric cables and flexible cords.

IS 3961: - Recommended current ratings for cables :(Part 2) PVC Insulated and PVC sheathed heavy duty cables.

IS 5831: - PVC insulation and sheath of electric cables.

INSPECTION:

All cables shall be tested inspected at manufacturer's works. However, upon receipt at site cables shall be checked for physical damages during transit. Cable shall be tested before laying and before termination.

JOINTING OF CABLES: -

All cable joints shall be made in suitable, approved cable joint boxes, jointing of cables in the joint boxes and the filling in of compound shall be done in accordance with manufacturer's instructions and in an approved manner. All straight joints shall be done in epoxy mould boxes with epoxy resin (Trampoline/M-Seal resin or approved equal). All jointing accessories shall be of CCI/INCAB or approved equal. All terminal leads of conductors shall be heavy soldered up to at least 50mm length.

All cables shall be joined color to color and tested for continuity and insulation resistance before jointing commences. The seals of cables shall not be removed until preparations for jointing are completed. Joints shall be finished on the same day as commenced and sufficient protection from the weather shall be arranged. The conductors shall be efficiently insulated with high voltage insulating tape and by using spreaders of approved size and pattern. The joints shall be completely filled with epoxy compound and tapped so as to ensure that the box is properly filled.

All underground cables and cable joints shall be marked on the surface by markers generally manufactured and tested to the requirements of relevant ISS. Approved CI cable markers shall be provided at every 30m along the route of the cables and at both ends of road crossing, indicating cable joints and cables as applicable. Special CI markers shall be provided at all buried cable joints indicating "Electrical Cable Joints". CI plates duly engraved with the size of the cable and the place it serves shall be tied to the cable at regular intervals of 5m for easy identification of cables.

Cable Tags: Cable tags shall be made out of 2 mm thick aluminum sheets, each tag 32 mm in dia. with one hole of 2.5 mm dia. 6 mm below the periphery shall be provided for clamping the same with cables. Cable designation is to be punched with letter/number punches and the tags are to be tied to cables with piano wires of approved quality and size. Tags shall be tied inside the panels beyond the glands as well as below the glands at cable entries. Along trays, tags are to be tied at all bends on straight lengths, tags shall be provided at every 5 meters.

Route markers

(a) Location Route markers shall be provided along the cables at locations approved by the Engineer-in Charge and generally at intervals not exceeding 100m. Markers shall also be provided to identify change in the direction of the cable route and at locations of underground joints.

(b) Plate type marker Route markers shall be made out of 100mm x 5mm GI/aluminum plate welded/bolted on 35mm x 35mm x 6mm angle iron, 60cm long. Such plate markers shall mounted parallel to and at about 0.5m away from edge of the trench.

(c) CC marker Alternatively, cement concrete 1:2:4 (1 cement: 2 sands: 4 graded stone aggregate of 20mm in size) as shown in figure 2 shall be laid flat and cantered over the cable. The concrete markers, unless otherwise instructed by the Engineer-in-Charge, shall project over the surrounding surface So as to make the cable route easily identifiable.

(d) Inscription The words 'CPWD-MV/HV CABLE' as the case may be inscribed on the marker

EXTRA LOW VOLTAGE (ELV) SYSTEM

1. AUDIO VIDEO (AV) & CONFERENCE SYSTEM IN HOSPITAL AND ACADEMIC BLOCK

EPC Contractor shall carry out Design, Supply, Installation, Testing & Commissioning of IP based Audio-Video System for Meeting, Audio Visual, Conference & Mini Conference Hall, Demonstration Halls, Meeting Halls, Multipurpose Hall and other similar area in the campus as explain below. The facilities, as following, but not limited to, for above occupancies shall be provided.

Audio or Sound reinforcement system includes Line array speakers, 86- & 65-inch Professional series Display, PTZ Professional Camera, delegate Units, High Resolution Projector & Screen, surround loudspeakers, Power amplifier, Microphones, USB Player, recorders, electrical wiring, cabling, their interconnections etc. of latest technology with all accessories to complete Sound reinforcement and Conferencing system in all respect for proper functioning.

2. COMPUTER / LAN DATA NETWORKING /WI-FI SYSTEM

Scope of work covers in:

1. Academic Building
2. MP Hall
3. Hospital
4. Gate & Guard Room
5. Hostels (Provision Only).

RJ-45 data outlets points will be provided for Computers, Networking, Wi-Fi, CCTV, Information Display system etc. as per requirement in rooms and other areas at various floors in all the blocks / buildings. Wi-Fi should to be available in all areas except residential quarters. In residential quarters, provision for network access point and TV cable should to be available inside each quarter.

The Data Outlet points shall be connected to Rack Panel/Computer hub with 4 pair CAT-6a wiring in Raceways, recessed/ surface conduit as required. UPS Power supply shall be provided to Network Rack, Servers & Computers wherever required.

Recommended to have Separate racks for various services. Otherwise, EPC contractor will provide a single rack having common patch panel & Ethernet switch for various systems like network, cctv, Wi-Fi pas etc. In high rise buildings, mention that position of quantity of racks will be finalized after discussion with EIC before preparing layouts

The maximum length of the CAT 6a cable from end user point to the Hub or Edge switches shall not be more than 90 M. Beyond 90 M length Fibre Optic Cable shall be used. The Rack Panel/computer hub at various floors will be connected to Main rack of the building/ block with Fibre Optic Cable through conduit or raceways on surface/ recess. Rack Panels shall be installed in separate room for individual buildings/blocks/floors along with 50% spare available for future expansion.

Distribution switch shall be connected to Edge switches of each building/ block with optical fibre cable in underground DWC HDPE pipe of suitable size for outside connectivity or in cable raceway/conduit inside the buildings.

The incoming Fibre cable from Service provider for the Campus Broadband connectivity shall be terminated in the Server/LV room in admin building. The laying and termination of Fibre optic cable within the campus will be provided.

The Rack panel comprising of jack/Patch panels, Network switches, patch cords, power supply units, Cooling Fans, Wire managers, LIUs, Trans-receivers, Fiber patch cord etc. of individual buildings/Blocks/ floors.

LAN Infrastructure at different Floors of various building shall be used commonly for IPABX, CCTV etc. along with LAN.

Brick masonry manholes with covers shall be provided at suitable lengths to facilitate easy wire/cable pulling.

The Network solution for satellite centre must include the following components:

1. High availability Firewall.
2. Wi-Fi System shall be provided in all Common area and Offices.
3. The complete system shall be on a Minimum 10G backbone.
4. High availability Core switches along with pre-populated SFP modules.
5. L2 switches having ports 40G and 10G/1G along with pre-populated 10 Giga SFP modules.
6. The core switch shall be N working + 1 Stand-by.
7. OTDR for Fiber Optical cabling and Penta Scanning Testing reports of all components are required.
8. Warranty — all active components must have 5 Years warranty from their respective OEMs.
9. Rack panel to be installed in the separate room for individual buildings/Blocks/ floors along with 50% space available for future expansion. They should be proper cooling facility.
10. The IT executing agency must prepare diagrams showing the locations and layout of the concentration points and the routes taken by the major trunks and uplink cables. These diagrams should be submitted in electronic AutoCAD format, and on paper. These diagrams should include floor plans, including room numbers, of the buildings with additional layers containing both data and voice copper cable and fiber cable routes. They should also contain the cable numbers in relation to room numbers. This document should be submitted in electronic, Excel, format. A paper copy should be available on demand. Each data point marked on a drawing will individually indicate the port/wire number (as the actual labelling) in close proximity without being obscured by other information.
11. IT being a specialized service, experienced agencies in the field of IT services shall be deployed to provide seamless maintenance and support of Network components, Servers etc. The detailed specifications will be provided before the tendering process.
12. EPC contractor shall submit floor wise network layouts and schematic/ riser diagrams of each building mentioning LAN points, details of wiring, rack position, patch panel, ethernet switch, back bone with supporting documents as required by EIC.
13. Material procurement shall commence only after approval of schematic/floor wise diagrams of network systems.

3. EPABX SYSTEM

IPABX with minimum capacity of 1000 Telephones with 1000 Licenses free for life time & expandable up to 2000 telephones shall be located at Server Room Academic, Hospital & MP Hall Building and all other locations shall have telephone points like workstations and other suitable location as per drawing Node matrix. The EPBAX system shall have all Analog/ Digital cards suitable as per the requirements.

IP PBX/IP Telephony Communications Server: The IP Telephony Solution shall support the following Services - Voice, Video, IM, Presence and Audio Conference the IP Telephony Solution should support H.323 and SIP the Solution should support the following Trunks - PRI and SIP the IP Telephony solution should incorporate all licenses for the Phones and Trunks Solution should support all Extensions from Day 1 with future scalability up to 1000 users. Licenses for all Phones

supplied should be provisioned on Day1 Solution should support 1 PRI, Hard 500 IP Phones, Softphones, Video Phones, Extensions. with necessary Licenses, rack mount architecture, complete as required and as per technical specifications. Provision of telephone point (up to MDF) in residential and hostel will be given as per the requirement or its equivalent specifications

IP Phone :Display should be 128 x 64 -pixel Graphical LCD (3.1 Inch) LED for Call and message wait Indication Intuitive user interface with icons Feature Keys 3 Feature Keys : Headset, Mute , Hands-free speaker phone 4 Context Sensitive Keys 2 Line keys Function such as navigation, Call Appearance , feature status · Volume Control Keys, Interface 2 X RJ45 10/100/1000 Mbps Ethernet Ports Power Over Ethernet (IEEE 802.3af), 1 x RJ9 Handset port, 1 xRJ9 Headset port DC Power Jack Enhanced Desktop Viewing LED for Call & message wait indication Intuitive user interface with Icon Clear Voice Codec: G.722, G.711(A/μ), G.729, G.723 DTMF: In-band, Out-of-band (RFC 2833) and SIP INFO Full Duplex Speakerphone with VAD, CNG, AEC, AJB & AGC Power Supply Power on Ethernet (IEEE 802.3af) .5VDC 0.6A Power Consumption 1W(Typical) Operating temperature: 0°C to 45°C Operating Humidity: 10 - 95% Desk mount External AC Adaptor, Certification: CE, FCC,EMI- EMC, SAFETY.ROHS Secure Communications Extended (Proprietary) SIP Protocol TLS/SRTP for Voice Security.

SITC of IP Phone 2 x 10/100/1000 Mbps LAN & PC Ports Graphical LCD with Backlit LED for Incoming/Ongoing Call, Mute, Hold Add on 24 key module support, maximum key modules shall be supported Intuitive User Interface with Icons Multiple Languages Caller ID with Name, Number 45 or more keys including 4 Context Sensitive Hard Keys RJ9 Handset Port, RJ9 Headset Port, Wall Mount, Table-top CE, FCC-15, RoHS, Power over Ethernet (IEEE 802.3af) Power Consumption: 5W (Typical) Connector: DC Power Jack, 5VDC/600mA Operating Temperature Range = 0 to 45°C Storage Temperature= 0 to 55°C Message wait Lamp, Ringer Lamp, Voice Mail, Call Pickup-Group and Selective, Paging, Key Feature Mute, Call Hold, Do Not Disturb, Speed Dial, Hotline, Redial, Call Back, Auto Answer, Call Forward, Call Waiting, Call Transfer, Room Monitoring, Conference, Directory, Call Logs, Paging, Dial-by-Name+B8:B1. System must have IP at the T core with seamless connectivity to all-pervasive legacy and new-generation wireless telecom networks like POTS, ISDN, T1/E1, and GSM/3G/4G/5G/LTE.

4. SECURITY AND SURVEILLANCE SYSTEM

INTRODUCTION

This subhead defines the requirement of security and surveillance for the building campus to secure the unauthorized action/entry/access to the campus with help of electronic medium. The provided solution will have three major components:

- IP CCTV and Recording System
- Physical Security Solution

The system integrator will have to supply, Install, test and commission the solution with reference to the defined specification, requirement and approval of the Consultant/Architect and Client jointly.

IP CCTV Surveillance and Recording Solution:

A Closed-Circuit Television (CCTV) system is a surveillance system used to capture and transmit video streams to a Control Centre for real-time monitoring and for recording. The main purpose of a CCTV system is to enhance the security in the areas where it is installed, mainly based on dissuasion. The recordings are useful to the security service and even security bodies in case of a security event or incident in the facilities.

One of the key advantages of an IP video system compared to an analogue video system is a better future scalability. That is, the system will be able to grow along with the user's needs. All cameras shall be IP.

The locations of the video cameras depend on the required resolution of the captured images and videos and its purpose. Cameras are able to perform the following functions:

- Identification: recognizing a person in the image by means of face recognition software. This can be achieved with an image resolution higher than 250 ppm (pixels per meter).
- Recognition: recognizing a person in the image by comparison with another video image obtained by the camera. This can be achieved with an image resolution higher than 125 ppm.
- Observation: recognizing the behaviour and motion of an individual in the field of view of the camera, people or objects tracking. This can be achieved with an image resolution higher than 63 ppm.
- Detection: detection of a person or an object in the field of view of the camera. This can be achieved with an image resolution higher than 25 ppm.

Most cameras in the project will perform functions of recognition and observation, considering identification functionality only in certain cases, for instance at the door entrance of Security Rooms, ICT Rooms, and the like. Detection functions are found mainly in outdoor perimetral surveillance.

According to all these criteria, a first estimation of the distribution of the cameras in the complex is included in Security drawings. However, definitive locations will depend on the final arrangements and the technical features of the supplied cameras.

The solution will have been implemented in the following but not limited to Locations:

- Hospital Building
- Academic Building
- MP Hall
- Campus External etc.

The indoor Dome Cameras and Bullet Cameras shall be provided at Entry & Exit Points of all floors, terraces, Ramps, all corridors, parking areas & drive ways, Lift Lobbies, Staircase Lobbies, Lift Cars, Reception Areas, all Waiting Areas and other common areas of Administration Building as directed by Engineer-In charge.

In all other building's cameras shall be provided at Entry & Exit Points of all floors, stilts, terraces, staircase lobbies, corridors, Lift lobbies, Lift Cars & common areas etc. as directed by Engineer-In charge.

All the outdoor cameras shall be in IP-66 Housing with Junction box, media converter etc. is proposed in weather proof housing. The existing LAN network switches would be used for CCTV connectivity and will be connected to central CCTV server & cameras shall have PoE connectivity ports.

Recommended to have Separate racks for various services. Otherwise, EPC contractor will provide a single rack having common patch panel & Ethernet switch for various systems like network, cctv, Wi-Fi pas etc. In high rise buildings, mention that position of quantity of racks will be finalized after discussion with EIC before preparing layouts

Network connectivity for outdoor cameras having distance more than 75 metres, shall be on optical fiber. Suitable provision shall be provided to connect with existing LAN infrastructure. The power supply to LAN switches and all Monitors will be on UPS. The video recording shall be non-embedded based recording server with video management software.

Dome camera: - These cameras shall be minimum 2MP Full HD IR Camera suitable for Day and night operations. Image Sensor: minimum 1/2.8" 2.1MP CMOS Sony Starvis Progressive Scan Sensor with 1945(H) X 1109(V) Pixels. Corridor View: On/ Off, 90 & 270 degrees. All the cameras shall be operative on automotive manual & scheduled mode. The cameras shall be UL, CE & STQC Listed. RJ- 45 Cable connectors will be used for Network/POE connectivity.

Bullet camera: - These cameras shall be minimum 5MP Full HD IR Camera suitable for Day and night operations. Image Sensor: minimum 1/2.8" 5.14MP CMOS Sony Starvis Progressive Scan Sensor with 2592(H) X 1944(V) Pixels. Corridor View: On/ Off, 90 & 270 degrees. All the cameras shall be operative on automotive manual & scheduled mode. The cameras shall be UL, CE & STQC Listed. RJ- 45 Cable connectors will be used for Network/POE connectivity.

PTZ outdoor cameras: - The true IP day and night viewing PTZ, Image sensor-1/2.8" 2.4MP CMOS Sony Starvis Progressive Scan Sensor with 1945(H) X 1109(V) Pixels. Lens: Remote Motorized Zoom Focus 4.3(w) ~ 129.0mm,

F1.6(w)~F4.3(t), Optical minimum 20x, Digital 12x. Multi Stream: Triple Streams with minimum 2nos of H.265 Stream with primary stream at 1920 (H) X 1080 (V) @ 30 fps. The PTZ camera shall automatically track the object to use its Pan/Tilt/Zoom feature and record 30 frames/ sec. The cameras shall be UL, CE & STQC Listed. RJ- 45 Cable connectors will be used for Network/POE connectivity.

ANPR IP Camera (2 Nos.: 1 no. for entry & 1 no. exit) with mounting brackets with ANPR Camera License Software and Monitoring System will necessary be given in all Campus Gates.

Central Core & Recording Server: - The main servers will be Intel Xeon processor E5-2600, minimum speed of 2.3 GHz with 6 Core, dual Gigabit Ethernet Port, USB port, Video port. The server memory will be 32 GB DDR4 RAM with operation and management Licenses to manage at least 15 Recording Servers and 350 Cameras.

LED Display Monitor: The sufficient no. of Full HD LED Monitors (For both Campus) with high resolutions screen sizes of 55" (Diagonal) are to be provided for viewing all live/ recorded camera proceedings. The resolutions of 1920(H) x 1080(V) pixels with comfortable viewing angle shall be provided for all monitors suitable for operation on 220-240V AC, 50 Hz power. The display LED monitors shall be equipped with all standard features such as Video-in, Audio-in, HDMI/DVI, RJ 45 Port etc. Individual/ dedicated LED Display Monitors shall be provided for each building of the campus.

CCTV Control Room (with display monitor screens & video management server) shall be located in the Security Room/ Fire Control Room at Ground Floor of the Administrative Block. The wiring inside the building shall be with CAT 6a cable in conduit and for Outdoor connectivity Armoured fiber Optic Cable shall be used. Optical fiber cable shall be laid underground in HDPE/ DWC pipes with suitable manholes for easy pulling and proper maintenance. PTZ cameras will be placed on roof top and on Street light Poles with necessary mounting arrangements in external areas. The video management server shall have minimum 30 days storing capacity.

Suitable hardware/ software shall be provided for streaming live CCTV signal feeds of all indoor and outdoor cameras installed in the campus to remote locations outside the campus through Internet connectivity.

EPC contractor shall submit floor wise SZ layout, riser/schematic diagram mentioning position of cameras, details of wiring, rack position, PoE switch, patch panel, NVR, hard disk, Head end equipment like main rack, monitor & server etc.

Material procurement shall commence after getting approval of floor wise, riser/schematic diagrams from

Note: 1. The Latest Notification regarding STQC published by the Ministry of Electronics & Information Technology will only be considered valid.

2. All Equipment's with 5 years warrantee will be separately given on OEM's Letter Head.

3. HD display system with minimum display of 5" x 8" per camera and hardware & software support both for indoor and external surveillance IP based Closed Circuit Surveillance system is proposed to monitor the activities at desired areas.

4. Minimum quantities for both the campus including buildings are :-

- a. Dome Camera – 576 Nos.
- b. Bullet Camera – 89 Nos.
- c. PTZ Camera – 5 Nos.
- d. ANPR Camera – 10 Nos. (For all gates at entry and exit)

5. INTEGRATED BUILDING MANAGEMEN SYSTEM (IBMS):

INTRODUCTION:

Supplying, installation, testing and commissioning of integrated building management system for digital/electronic display, monitoring and controlling of all E&M systems like substation, DG sets, UPS, solar power, lifts, AC plants, ventilation systems, fire protection systems, pumps etc. to include cabling, monitors, recording, display system, hardware, software support.

SPECIFICATION

Web based Building Management System (BMS) on open protocol with Software having 3D & HD vector dynamic graphics with AutoCAD import, Zoom In & Zoom Out facility, Multi-Monitor

Support-(Max 4 Nos), BTL, UL, EN Certified System, BACnet Profile B-AWS (Advanced workstation) BACnet Protocol Revision 1.18 as per the BTL Listing, dot net platform, Certified OPC DA Server by OPC Foundation, Web-Based Server software shall permit use of Standard Web-Browsers such as Microsoft Internet Explorer, Netscape Navigator, etc. complying to security standards such as ISA-99/IEC 62443 Security Level 2 (SL2) and OWASP. Cybersecurity audit trail, 4-eye principle. It should work a True IP Based DDC Controllers having inbuilt 2-port Ethernet switch, minimum 600 Mhz processor with 512 MByte SDRAM (DDR3) and 512 MByte NAND Flash. Each DDC shall have IEC 62443 Security Level 2 (SL2), WLAN interface for local operation (POT), engineering and commissioning, Cloud connectivity for remote access and work on BACnet Secure Connect. The BMS should support major communication protocols like BACnet, /IP, BACnet MS/TP, Modbus IP and Modbus RTU upto 500 points per Integrator.

AIR-CONDITION SYSTEM: (VRV/VRF & SPLIT AC)

Required For: -

Hospital building -1750 Hp

Academic & Administrative Building-1107 Hp

Multipurpose Hall Building-125 Hp

Guest House- 19 Nos. 5-star Split AC System with stabilizer.

INTRODUCTION:

VRV/VRF with provision of separate AHU for each OT for as per design calculation is an air-condition system for the **construction of State Medical College Ballia (U.P.)** building application with sophisticated individual zone control. These systems are the most versatile of the multi-split systems as the indoor units may function individually and will cool individually.

General Specification

1. The system VRV VRF will adopt the inverter technology for energy saving and shall use R410A Eco-friendly refrigerant for green environment and shall connect multiple indoor units for independent operation with long piping / high elevation / big capacity having COP 4.0 on non-varying load. The system shall be able to operate at cooling as well as heating mode and must deliver 100% cooling @ 42 degree centigrade of outside temperature and Outdoor unit shall operate continuously without tripping up to 53 deg. C DBT in cooling mode. The outdoor unit shall have a powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory. Outdoor unit shall consist of BLDC inverter scroll compressors (All Inverter), Inverter fan motor, electronic expansion valve, oil separator, and accumulator. Outdoor unit shall have High pressure switch, high pressure sensor, reverse phase protection, Self-diagnosis and Soft start as safety devices or functions. The sum of connected capacity of all indoor air handlers shall range from 50% to 130% of outdoor rated capacity. All other specification of High & Low Side should match with the latest CPWD Specification.

2. All split AC will be BEE 5-star rate with inverter technology will be given in Guest House.

HVAC CALCULATIONS FOR HOSPITAL BLOCK :-

ANNEXURE- I						
PROJECT:M/S BALLIA MEDICAL COLLEGE AT BALLIA						
AREA DETAILS & CONFIGURATION OF INDOOR UNITS						
S. N.	AREA PARTICULARS	AREA(SFT)	TYPE OF INDOOR UNIT	TR. EACH	Qty.	Total TR

A	BASEMENT FLOOR-1					
1	ROOM FOR 300,500,800 mA	423	4-WAY CASSETTE TYPE UNIT	2.08	2	4.16
2	DARK ROOM	160	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
3	60mA MOBILE X-RAY	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
4	CT SCAN	545	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
5	CONTROL ROOM	194	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
6	MRI	581	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
7	MUSEUM	266	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
8	ULTRASOUND	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
9	IITV SYSTEM FLUROSCOPY	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
10	CSSD	2458	4-WAY CASSETTE TYPE UNIT	4.13	6	24.78
11	REGISTRATION	484	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
12	WAITING AREA	1063	4-WAY CASSETTE TYPE UNIT	3.33	3	9.99
	SUB TOTAL-A	6707			22	65
B	GROUND FLOOR					
1	DEMO ROOM	315	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
2	EXAMINATION CHAMBER-1	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
3	EXAMINATION CHAMBER-2	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
4	EXAMINATION CHAMBER-3	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
5	EXAMINATION CHAMBER-4	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
7	PLASTER ROOM	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
8	PLASTER CUTTING ROOM	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
9	REGISTRATION COUNTER	184	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
10	MINOR OT	325	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
12	DISPENSARY	352	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
15	CENTRAL HOSPITAL PHARMACY+STORE	1086	4-WAY CASSETTE TYPE UNIT	3.33	2	6.66
			4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
16	CENTRAL REGISTRATION	1882	4-WAY CASSETTE TYPE UNIT	3.33	3	9.99
			4-WAY CASSETTE TYPE UNIT	4.13	2	8.26
17	BACK OFFICE	680	4-WAY CASSETTE TYPE UNIT	3.33	2	6.66
21	HOSPITAL OFFICES FOR THE SUPPORTING STAFF	827	4-WAY CASSETTE TYPE UNIT	4.13	2	8.26
22	HOSPITAL & STAFF COMETTIE ROOM	646	4-WAY CASSETTE TYPE UNIT	3.33	2	6.66
23	MEDICAL SUPERITENDENTS OFFICE	404	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
24	DEANS OFFICE	404	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
25	WAITING AREA	942	4-WAY CASSETTE TYPE UNIT	3.33	3	9.99
28	SAMPLE COLLECTION AREA	344	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
29	REPORT DISTRIBUTION & REGISTRATION	406	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
	SUB TOTAL-B	9860			31	98
C	FIRST FLOOR					
1	DEMO ROOM	315	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33

2	EXAMINATION CHAMBER-1	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
3	EXAMINATION CHAMBER-2	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
4	EXAMINATION CHAMBER-3	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
5	EXAMINATION CHAMBER-4	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
7	FEMALE DRESSING ROOM	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
8	MALE DRESSING ROOM	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
9	REGISTRATION COUNTER	184	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
10	MINOR OT	325	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
12	DISPENSARY	352	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
14	REFRACTION ROOM	315	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
15	DARK ROOM	87	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
16	MINOR OT	325	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
17	EXAMINATION ROOM-1	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
18	EXAMINATION ROOM-2	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
19	DRESSING ROOM MALE	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
20	DRESSING ROOM FEMALE	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
21	DEMO ROOM	271	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
22	DISPENSARY	352	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
23	WAITING AREA	1904	4-WAY CASSETTE TYPE UNIT	3.33	6	19.98
26	DISPENSARY	352	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
27	DEMO ROOM	271	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
28	DRESSING ROOM MALE	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
29	DRESSING ROOM FEMALE	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
30	EXAMINATION-1	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
31	EXAMINATION-2	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
32	MINOR OT	325	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
33	SOUND AUDIOMETRIC ROOM	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
34	ENG LAB	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
35	SPEECH THERAPY	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
36	WAITING AREA	1856	4-WAY CASSETTE TYPE UNIT	3.33	6	19.98
	SUB TOTAL-C	10253			41	103
D	SECOND FLOOR					
1	DEMO ROOM	315	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
2	EXAMINATION CHAMBER-1	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
3	EXAMINATION CHAMBER-2	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
4	EXAMINATION CHAMBER-3	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
5	EXAMINATION CHAMBER-4	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
6	WAITING AREA	1824	4-WAY CASSETTE TYPE UNIT	3.33	3	9.99
7			4-WAY CASSETTE TYPE UNIT	4.13	2	8.26

8	REGISTRATION COUNTER	369	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
9	TMT	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
10	ENDOSCOPY	455	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
11	HOLTER	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
12	DISPENSARY	344	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
13	LAGER LAB	238	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
14	LAGER LAB	220	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
15	DEMO ROOM	510	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
16	EXAMINATION ROOM-1	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
17	EXAMINATION ROOM-2	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
18	EXAMINATION ROOM-3	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
19	EXAMINATION ROOM-4	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
20	HALL	1798	4-WAY CASSETTE TYPE UNIT	2.65	4	10.60
21			4-WAY CASSETTE TYPE UNIT	4.13	2	8.26
22	WAITING AREA	1856	4-WAY CASSETTE TYPE UNIT	3.33	6	19.98
23	WAITING AREA	1856	4-WAY CASSETTE TYPE UNIT	3.33	6	19.98
24	DISPENSARY	292	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
25	OCCUPATIONAL	502	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
26	RECREATIONAL	456	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
27			4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
28	EXAMINATION-1	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
29	EXAMINATION-2	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
30	EXAMINATION-3	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
31	EXAMINATION-4	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
32	DISPENSARY	349	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
	SUB TOTAL-D	13872			51	141
D	THIRD FLOOR					
1	CLINICAL DEMO ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
2	FACULTY ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
3	EXAMINATION & TREATMENT ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
4	RESIDENTS DOCTOR	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
6	WARD	2756	4-WAY CASSETTE TYPE UNIT	3.33	6	19.98
			4-WAY CASSETTE TYPE UNIT	4.13	2	8.26
7	NURSE DUTY ROOM	145	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
8	NURSE STATION	118	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
10	DISPENSARY	364	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
12	DEMO ROOM	510	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
13	EXAMINATION ROOM-1	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
14	EXAMINATION ROOM-2	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65

15	EXAMINATION ROOM-3	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
16	EXAMINATION ROOM-4	178	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
17	DENTAL SURGERY	456	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
			4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
18	PROSTHETIC DENTISTRY	502	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
19	WAITING AREA	1874	4-WAY CASSETTE TYPE UNIT	3.33	6	19.98
21	PUBLIC WAITING LOBBY	2892	4-WAY CASSETTE TYPE UNIT	4.13	7	28.91
22	RESIDENTS DOCTOR	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
23	EXAMINATION & TREATMENT ROOM	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
24	FACULTY ROOM	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
25	CLINICAL DEMO ROOM	197	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
27	WARD	2795	4-WAY CASSETTE TYPE UNIT	4.13	7	28.91
28	NURSE STATION	118	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
29	NURSE DUTY ROOM	145	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
SUB TOTAL-D		15087			51	154
D	FOURTH FLOOR					
1	CLINICAL DEMO ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
2	FACULTY ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
3	EXAMINATION & TREATMENT ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
4	RESIDENTS DOCTOR	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
6	WARD	2756	4-WAY CASSETTE TYPE UNIT	3.33	6	19.98
			4-WAY CASSETTE TYPE UNIT	4.13	2	8.26
7	NURSE DUTY ROOM	145	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
8	NURSE STATION	118	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
10	WARD	2795	4-WAY CASSETTE TYPE UNIT	4.13	7	28.91
11	NURSE DUTY ROOM	145	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
12	NURSE STATION	118	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
15	RESIDENTS DOCTOR	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
16	EXAMINATION & TREATMENT ROOM	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
17	FACULTY ROOM	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
18	CLINICAL DEMO ROOM	197	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
19	PUBLIC WAITING LOBBY	2892	4-WAY CASSETTE TYPE UNIT	4.13	7	28.91
20	RESIDENTS DOCTOR	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
21	EXAMINATION & TREATMENT ROOM	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
22	FACULTY ROOM	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
23	CLINICAL DEMO ROOM	197	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
25	WARD	2795	4-WAY CASSETTE TYPE UNIT	4.13	7	28.91
26	NURSE STATION	118	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
27	NURSE DUTY ROOM	145	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65

SUB TOTAL-D		14580			47	148
D	FIFTH FLOOR					
1	CLINICAL DEMO ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
2	FACULTY ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
3	EXAMINATION & TREATMENT ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
4	RESIDENTS DOCTOR	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
6	WARD	2756	4-WAY CASSETTE TYPE UNIT	3.33	6	19.98
			4-WAY CASSETTE TYPE UNIT	4.13	2	8.26
7	NURSE DUTY ROOM	145	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
8	NURSE STATION	118	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
10	WARD	2795	4-WAY CASSETTE TYPE UNIT	4.13	7	28.91
11	NURSE DUTY ROOM	145	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
12	NURSE STATION	118	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
15	FACULTY ROOM	263	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
16	RESIDENTS DOCTOR	263	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
17	INSTRUMENT STORE	174	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
18	DEMO ROOM	395	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
20	NURSE DUTY ROOM	252	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
21	BUFFER	218	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
22	DRUG STORE	168	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
23	PUBLIC WAITING LOBBY	2946	4-WAY CASSETTE TYPE UNIT	4.13	7	28.91
24	WARD	3785	4-WAY CASSETTE TYPE UNIT	4.13	9	37.17
SUB TOTAL-D		15396			46	154
D	SIXTH FLOOR					
1	SURGEON & ANESTHETIC-1	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
2	SURGEON & ANESTHETIC-2	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
3	SURGEON & ANESTHETIC-3	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
4	SURGEON & ANESTHETIC-4	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
6	ASSISTANT ROOM-1	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
7	ASSISTANT ROOM-2	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
8	ASSISTANT ROOM-3	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
9	ASSISTANT ROOM-4	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
10	SURGEON & ANESTHETIC-1	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
11	SURGEON & ANESTHETIC-2	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
12	SURGEON & ANESTHETIC-3	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
13	SURGEON & ANESTHETIC-4	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
14	NURSE DUTY ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
17	PRE OPERATIVE WARD	949	4-WAY CASSETTE TYPE UNIT	3.33	3	9.99
18	PATIENT WAITING AREA	285	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
19	INSTRUMENT ROOM	277	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65

20	CENTRAL STERILIZATION	253	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
21	CONSULTATION ROOM	277	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
23	WAITING LOBBY	1771	4-WAY CASSETTE TYPE UNIT	3.33	5	16.65
24	BUFFER	470	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
25	DOCTORS LOUNGE	277	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
26	POST OPERATIVE WARD	1228	4-WAY CASSETTE TYPE UNIT	4.13	3	12.39
28	BUFFER	231	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
29	OBSERVATION GALLERY FOR STUDENTS	610	4-WAY CASSETTE TYPE UNIT	3.33	2	6.66
	SUB TOTAL-D	9230			33	93
D	SEVENTH FLOOR					
1	SURGEON & ANESTHETIC-1	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
2	SURGEON & ANESTHETIC-2	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
3	SURGEON & ANESTHETIC-3	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
4	SURGEON & ANESTHETIC-4	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
6	ASSISTANT ROOM-1	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
7	ASSISTANT ROOM-2	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
8	ASSISTANT ROOM-3	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
9	ASSISTANT ROOM-4	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
10	SURGEON & ANESTHETIC-1	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
11	SURGEON & ANESTHETIC-2	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
12	SURGEON & ANESTHETIC-3	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
13	SURGEON & ANESTHETIC-4	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
14	NURSE DUTY ROOM	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
17	PRE OPERATIVE WARD	949	4-WAY CASSETTE TYPE UNIT	3.33	3	9.99
18	PATIENT WAITING AREA	285	4-WAY CASSETTE TYPE UNIT	3.33	1	3.33
19	INSTRUMENT ROOM	277	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
20	CENTRAL STERILIZATION	253	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
21	CONSULTATION ROOM	277	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
24	BUFFER	470	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
25	DOCTORS LOUNGE	277	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
26	POST OPERATIVE WARD	1228	4-WAY CASSETTE TYPE UNIT	4.13	3	12.39
28	BUFFER	231	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
29	OBSERVATION GALLERY FOR STUDENTS	610	4-WAY CASSETTE TYPE UNIT	3.33	2	6.66
	SUB TOTAL-D	7459			28	76
D	EIGHTH FLOOR					
1	ASST PROF-1	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
2	ASST PROF-2	155	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
3	ASST PROF-3	155	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
4	ASST PROF-4	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
6	PROF. RADIODIAGNOSIS	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08

7	ASSOCIATE PROF.	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
8	ASST. PROF.-1	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
9	ASST. PROF.-2	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
10	ASST. PROF.-3	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
11	ASST. PROF.-4	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
12	ASSOCIATE PROF.-1	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
13	ASSOCIATE PROF.-2	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
14	PROF.GENERAL MEDICINE	213	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
17	TEACHING ROOM 1	420	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
18	TEACHING ROOM 2	420	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
20	ASSOCIATE PROF.	220	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
21	ASSOCIATE PROF.-1	141	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
22	ASSOCIATE PROF.-2	141	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
23	ASSOCIATE PROF.-3	112	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
24	ASSOCIATE PROF.-4	112	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
26	ASSOCIATE PROF.-5	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
27	ASSOCIATE PROF.-6	142	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
28	ASSOCIATE PROF.-7	142	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
29	ASSOCIATE PROF.-8	217	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
31	PROFESSOR ANESTHESIOLOGY	237	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
32	ASSOCIATE PROF.-1	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
33	ASSOCIATE PROF.-2	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
34	ASSOCIATE PROF.-3	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
35	ASSOCIATE PROF.-4	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
36	PROFESSOR GENERAL	206	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
39	WAITING LOBBY	1729	4-WAY CASSETTE TYPE UNIT	3.33	4	13.32
			4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
40	PROFESSOR ORTHOPEDICS	240	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
41	ASST. PROF.	142	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
42	ASST. PROF.	142	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
43	ASSOCIATE PROF.	240	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
44	PROFESSOR ENT.	237	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
46	ASSOCIATE PROF.	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
47	ASST. PROF.-1	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
48	ASST. PROF.-2	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
49	ASST. PROF.-3	220	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
51	PROFESSOR	206	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
52	ASSOCIATE PROF.	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
53	ASST.PROFESSOR-1	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65

54	ASST.PROFESSOR-2	140	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
55	ASST.PROFESSOR-3	192	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
SUB TOTAL-D		9958			49	106
E	NINTH FLOOR					
1	LECTURE THEATER	3673	4-WAY-CASSETTE TYPE UNIT	4.13	9	37.17
2	ROOM	234	4-WAY-CASSETTE TYPE UNIT	2.65	1	2.65
7	LAB 1	419	4-WAY-CASSETTE TYPE UNIT	2.08	2	4.16
8	LAB 2	419	4-WAY-CASSETTE TYPE UNIT	2.08	2	4.16
9	BIO CHEMISTRY LAB	488	4-WAY-CASSETTE TYPE UNIT	2.08	1	2.08
			4-WAY-CASSETTE TYPE UNIT	2.65	1	2.65
10	ROOM	84	4-WAY-CASSETTE TYPE UNIT	1.08	1	1.08
11	MEDIA PREP. ROOM	84	4-WAY-CASSETTE TYPE UNIT	1.08	1	1.08
12	MICRO BIOLOGY LAB	513	4-WAY-CASSETTE TYPE UNIT	2.65	2	5.30
13	ROOM	116	4-WAY-CASSETTE TYPE UNIT	1.08	1	1.08
14	MEDIA PREP. ROOM	116	4-WAY-CASSETTE TYPE UNIT	1.08	1	1.08
17	LOBBY	1771	4-WAY-CASSETTE TYPE UNIT	3.33	4	13.32
			4-WAY-CASSETTE TYPE UNIT	4.13	1	4.13
18	MEDIA PREP. ROOM	99	4-WAY-CASSETTE TYPE UNIT	1.08	1	1.08
19	ROOM	116	4-WAY-CASSETTE TYPE UNIT	1.08	1	1.08
20	PATHOLOGY LAB	901	4-WAY-CASSETTE TYPE UNIT	3.33	3	9.99
21	CENTRAL MEDICAL RECORD	2299	4-WAY-CASSETTE TYPE UNIT	3.33	7	23.31
SUB TOTAL-D		11333			39	115
E	TENTH FLOOR					
1	CANTEEN	2299	4-WAY CASSETTE TYPE UNIT	3.33	7	23.31
4	LOBBY	1742	4-WAY CASSETTE TYPE UNIT	3.33	4	13.32
			4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
6	STAFF DINNING	1600	4-WAY CASSETTE TYPE UNIT	4.13	4	16.52
SUB TOTAL-D		5640			16	57
GRAND TOTAL		129375			454	1312
(ODU- 1622 HP)						
OT DETAILS						
SIXTH FLOOR						
1	OT-1	531	AHU (5000 CFM)	12.96	1	12.96
2	OT-2	531	AHU (5000 CFM)	12.96	1	12.96
3	OT-3	531	AHU (5000 CFM)	12.96	1	12.96
4	OT-4	531	AHU (5000 CFM)	12.96	1	12.96
SEVENTH FLOOR						
1	OT-1	531	AHU (5000 CFM)	12.96	1	12.96
2	OT-2	531	AHU (5000 CFM)	12.96	1	12.96
3	OT-3	531	AHU (5000 CFM)	12.96	1	12.96
4	OT-4	531	AHU (5000 CFM)	12.96	1	12.96
(ODU- 128 HP)						

***TOTAL (1622 HP + 128 HP =1750 HP)**

HVAC CALCULATIONS FOR MULTIPURPOSE HALL :-

PROJECT: - M/S BALLIA MEDICAL COLLEGE						
AREA DETAILS & CONFIGURATION OF INDOOR UNITS						
S. N.	AREA	AREA(SFT)	TYPE OF INDOOR UNIT	TR. EACH	Qty.	Total TR
A	PARTICULARS GROUND FLOOR					
1	MULTIPURPOSE HALL	7550	DUCTABLE	8.20	13	106.60
	SUB TOTAL-A	7550			13	106.60
125 HP INDOOR CAN BE CONNECTED WITH 125 HP OUTDOOR UNIT WITH 100 % DIVERSITY						

HVAC CALCULATIONS FOR ACADEMIC AND ADMIN BLOCK: -

ACADEMIC BLOCK						
	AREA	AREA(SFT)	TYPE OF INDOOR UNIT	TR. EACH	Qty.	Total TR
A	PARTICULARS GROUND FLOOR-1					
1	PROFESSOR ROOM	537	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
2	ASST. PRO.	225	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
3	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
4	DEMO LIBAREY	538	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
5	DEMO ROOM 01	755	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
6	LECTURE THEATER	2377	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
7	LECTURE THEATER	2377	4-WAY CASSETTE TYPE UNIT	4.13	3	12.39
8	METTING ROOM	398	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
9	TUTOR	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
10	NON TEACHING	172	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
11	CLERK	150	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
12	HISTOLOGY LAB	2184	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
13	MUSEUM	1460	4-WAY CASSETTE TYPE UNIT	3.20	3	9.60
14	RESEARCH LAB	538	4-WAY CASSETTE TYPE UNIT	2.65	2	5.3
15	DEMO ROOM 02	765	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
	TOTAL	12895			28	83
B	FIRST FLOOR					
1	PROFESSOR ROOM	537	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
2	ASST. PRO.	225	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
3	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
4	DEPARMENT LIBAREY	538	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
5	DEMO ROOM 01	755	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
6	CLINICAL LAB	1802	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
7	HEMETOLOGY LAB	2195	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
8	AMPHIBIAN LAB	2195	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
9	MAMMALIAN LAB	1624	4-WAY CASSETTE TYPE UNIT	4.13	3	12.39
10	MEETING ROOM	398	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13

11	ROOM	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
12	TUTOR	172	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
13	NON TEACHING	150	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
14	CLARK	150	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
15	RESEARCH LAB	538	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
	TOTAL	11698			26	89
C	SECOND FLOOR					
1	PROFESSOR ROOM	412	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
2	ASST. PRO.	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
3	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
4	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
5	DEPARMENT LIBAREY	532	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
6	DEMO ROOM	753	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
7	MUSEUM	1796	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
8	CLINICAL PHARMA	2195	4-WAY CASSETTE TYPE UNIT	4.65	4	18.60
9	LECTURE THEATER 01	2377	4-WAY CASSETTE TYPE UNIT	4.13	4	16.52
10	LECTURE THEATER 02	2377	4-WAY CASSETTE TYPE UNIT	4.13	4	16.52
11	PRITICAL LAB	2195	4-WAY CASSETTE TYPE UNIT	4.65	4	18.60
12	RESEARCH LAB	1796	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
13	PROFESSOR ROOM	398	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
14	ASST. PRO.	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
15	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
16	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
17	TUTOR	172	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
18	CLERK	150	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
19	NON TEACHING	150	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
20	DEPARMENT LIBAREY	1016	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
21	DEMO ROOM	755	4-WAY CASSETTE TYPE UNIT	3.20	2	6.40
	TOTAL	18234			43	147
D	THIRD FLOOR					
1	PROFESSOR ROOM	412	4-WAY CASSETTE TYPE UNIT	3.20	1	3.20
2	ASST. PRO.	258	4-WAY CASSETTE TYPE UNIT	2.08	1	2.08
3	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
4	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
5	ASST. PRO.	161	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
6	TUTOR	172	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
7	NON TEACHING	150	4-WAY CASSETTE TYPE UNIT	1.08	1	1.08
8	RESEARCH LEB	538	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
9	MUSEUM	753	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
10	RESEARCH LEB	1796	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95

11	PECTICAL LAB	2195	4-WAY CASSETTE TYPE UNIT	4.65	4	18.60
12	CANFERENCE HALL	398	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
13	ASST. PRO.	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
14	DEPARMENTAL LAB	532	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
15	DEMO ROOM	753	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
16	HEMETOLOGY LAB	2195	4-WAY CASSETTE TYPE UNIT	4.65	4	18.60
17	HISPOPATHOLOGY LAB	1796	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
	TOTAL	12689			33	110
E	FOURTH FLOOR					
1	PROFESSOR ROOM	398	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
2	ASST. PRO.	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
3	ASST. PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
4	ASST. PRO.	145	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
5	TUTOR	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
6	NON TEACHING	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
7	CLRCK	510	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
8	RESARECH LAB	532	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
9	DEMO ROOM	753	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
10	MUSEUM	796	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
11	PRACTICAL LAB	2195	4-WAY CASSETTE TYPE UNIT	4.65	5	23.25
12	SERVICE LAB 01	322	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
13	SERVICE LAB 02	322	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
14	SERVICE LAB 03	322	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
15	SERVICE LAB 04	322	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
16	SERVICE LAB 05	322	4-WAY CASSETTE TYPE UNIT	3.20	1	3.20
17	SERVICE LAB 06	322	4-WAY CASSETTE TYPE UNIT	3.20	1	3.20
18	SERVICE LAB 07	322	4-WAY CASSETTE TYPE UNIT	3.20	1	3.20
19	MEDIA PERPACTION	322	4-WAY CASSETTE TYPE UNIT	3.20	1	3.20
20	PROFESSOR ROOM	398	4-WAY CASSETTE TYPE UNIT	3.20	1	3.20
21	ASST. PRO.	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
22	ASST. PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
23	ASST. PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
24	ASST. PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
25	TUTOR	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
26	NON TEACHING	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
27	CLRCK	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
28	PRECTICAL LAB	2195	4-WAY CASSETTE TYPE UNIT	4.65	5	23.25
29	MUSEUM	538	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
30	DEPARTMENT LAB.	573	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
31	ROOM	484	4-WAY CASSETTE TYPE UNIT	4.65	1	4.65

32	RESARECH LAB	532	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
33	DEMO ROOM	774	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
34	PERPACTION	322	4-WAY CASSETTE TYPE UNIT	3.20	1	3.20
	TOTAL	15587			52	153
	FIFTH FLOOR					
1	PROFERSSER	398	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
2	ASST.PRO.	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
3	ASST.PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
4	ASST.PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
5	ASST.PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
6	DEPARTMENT LAB.	473	4-WAY CASSETTE TYPE UNIT	4.65	1	4.65
7	RESARECH LAB	527	4-WAY CASSETTE TYPE UNIT	2.65	2	5.30
8	DEMO ROOM	753	4-WAY CASSETTE TYPE UNIT	2.65	3	7.95
9	MUSUEM	1829	4-WAY CASSETTE TYPE UNIT	4.65	4	18.60
10	PRATICAL LAB	2108	4-WAY CASSETTE TYPE UNIT	4.13	4	16.52
11	METTING HALL	398	4-WAY CASSETTE TYPE UNIT	4.13	1	4.13
12	ASST.PRO.	258	4-WAY CASSETTE TYPE UNIT	2.65	1	2.65
13	ASST.PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
14	ASST.PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
15	ASST.PRO.	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
16	TUTOR	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
17	CLECK	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
18	NON TEACHING	150	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
19	COMMON WORKSHOP	1291	4-WAY CASSETTE TYPE UNIT	4.65	3	13.95
20	NURSE DUTY ROOM	145	4-WAY CASSETTE TYPE UNIT	1.30	1	1.30
	TOTAL	9788			31	94
	SIXTH FLOOR					
1	LAB ASST.	150	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
2	COMMON	473	4-WAY CASSETTE TYPE UNIT	4.65	1	4.65
2	COMMON	473	4-WAY CASSETTE TYPE UNIT	4.65	1	4.65
3	LAB ASST.	150	4-WAY CASSETTE TYPE UNIT	1.65	1	1.65
3	SKILL LAB	5982	4-WAY CASSETTE TYPE UNIT	4.65	8	37.20
	TOTAL	7228			12	50
	GRAND TOTAL	88119			225	725
ADMIN BLOCK						
	GROUND FLOOR	AREA (SQFT)	TYPE OF INDOOR UNIT	TR	NOS	TOTAL
1	READING AERA & STACKING	3500	4-WAY CASSETTE TYPE UNIT	4.13	8	33.04
2	OUTSIDE READING	1683	4-WAY CASSETTE TYPE UNIT	4.13	3	12.39

3	SATFF READING	608	4-WAY CASSETTE TYPE UNIT	3.30	2	6.60
4	LIBRARAIN	401	4-WAY CASSETTE TYPE	3.20	1	3.20
	SATFF READING	405	4-WAY CASSETTE TYPE UNIT	3.20	1	3.20
		6597			15	58
	FIRST FLOOR					
1	READING AERA & STACKING	3500	4-WAY CASSETTE TYPE UNIT	4.13	8	33.04
2	INTERNET SECTION	1741	4-WAY CASSETTE TYPE UNIT	4.13	3	13.22
2	ADIUO VISULES	1030	4-WAY CASSETTE TYPE UNIT	3.20	2	6.40
		6271			13	53
	SECOND FLOOR					
1	CENTRAL RESEARCH LEB	1070	DUCTABLE	6.60	1	6.60
		178		4.65	1	4.65
2	CAFETAERA	1500	4-WAY CASSETTE TYPE UNIT	2.65	4	10.60
		2748			6	22
	THIRD FLOOR					
1	OFFICE	1624	4-WAY CASSETTE TYPE UNIT	4.13	4	16.52
2	PRINCPAL ROOM	570	4-WAY CASSETTE TYPE UNIT	4.65	1	4.65
3	MINI CON.	441	4-WAY CASSETTE TYPE UNIT	4.65	1	4.65
4	MEDICAL EDCATION	1660	4-WAY CASSETTE TYPE UNIT	4.13	3	12.39
5	COLLEGE COUNCIL	1017	4-WAY CASSETTE TYPE UNIT	4.65	2	9.30
		5312			11	48
	FOURTH FLOOR					
1	EXAMINATION HALL	2112	4-WAY CASSETTE TYPE UNIT	4.65	4	18.60
		2112			4	18.60
	GRAND TOTAL	23040			49	199

***TOTAL (869 HP + 238 HP =1107 HP)**

LIFTS WORKS

GENERAL

The EPC Contractor shall carry out Design, Supply, Installation and Testing & Commissioning of Lift Works. Passenger cum Bed lifts and Passenger Lifts shall be provided for various buildings in both

Campus. The installation shall be carried out as per statutory rules & regulations stipulated by Central/ State/ Local Bodies and IS Codes that govern the installations of the lift. The voltage and frequency of the supply shall subject to variation permissible under Indian Electricity Act and Rules.

IP-based CCTV camera (1 No.) shall be provided in all Lift Cars of all buildings for surveillance/monitoring of lift control panel. The CCTV cameras, installed in the lifts, shall be connected/ integrated with the CCTV system with suitable cabling, hardware items etc as required. Suitable warning mentioning “You are under CCTV surveillance” shall be posted inside the lift car. These cameras may be located at ceiling level and at any location which cannot be easily accessed, noticed or tampered with. The cable used for connecting in car camera to monitoring system, shall be of trailing grade. Ordinary co-axial or twisted pair wires shall not be lashed or tied along with trailing cables. Specialized trailing cables shall be used in lift applications. Wireless CCTV cameras complete with transmitter/ receiver & all accessories as required, may also be provided alternatively.

NOTE:

- 1.Lift Well, Car Size, Lift Pit Depth, Overhead, and Clear Entrance Width & Height dimensions shall conform to NBC 2016 / IS Code or OEM Standards/ recommendations. Alllifts shall be without Machine room/ MRL type.
- 2.Anti-skid granite or Stainless Steel 304 chequered plate flooring of suitable thickness shallbe provided in all the lifts.
- 3.Car enclosure & doors shall be made out of SS 304 sheet of required thickness.
- 4.All lift shall have necessary provisions & door opening as required for physicallychallenged person.
- 5.Power supply to each elevator shall be connected with dual source. One elevator from each bank of elevators shall be key operated to be used as fireman’s lift as per code.
- 6.Lift Car operating Panel shall be equipped with Braille buttons. Automatic rescue device and emergency lighting shall be provided in each elevator supported by independent rechargeable batteries.
- 7.All Lifts shall have provision of integrated with BMS System for normal operation status & operation in case of fire. Lift shall be compatible with Modbus /BacNet communication protocol or as per OEM requirement.
- 8.Lifts shall be provided complete in all respect as per technical specifications and directions of theEngineer-in-Charge.
- 9.All lifts will be provided as per the Architectural Plan.

S.NO.	NON-RESIDENTIAL BUILDINGS	NO OF LIFT PER BLOCK
1	ACADEMIC(B+G+6) ADMINISTRATION BLOCK (B+G+4)	8 NOS= 13 PAX. LIFT
2	GUEST HOUSE (G+1)	2 NOS= 8 PAX. LIFT
3.	Sr. RESIDENT HOSTEL (G+8)	1 NO.= 8 PAX. LIFT

		1 NO.= 13 PAX. LIFT
4.	Jr. RESIDENT HOSTEL BOYS (G+5)	1 NO.= 8 PAX. LIFT
		1 NO.= 13 PAX. LIFT
5.	Jr. RESIDENT HOSTEL GIRLS (G+3)	1 NO.= 8 PAX. LIFT
		1 NO.= 13 PAX. LIFT
6.	UG BOYS HOSTEL (G+9)	1 NO.= 8 PAX. LIFT
		1 NO.= 13 PAX. LIFT
7	UG GIRLS HOSTEL (G+7)	1 NO.= 8 PAX. LIFT
		1 NO.= 13 PAX. LIFT
8.	INTERNS BOYS HOSTEL (G+6)	1 NO.= 8 PAX. LIFT
		1 NO.= 13 PAX. LIFT
9.	INTERNS GIRLS HOSTEL (G+4)	1 NO.= 8 PAX. LIFT
		1 NO.= 13 PAX. LIFT
10.	INTERNS NURSES HOSTEL (G+5)	1 NO.= 8 PAX. LIFT
		1 NO.= 13 PAX. LIFT
11.	TYPE-II RESIDENCE (S+10)	2 NOS.= 13 PAX. LIFT
12.	TYPE-III RESIDENCE (S+10)	2 NOS.= 13 PAX. LIFT
13.	TYPE-IV RESIDENCE (S+10)	2 NOS.= 13 PAX. LIFT
15.	TYPE-V RESIDENCE (S+5)	2 NOS.= 13 PAX. LIFT
16.	HOSPITAL BUILDING (3B+G+10)	10 NOS.= 20 PAX. BED LIFT
		1 NO.= DUMB WAITER LIFT

PRESSURIZATION, MECHANICAL VENTILATION SYSTEM & FRESH AIR SYSTEM.

The system shall be provided as per National Building Code of India- 2016 and requirement of the local body, CPWD General Specifications for Heating, Ventilation and air conditioning work-2017 and relevant I.S Codes;

The system shall be designed and provided to achieve rate of air change in various ventilated areas for complete building as prescribed in NBC-2016 and local building bye-laws/ site requirements.

All the fan motors which will operate in normal mode shall have IE-3 efficiency. The fan motors required to be operated during fire mode shall be minimum IE-2 efficiency. Mechanical Ventilation will be given majorly in basements of the Academic/Admin Building & Hospital Building.

The Staircase, Lift Lobby & Lift Well pressurization shall be designed and provided as per provisions given in NBC 2016 and Local by laws. Scope of works include GSS ducting, grills, louvers and all associated works and shall be executed as per CPWD specifications; The pressurization system shall be integrated with fire alarm system for automatic operation on command from fire detection system. Fresh air supply unit for each toilet shall be provided.

EMERGENCY LIGHT & ILLUMINATED SIGNAGE

Emergency Light and Signage shall be provided in all building(internal) and campus(external). Exit signs shall not exceed 5 W per phase as per ECBC-2017;

Self-contained rechargeable emergency exit light with minimum 6 hours battery backup; IP 20 rated; Confirms to IS: 10322 (part-5 / sec1): 2012, Single side / Double side facia as per requirement of location installed in entire campus & Buildings/Blocks.

CODES & STANDARDS

The design engineering manufacturing and the installation shall be in accordance with established codes, sound engineering, practices, and specifications and shall conform to the statutory regulations applicable in the country. EPC Contractor shall obtain all approvals from statutory authorities' e.g. Electrical inspector, pollution control boards, concerned SEB as applicable before commissioning of electrical/DG sets, Elevators, Indian Electricity Act, Indian Electricity Rules, Factory Act, Pollution Control Act.

- All electrical work shall be governed by CPWD Specifications for electrical works amended till date unless otherwise specifically mentioned separately.
- IS-732: Code of practice for electrical wiring installation system voltage not exceeding 650V.
- IS 3043: 1987 with latest amendments- Earthing.
- IS-2309: Code of practice for the protection of buildings and allied structure against Lightning
- IS-7689: Guide for control of undesirable static electricity.
- IS-3716: Insulation co-ordination application guide.
- IS-8130: Conductors for insulated electrical cables and flexible cords.
- IS-5831: PVC insulation and sheath of electric cables.
- IS-3975: Mild steel wire, strips & tapes for armoring cable.
- IS-3961: Current rating of cables
- IS-694: PVC insulated (heavy-duty) electric cables for working. Voltage up to and including 1100volts.
- IS-424- 1475 (F-3): Power cable flexibility test.
- IEC-439/IS-7098: Specification for cross-linked polyethylene insulated PVC sheathed cable for working voltage up to 1.1KV.
- IS-1554: PVC insulated cables up to 1100volts.
- IS-10810: Test procedures for cables.
- IS-6121: Cable glands.

- IS-10418: Cable drums.IEC-754 (1): HFFR cable.
- ASTM-D-2863: Standard method for measuring minimum oxygen concentration to support candle like combustion of plastic (oxygen index).
- ASTM-D-2843: Standard test method for measuring the density of smoke from burning or decomposition.
- 20. ASTM E-662/IEC 754(A).
- IS 2309: 1989 with latest amendments- Advance Lightning Protection System.
- The 33 H.T. Metering Panel shall comply with the following standards as amended up to date.
- IS:2544: Bus Bar Supports
- IS: 2705 / IEC–185: Current Transformer
- IS: 3516 / IEC–186: Potential Transformer
- BS 5655 Part 1 to Part 13 safety rules for the construction and installation of electric lifts, and hydraulic lifts published by the British Standards Institution (BSI).
- N81 Part1to Part13 safety rules for the construction and install at ion of electric lifts and hydraulic lifts, published by the European Committee for Standardization (CEN).
- BS 7255 Code of Practice for safe working on lifts, published by the British Standards Institution (BSI)
- IS: 3696 (Part I) -1966 Safety code for scaffolds and ladders: Part IS scaffolds.
- IS: 3696 (Part II) -1966 Safety code for scaffolds and ladders: Part II Ladders.

FIRE FIGHTING, DETECTION AND ALARM SYSTEM.

This Documents Covers:

FIRE FIGHTING

DETECTION

ALARM AND P.A. SYSTEM

CODES & STANDARDS

- National Building Code 2016: Part IV for Fire & Life safety
- Local Bye-Laws.
- Relevant BIS codes: IS: 3044, IS: 5290 and IS: 5312, IS: 908 and IS: 2190, IS: 3844, IS: 15105.
- NFPA & TAC Manual
- Consultation with local Chief Fire Officer.

DESIGN CONCEPT

The firefighting design concept shall be as per the requirement of local guidelines, NBC-2016 part iv. The entire fire safety installation shall be compliant with the most stringent codes / standard for the entire building/Campus to ensure the highest safety standard and uniformity of system. Further, before property is opened to public, the fire protection shall be fully operated and tested under simulated conditions to demonstrate compliance with the most stringent standards, codes and guidelines.

Following functional system shall be provided; strictly in compliance with the listed reference standards:

Main part of Fire Fighting system is :

Internal Hydrant System

External Fire Hydrant System

Automatic Sprinkler System

First Aid Extinguisher

SCOPE

Fire Fighting, Fire Alarm & Detection & Public Address System:

- i. Preparing all firefighting drawing as per NBC 2016 and implementation of the same after approval from consultant.
- ii. Fire Extinguisher
- iii. Hydrant system
- iv. Sprinkler system
- v. Fire pumps and equipment
- vi. Fire detection & alarm system
- vii. Fire compartmentation/ containment system (Cl. 2.20 & 2.21 of NBC 2016, Part IV, Life & Safety)
- viii. Public address and talk back system
- ix. All miscellaneous work completes in all respect.
- x. Generic requirement even though not mentioned in DBR for proper functionality of building has to be adhered.

SCHEDULE OF FIRE FIGHTING PUMPS FOR HYDRANT & SPRINKLER SYSTEM:

S.No.	Description of Pumps	Remark/Standard
1.	Electrical Driven Hydrant Pump	NBC 2016 Part-IV Table-7
2.	Diesel Driven Fire Pump	NBC 2016 Part-IV Table-7
3.	Jockey Pumps for Hydrant& Sprinkler Systems	NBC 2016 Part-IV Table-7

5.	Terrace Pumps systems	NBC 2016 Part-IV Table-7
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Note: The above tables are provided only for reference purposes. The EPC contractor shall design the fire protection system as per the prevailing NBC rules of the local fire authorities.

System Description:

Fire water storage

Static Underground fire water storage tank of **200 KLD** for Hospital Campus and 100 KLD for Medical College Campus capacity for Fire Protection System has been provided and Terrace tank (wherever required) as per NBC 2016 Part-IV-Table 7. Fire department connection shall also be provided on the external wall of the property near the main entrance. These shall comprise of 4 Nos. 63 mm dia male outlets capable of directly feeding the ring mains through non-return valves or directly filling the static fire storage tanks. These shall be mounted in specially identified boxes.

Fire pumping system

The fire pumping system shall comprise of independent electrical pumps for hydrant and sprinkler system, diesel engine driven pump & jockey pump for hydrant & sprinkler system and terrace pump for hydrant system.

- i. Electric pump
- ii. Diesel engine driven pump
- iii. Jockey pumps
- iv. Terrace Pump – as per the NBC –2016 Table number 7

Electrical pump shall provide adequate flow for catering requirement of hydrant system. Diesel engine driven fire pumps shall be provided for ensuring operation & performance of the system in case of total electrical power failure. Jockey pumps shall compensate for pressure drop and line leakage in the hydrant and sprinkler installation. Provision of PRS/ orifice plate shall be made in sprinkler riser to restrict pressure on sprinkler system.

Individual suction lines shall be drawn from the fire reserve tank and connected to independent fire suction header. The electric fire pumps, diesel engine driven fire pumps and the jockey pumps shall all draw from this suction header. Delivery lines from various pumps shall also be connected to a common header in order to ensure that maximum standby capacity is available. The sprinkler pump shall be isolated from the main discharge header by a non-return valve so that the hydrant pump can also act as standby for the sprinkler system. The ring main shall remain pressurized at all times and Jockey pumps shall make up minor line losses. Automation required to make the system fully functional shall be provided.

Fire hydrant system

Internal and external stand pipe fire hydrant system shall be provided with landing valve, hose reel, first aid hose reels, complete with instantaneous pattern short gunmetal pipe in the building. The internal diameter of inlet connection shall be at least 80/100 mm. The outlet shall be of instant spring lock type gunmetal ferrule coupling of 63 mm dia for connecting to hose pipe. Provision of flow switch on riser shall be made for effective zone monitoring. The flow switch shall be wired to FAP and shall indicate water flow on hydrant of the identified zone. Recessed cupboard/ fire hydrant cabinet shall be strategically located for firefighting requirement. Location of cabinets shall be accessed as per compartmentation plan in consultation with the Architect. Provision of fireman's axe shall be made for internal hydrant. External hydrant shall be located within 2 m from the building to be protected such that they are accessible and may not be damaged by vehicle movement. A spacing of about 30-45m between hydrants for the building shall be adopted.

Sprinkler system

Automatic sprinkler system shall be provided. The system shall be suitably zoned for its optimum functional performance. The sprinkler system shall be provided with control valves, flow and tamper switches at suitable location and shall be connected to control module of the fire alarm system for its

monitoring and annunciation in case of activation. Sprinkler type along with its bulb ratings shall be selected based on the requirement of the space and shall be specified accordingly. Inspector's test valve assembly with sight glass shall be provided at remote end with discharge piped to drain outlet/ Pipe.

Hand held fire extinguishers

Portable fire extinguishers of water (gas pressure), Carbon-di-oxide and foam type shall be provided as first aid fire extinguishing appliances. These extinguishers shall be suitably distributed. The appliances shall be so distributed over the entire floor area, that a person is not required to travel more than 15 m to reach the nearest extinguisher.

The construction of the body shall be of welded type and thickness of the mild steel sheet shall be not less than 1.6mm & full fill IS 10204:2001 specifications.

Each extinguisher shall be painted 'FIRE RED', conforming to shade No. 537 of IS 5 and shall have a warranty of minimum 10 years. The paint shall conform to IS 2932 or epoxy powder coating conforming to IS 13871.

These shall be placed or hanged on wall in a group on several suitable places. Classification of extinguishers shall be as per the following table:

Table- Fire Class

Class of Fire	Description	Suitable Type of Appliances
a.	Fire in ordinary combustibles (wood, fibers, rubber plastics, paper and the like)	Gas Expelled Water Type
b.	Fires in flammable liquids, paints, grease, solvents and the like.	Chemical extinguishers of carbon Dioxide, dry powder type and buckets.
c.	Fire in gaseous substances under pressure including liquefied gases (Class C fire- Not Gases but Electrical Equipment)	Chemical extinguishers of carbon dioxide and dry powder type

Further, for rooms containing electrical transformers, switchgears, motors and of electrical apparatus, minimum 2 Nos. dry powder or carbon di oxide type/sand buckets extinguishers shall be additionally provided within 15 m of the apparatus.

Equipment Piping

M.S. 'C' Class Heavy Duty Pipe with red oxide primer + two coats of synthetic / enamel paint (shade "Post Office Red" per IS:5, shade No. 536) as per applicable Fire Norms Internally & Externally shall be provided throughout the Complex. Pipes buried below ground shall be suitably protected with anti-rust treatment. All pipe clamps and supports shall be fabricated from MS steel sections and shall be factory galvanized before use at site. Welding of galvanized clamps and supports shall not be permitted. Pipes shall be hung by means of expandable anchor fastener of approved make and design.

Hangers and supports shall be thoroughly galvanized after fabrication. The selection and design of the hanger & support shall be capable of carrying the sum of all concurrently acting loads. They shall be designed to provide the required supporting effects and allow pipeline movements as necessary. All guides, anchors, braces, dampener, expansion joint and structural steel shall be attached to the building/structure.

Flanged joints shall be used for connections for vessels, equipment, flanged valves and also on two straight lengths of pipelines of strategic points to facilitate erection and subsequent maintenance work.

Wrapping & coating is mandatory for External firefighting pipes and shall be done after Zinc Oxide Primer Coating.

Wrapping & coating is mandatory for Exposed Joints of Pipes.

Fire Hydrants

External Hydrants

External hydrants shall be provided all around the Complex. The hydrants shall be controlled by a castiron sluice valve or butterfly valve. Hydrants shall have instantaneous type 63mm dia outlets. The hydrants shall be double outlet with CI duck foot bend and flanged riser or required height to bring the hydrant to correct level above ground.

For each external fire hydrant two numbers of 63mm dia. 15 m long controlled percolation hose pipe with gunmetal male and female instantaneous type couplings machine wound with GI wire, gunmetal branch pipe with nozzle shall be provided.

Each external hydrant hose cabinet shall be provided with a drain in the bottom plate. Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".

Internal Hydrants

Internal hydrant shall be provided on each landing and other locations as required by NBC-2016 with double headed gunmetal landing valve with 100 mm dia inlet, with shut off valves having cast iron wheels. Landing valve shall have flanged inlet and instantaneous type outlets. Instantaneous outlets for fire hydrants shall be standard pattern and suitable for fire hoses. For each internal fire hydrant station two numbers of 63 mm dia. 15 m long rubberized fabric lined hose pipes with gunmetal male and female instantaneous type coupling machine wound with GI wire, fire hose reel, gunmetal branch pipe with nozzle shall be provided.

Standard fire hose reels of 20mm dia high pressure rubber hose 30 m long with gunmetal nozzle, all mounted on a circular hose reel of heavy-duty mild steel construction having cast iron brackets shall be provided. Hose reel shall be connected directly to the wet riser with an isolating valve. Hose reel shall be mounted vertically.

Each internal hydrant hose cabinet shall be provided with a drain in the bottom plate. The drain point shall be led away to the nearest general drain.

Each internal hydrant hose cabinet containing items as above shall also be provided with a nozzle spanner and a Fireman's Axe. The cabinet shall be recessed in the wall.

Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE". Piping for hydrant system will pass through the central portion of the beam that is in sleeve. No core cutting and piping work under the beam will be allowed.

HOSE REEL:

Hose reel shall be heavy duty, 20 mm dia. length shall be 30-meter-long fitted with gun metal chromiumplated nozzle, mild steel pressed reel drum which can swing up to 170 degrees with wall brackets of castiron finished with red and black enamel complete.

SPRINKLER SYSTEM:

Quartzite Bulb Automatic Sprinkler: Sprinkler heads shall be made of brass/ quartzite bulb sufficiently strong, in compression to withstand any pressure, surge or hammer likely to occur in the system. The yoke & body shall be made of high-quality gun metal brass with arms streamlined to ensure minimum interference with the spread of water. The deflector of suitable design shall be fitted to give even distribution of water over the area commanded by the sprinkler.

The bulb shall contain a liquid having a freezing point below any natural climatic figure and a high coefficient of expansion. The temperature rating of the sprinkler shall be stamped on the deflector & the colour of the liquid filled in the bulb shall be according to the temperature rating as per NFPA standard. The sprinkler heads shall be of type & quality approved by the local fire brigade authority. The inlet shall be screwed.

The sprinklers shall have 15 mm nominal size of the orifice for ordinary hazard. The orifice size shall be marked on the body or the deflector of the sprinkler. Metal guards for protection of sprinkler against accidental or mechanical damage shall be provided.

Sprinkler Installation: Sprinkler heads (fully recessed or semi-recessed) shall be quick response type, **located in positions shown on the drawings**. The maximum spacing between sprinkler heads, pipe dia and coverage area shall not exceed those stipulated in the NFPA 13 Rules.

The Fire Protection Services Trade shall co-ordinate with the ceiling Trade to set out the sprinkler locations to suit the site location of the unit grid. Chrome plated wire mesh guards shall be used to protect the sprinkler heads which are liable to accidental or mechanical damage

FLOW REQUIREMENT:

The flow requirement for sprinkler heads shall be specifically approved for the designated area of Installation to ensure compliance to AMAO based upon hazard classification.

Orifice Plates: For restricting pressure at lower levels in the sprinkler system, orifice plates of appropriate sizes shall be fitted at different floor levels, at the branching points from Riser Main.

The Diameter of such orifice shall not be less than 50% of the dia. of pipe into which it is to be fitted, which shall not be less than 50mm dia. These orifice plates must be of stainless steel with plain central hole without burrs, and the thickness shall be 3mm for pipe size up to 80 mm, 6 mm for pipes from 80 to 125 mm dia. and 9 mm for pipes greater than 125 mm dia. Such orifice plate must have a projecting identification tag. The orifice plate shall be fitted not less than two pipe internal diameters downstream of the outlet from any elbow or bend.

INSTALLATION CONTROL VALVE:

Each installation shall be provided with a set of installation control valves comprising: -

- An Alarm Valve.
- A Water Motor Alarm & Gong.
- Installation valves shall be installed on the sprinkler circuits as shown on the drawings.
- Installation valve shall comprise of a cast iron body with gunmetal trim, and double seated clapper check valves, pressure gauges, test valve and orifice assembly and drain valve with pressure gauges, turbine water gong including all accessories necessary and required and as supplied by original equipment manufacturer and required for full and satisfactory performance of the system. A cast iron isolation valve with lock and chain at the inlet of the installation valve shall be provided.
- **Inspection and Test Valve Assembly:** Inspection and testing of the automatic starting of the sprinkler system shall be done by providing an assembly consisting of gunmetal valves, gunmetal sight glass, by-pass valve and orifice assembly.

FLOW SWITCH

Flow switch shall have a paddle made of flexible and sturdy material of the width to fit within the pipebore. The terminal box shall be mounted over the paddle/ pipe through a connecting socket. The Switch shall be potential free in either NO or NC position as required. The switch shall be able to trip and make/Break contact on the operation of a single sprinkler head. The terminal box shall have connections for wiring to the Annunciation Panel. The flow switch shall have connections for wiring the seat shall be of S.S to the Annunciation Panel. The flow switch shall have IP: 55 protections.

The flow switches work at a triggering threshold bandwidth (flow rate) of 4 to 10 GPM. Further, it shall have a 'Retard' to compensate for line leakage or intermittent flows.

Fire Pump

The fire pump multistage centrifugal with bronze impeller and stainless-steel shaft shall be horizontally mounted, variable speed type suitable for automatic operation. It shall have a capacity to deliver and developing adequate head so as to ensure a minimum pressure at the highest and the farthest outlet.

The pump shall be capable of giving a discharge of not less than 150 per cent of the rated discharge, at a head of not less than 65 per cent of the rated head. The shut off head shall be within 120 per cent of the rated head. The pump casing shall be of cast iron and parts like impeller, shaft sleeve, wearing ring etc. shall be of non-corrosive metal like bronze/brass/gun metal. Provision of mechanical seal shall also be made.

Bearings of the pump shall be effectively sealed to prevent loss of lubricant or entry of dust or water. The pump shall be provided with a plate indicating the suction lift, delivery head, discharge, speed and number of stages. The pump casing shall be designed to withstand 1.5 times the working pressure.

Wet riser system shall be connected with the fire pumps, which will be operated automatically. Therefore, entire system will remain pressurized all the time, so that water is always available with required pressure, for firefighting purpose. There shall be a provision for the fire brigade inlet connection with non-return valves to the fire ring main for emergency purpose. Considering the various sensitive activities to be conducted in the campus and importance of the safety of the life of the users, it is proposed to provide a proper firefighting system, keeping in mind the likely loss of human life and colossal damage to sensitive equipment's in the event of fire.

Fire Extinguishers:

The following type of portable fire extinguishers (UL) shall be provided at all levels of all towers, at strategic locations as per NBC requirements, generally to follow IS – 2190: 1992).

Table-Fire Extiguisher capacity

Location	Type Of Fire Extinguisher
Every Floor	4.0 or 6.0 kg ABC & 4.5 or 6.0 Kg CO2 Type
Pump room	4.0 or 6.0 kg ABC & 4.5 or 6.0 Kg CO2 Type
Parking Area	4.0 or 6.0 kg ABC & 4.5 or 6.0 Kg CO2 Type

GAS BASED FIRE FIGHTING SYSTEM

Clean Agent Gas based firefighting system shall be provided for special purpose as example Record Rooms, Main LT Panel, Server, Record Room etc. where water system can damage equipment's.

FIRE DETECTION AND ALARM SYSTEM

Addressable Intelligent fire detection and Alarm system of latest technology with fire alarm panels, multi-Sensor detectors, smoke detectors, heat detectors, beam detectors, response indicators, manual call point and hooters, light strobe etc. shall be provided. It shall be UL Listed & FM approved and meet the requirement of NBC 2016/State By-laws.

License/Approval of Local Fire Authorities shall be provided for the complex. There shall be the proper Zoning of the complex/buildings considering the Non-Critical & Critical areas (critical area like OT, ICUs Labs, sterilize zones, chemical labs, laundries, etc.). Repeater panels shall be provided in various buildings as required.

All fire alarm control panels shall be interconnected with each other through Copper Wire or Fiber as per the distance. Fire Detectors and devices of other ancillary buildings/ blocks shall be connected to Fire Control Panel of the nearest building through necessary cables in DWC HDPE pipes. The monitoring of whole complex shall be in the Main Fire Control Room of Hospital Building. For Central Monitoring of all the Fire Panels, necessary devices like PC,

Printer, modules & Software etc. of latest technology with minimum 1 TB hard disk shall be provided in the Control room. Fire Alarm control Panel shall have 130 devices and 130 detectors in one loop. The details of the system proposed shall be as follows:

- Main fire alarm panel with digital voice command system, Fire fighters' telephone, amplifier, zone selector keypad and announcement console – Ground floor – Near passenger lift lobby.
- Secondary fire alarm panels / Repeater Panel at each level – near lift lobby
- Active repeater panels at security cabin
- Fire survival cables (1010 deg. 2 hours).
- Class - A cabling to loop all detectors, devices & MCP's to control panel
- Coverage per detector as per NFPA -2015, considering > 60 ACH
- System integration (Soft integration) with all standalone panels such as agent release panels for deluge valves, Pre-action panels, lift switchboard, DG fresh air switchboard, etc.
- Addressable VESDA (Very Early Smoke Detection Apparatus) or equivalent technology with sensitivity of 0.02%obs/ft to be used in all Critical areas such as UPS Room, Battery Room, Server Room, MRI/CT/Xray Rooms, Record Room, etc.
- Addressable CO+IR Detector to be used in the areas with highly flammable substances such as Chemical Laboratories, Laundries/Washing Areas, DG Rooms, Oil Storage Areas, Lift Mechanical rooms, etc.
- Addressable Duct Detectors having 0.02% obs/ft sensitivity to be installed in all the return air ducts.
- Fire alarm system to have inbuilt capability of Addressable Wireless Smoke/Heat/Multi Detectors for use in the areas with low accessibility for cabling /maintenance & also the provision to add in future without the need of cabling.
- Seamlessly Integrated Public Address Voice Alarm (PAVA) system, integral with the Main FACP, including voice alarm system components, microphones, digital amplifiers, 2W UL Speakers, zone selector keypads and tone generators to be provided of same make as of Fire Alarm System.
- Audible Alarm Notifications.
- Fire fighters' telephone (Talk Back) system as part of main fire alarm system which is two-way, supervised voice communication proposed to link between the MFACP and remote fire fighters' telephone stations. Required loops with 24 hrs. Battery backup with LCD display, printer etc. shall be located in the fire control room.
- Fire Alarm Panels shall be integrated with BMS also.
- Fire alarm system to have inbuilt capability to monitor & control the system remotely over cloud. Necessary hardware shall be part of the main FACP.

- Two Way communication Fire Fighters Telephone Jack & Handset with necessary accessories are to be provided in all the buildings as required.
- Fire Alarm Systems shall be programmable from the Panel itself without the need of any special tools, dongle or any software.

All Fire Alarm Panels shall also be integrated with each other on a peer-to-peer network. A Repeater panel shall be installed in the Main Security Room of whole complex and Guard room in a location clearly visible to the operators and in secured area manned 24 hours a day.

FIRE PANEL AND ANNUNCIATOR:

Microprocessor based Multi-loop, Networkable Addressable Fire Alarm Control Panel with minimum 600 characters LCD display, 4000 trouble events including 1000 alarm log history events, Self-Programmable alphanumeric keypad for programming. The panel should be equipped with sufficient number of loops & each loop shall have a capacity of minimum 130 detectors & 130 devices. The panel shall work in degrade mode in case of CPU failure, Products not having this feature may offer Redundant CPU. Four access levels, flash EPROM, 240 volts AC power supply, automatic battery charger, 24 volts sealed lead acid batteries sufficient for 24 hours normal working and 30 mins in alarm condition with the charging capacity of 200AH. The panel shall be complete with Integrated 8 channel Digital Voice Evacuation System Controller capable of broadcasting Evacuation Messages on same peer-to-peer Network and 2 ways Communication Fire Fighters System capable of supervising all the speaker circuits with adequate zone control and accessories. Failure of Fire Panel CPU shall not result in failure of DVC operation. Products not having this feature must provide dedicated CPU for DVC. The Fire Fighters Telephone System shall be capable of having minimum 30 Telephones in conference in multiple FFT Risers. The panel shall be capable of self-programming without any dependency on dongle or programming software. Quoted rate shall include supply of necessary software & hardware for programming the panel with all necessary license. Panel shall have Modbus/ BACnet over IP protocol for future integration with BMS. However, for present arrangement FA system will be standalone with 24x7 monitoring. The panel shall be capable for remote accessibility on a mobile app through cloud platform/solution. Complied to meet UL864, 10th Edition. (10 Loop with digital voice command).

REPEATER PANEL:

Repeater Panel with Programmable alphanumeric keypad, mapping minimum 2, 00,000 points on network. The NRP shall act as an independent node communicating on the peer-to-peer network and shall not be dependent on the Fire Panel CPU for operation. Failure of Fire Panel CPU shall not result in failure of NRP operation.

Digital Audio Amplifier. Amplifier shall be capable of N: N configuration and shall be dual channel capable of processing Two of 8 audio channels and total of 100 W at 70.7 VRMS output along with necessary enclosures with local FFT Raiser. The Digital Audio Amplifier shall be fully monitored for fault and alarm reporting. The proposed Digital Audio Amplifiers shall (be Wall/Panel Mounted) not be rail mounted / dependant on Fire Panel CPU for operation. Failure of Fire Panel CPU shall not result in failure of Amplifier operation. The Amplifiers shall be distributed across the building/floor to manage the sound attenuation problem & for the best sound intelligibility. All amplifiers shall provide back

up of minimum 5 hours using secondary power source (battery power/UPS power Remote Paging Station for Zone selection & paging to selected area in case of emergency.

SOFTWARE & GATEWAYS:

Supplying, installing, testing and commissioning approved make Graphics User Interface for Monitoring & Control of complete Fire, Voice Evacuation & Telephone Talkback System. The GUI based main network software shall network with other panels on network. It shall be capable of graphically representing each facility being monitored with floor plans and icons depicting the actual locations of the various systems, and / or sensors' locations. It shall have the facility to change the sensitivity of any detector. The software shall be capable of monitoring 200 Nodes with 100 Mbps Transmission rate on Fibre Optics Network and 12 Mbps Transmission on cable and 2,50,000 network points. The software shall be capable to Monitor & Control all the Digital Voice Evacuation as well as 2-way communication from main control room using voice signals over Fire Network along with the Fire detection signal.

The Graphic workstation shall act as an independent node communicating on the peer-to-peer network and shall not be dependent on the Fire Panel CPU for operation. Failure of Fire Panel CPU shall not result in failure of GUI.

Installing, testing and commissioning of OEM make Cloud based service through universal gateway, which shall be enabled through internet. Remote health monitoring solution shall utilize cloud-based software-as-a-service web application & supplementary network gateway hardware. System shall provide secure web access to cloud-based web application using any of the web browsers like Google Chrome (preferable), Internet Explorer etc. from any computer/ tablet/ smartphone connected over internet via defined credentials – username and password. It shall also have the facility to monitor the cloud service over the mobile apps. The cloud-based web application shall capture all fire alarm system data points as received from the system via supplementary gateway hardware of the same make as Fire Alarm Panel. The software shall display real time view of fire system effectiveness, multi-location unified view, custom dashboard, device level information, scheduled reporting, e-mail of critical alarms. The cloud service shall be capable of monitoring 250000 datapoints scattered across multiple install bases spread across multiple geographical locations

SMOKE, HEAT DETECTORS:

Addressable Multi-criteria Photo-Thermal Above False Ceiling Detector with sensitivity range of 0.5 to 4.0% obs/ft. The intelligent multi criteria detection device shall include the ability to combine the signal of the thermal sensor with the signal of the photoelectric signal in an effort to react hastily in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of the thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena. The detector shall have twin bi-colour LED for 360 deg viewing. Addressing shall be with user friendly rotary decimal switches. The detector sensitivity (day & night) shall be controlled from the panel to get accustomed to the local environment. The detector shall comply UL268, 7th Edition guidelines.

Addressable Photoelectric **Smoke Detector** with sensitivity range of 0.5 to 4.0% obs/ft. The detector shall have group decision technology for faster response & avoid false alarms. The detector shall have twin bi-colour LED for 360 deg viewing. Addressing shall be with user friendly rotary decimal switches. The detector shall work on cooperative mode to avoid false alarm. The detector shall comply UL268, 7th Edition guidelines.

Addressable Rate of Rise **Heat Detector** rated at 8.3 deg C/min. The detector shall have twin bi-colour LED for 360 deg viewing. Addressing shall be with user friendly rotary decimal switches. Detector shall comply UL521 guideline.

Response indicator for all detectors located above false ceiling of same make as of Fire Alarm System.

Addressable Duct Smoke Detector

The Duct Detector shall have sensitivity of 0.02% obs/ft with Smoke Probe/Tubes including the cost of mounting accessories complete as per specifications and as required. Product Shall be listed under UL Listed to standard 268A-7th edition & FM approved.

Addressable multi-Criteria CO+IR Detector

- a. Advanced Multi-Criteria Fire/CO detector be an addressable advanced multi-criteria smoke detector with a separate signal for carbon monoxide (CO) detection per UL 2075 standards.
- b. The detector shall be comprised of four sensing elements, including a photoelectric (light-scattering) particulate sensor, an electrochemical CO sensor, a daylight-filtered infrared (IR) sensor and solid-state thermal sensor(s) rated at 135°F (57.2°C). The device shall be able to indicate distinct smoke and heat alarms.

Intelligent High Sensitivity Photo Smoke Detector

The intelligent high sensitivity photo smoke detector shall be a spot type detector that incorporates an extremely bright high sensitivity diode and an integral lens that focuses the light beam to a very small volume near a receiving photo sensor. The scattering of smoke particles shall activate the photo sensor.

- Designed to meet UL268, 7th Edition
- The high sensitivity detector shall have conductive plastic so that dust accumulation is reduced significantly.
- The intelligent high sensitivity photo detector shall have nine sensitivity levels and be sensitive to a minimum obscuration of 0.02% obs/foot.
- The high sensitivity detector shall not require expensive conduit, special fittings or PVC pipe.
- The intelligent high sensitivity photo detector shall support standard, relay, isolator and sounder detector bases.
- The high sensitivity photo detector shall not require other cleaning requirements than those listed in NFPA 72. Replacement, refurbishment or specialized cleaning of the detector head shall not be required.
- The high sensitivity photo detector shall include two bicolour LEDs that flash green in normal operation and turn on steady red in alarm.

NOTIFICATION DEVICE:

Approved make Sounder cum Strobe rated at 80 dBA @ 3m for Audible annunciation and 115cd flashing at 1 Hz for visual indication. UL Listed.2W multi-Tap (0.25W; 0.5W; 1W; 2W), Ceiling & Wall Mount Speakers. The speakers shall be of same make as that of the Control Panel & Amplifiers. They shall be compatible with supplied Amplifiers and shall

Work on 70.7Vrms. Power Supply Unit: 24V DC for Notification Appliances. The PSU shall be UL Listed, supervised by Fire Panel & of the same make as Fire Alarm System.

TELEPHONE TALK BACK:

Addressable Fire Fighter's Telephone Jack with suitable supervised module along with Portable type Fire Telephone Handset for two-way communication between Remote Fire Fighter & Fire Command Centre.

Wiring to detectors shall be carried out with PVC insulated FRLS (IS-964:1990) copper conductorwires / FR screened & shielded copper conductor wires in MS conduits.

Wiring to Critical Loads viz. Ventilation Fans Panels, Pressurization Fan Panels, Fire Pump Panels shall generally be carried with XLPE Insulated Aluminum Conductor Armored Cables.

Conduits in non-false ceiling area shall be recessed in slab.

Commissioning and Testing

- a. Pressurise the fire hydrant system by running the jockey pump and after it attains the shutoff pressure of the pump, then
- b. Open bypass valve and allow the pressure to drop in the system. Check that the jockey pump cuts- in and cuts-out at the preset pressure. If necessary, adjust the pressure switch for the jockey pump. Close by-pass valve.
- c. Open hydrant valve and allow the water to flow into the fire water tank in order to avoid wastage of water. The main fire pump shall cut-in at the preset pressure and shall not cutout automatically on reaching the normal line pressure. The main fire pump shall stop only by manual push button. However, the jockey pump shall cut-out as soon as the main pump starts,
- d. Switch off the main fire pump and test check the diesel engine driven pump in the same manner as the electrically driven pump,
- e. When the fire pumps have been checked for satisfactory working on automatic controls, open fire hydrant valves simultaneously and allow the hose pipes to discharge water into the fire tank to avoid wastage.
- f. Check each landing valve, male and female couplings and branch pipes, for compatibility with each other. Any fitting which is found to be incompatible and do not fit into the other properly shall be replaced by the Contractor. Each landing valve shall also be checked by opening and closing under pressure.
- g. Check all annunciations by simulating the alarm conditions at site.

STATUTORY AUTHORITIES' TESTS AND INSPECTIONS

As and when notified in writing or instructed by the Architect/Engineer in charge, the Contractor shall submit shop drawing and attend all tests and inspections carried out by Local Fire Authorities, Water Authority and other Statutory Authorities, and shall forthwith execute free of charge any rectification work ordered by the Architect as a result of such tests and inspections where these indicate non- compliance with Statutory Regulations. Some of these tests may take place after the issue of Practical Completion of the Main Contract and the Contractor shall make all allowances in this respect.

The Contractor shall be responsible for the submission of all necessary forms and shop drawings to the Statutory Authorities which shall conform in layout to the latest architectural plans submitted to and kept by these Authorities.

The submission shall comply with the requirements set forth in the current Codes of Practice and circular letters of the Statutory Authorities. The shop drawings to be submitted shall be forwarded to the Architect for checking before submission.

The Contractor shall allow for at least two submissions of complete sets of shop drawings to the Authorities, one to be made within six months after the award of the Contract but not less than six weeks before the inspection. The Architect may at his discretion instruct the Contractor for additional submissions to the Local Authorities whenever necessary.

The Contractor shall notify the Architect at least seven days in advance of his application for local Authority tests and inspections. On receipt of a confirmed date for test and inspection the Contractor shall inform the Architect without delay.

FINAL ACCEPTANCE TESTS

Following commissioning and inspection of the entire installation, and prior to issue of the Completion Certificate, the Contractor shall carry out final acceptance tests in accordance with a programme to be agreed with the Architect/Engineer in charge.

Should the results of the acceptance tests show that plant, systems and/or equipment fail to perform to the efficiencies or other performance figures as given in this Specification, the Contractor shall adjust, modify and if necessary, replace the equipment without further payment in order that the required performance is obtained.

Where acceptance tests are required by the relevant Authorities having jurisdiction, these tests shall be carried out by the Contractor prior to the issue of Completion Certificate to the acceptance of the Authorities.

REJECTION OF INSTALLATION / PLANT

Any item of plant or system or component which fails to comply with the requirements of this Specification in any respect whatsoever at any stage of manufacture, test, erection or on completion at site may be rejected by the Architect/Engineer in charge, either in whole or in part as he considers Necessary/appropriate. Adjustment and/or modification work as required by the Architect so as to comply with the Authority's requirements and the intent of the Specification shall be carried out by the Contractor at his own expense and to the satisfaction of the Authority/Architect.

After works have been accepted, the Contractor may be required to carry out assist in carrying out additional performance tests as reasonably required by the Architect/Employer.

WARRANTY AND HANDOVER

The Contractor shall warrant that all plant, materials and equipment supplied and all workmanship performed by him to be free from defects of whatsoever nature before handover to the Owner.

HANDING OVER OF DOCUMENTS

All testing and commissioning shall be done by the Contractor to the entire satisfaction of the Owner's site representative and all testing and commissioning documents shall be handed over to the Owner's site representative.

The Contractor shall also hand over all maintenance and operation manuals, all certificates and all other documentation as per the terms of the contract to the Owner's site representative.

FIRE PROVISIONS:

Fire Fighting Requirements as Per NBC 2016			
S.No.	Building / Provision	Height	Requirements
1	Hospital Building (B2+B1+G+10)		
	Institutional Building 'C-1' (Above 24 M And Not Exceeding 45 M In Height)	44.90	Fire Extinguisher
			First Aid Hose Reel
			Wet Riser
			Yard Hydrant
			Automatic Sprinkler System
			M.O.E.F.A. (With Pa Talk Back)
			Automatic Detection & Alarm System
			200 Kl.- Underground Tank
			20000 Ltr.- Terrace Tank
			2280 Lpm - Diesel Pump - 1 No.
			2280 Lpm - Electric Pump - 2 No.
			180 Lpm - Jockey Pump - 2 No.
2	Academic & Admin Block (B+G+6)		
	Educational Building 'B-2' (Above 24 M And Not Exceeding 30 M In Height)	30.60	Fire Extinguisher
			First Aid Hose Reel
			Wet Riser
			Yard Hydrant
			Automatic Sprinkler System In Basement
			M.O.E.F.A. (With Pa Talk Back)
			50 Kl.- Underground Tank
			5000 Ltr.- Terrace Tank
			1620 Lpm - Diesel Pump - 1 No.
			1620 Lpm - Electric Pump - 1 No.
			180 Lpm - Jockey Pump - 1 No.
			3
Residential Building 'A-1' (Up To 15 Rooms)	7.20	Fire Extinguisher	
4	Multipurpose Hall (G+1)		
	Assembly Building 'D-2' (Above 10 M But Not Exceeding 15 M In Height)	13.20	Fire Extinguisher
			First Aid Hose Reel
			Wet Riser
			M.O.E.F.A.
			Automatic Detection & Alarm System
			100 Kl.- Underground Tank
			5000 Ltr.- Terrace Tank
			2280 Lpm - Diesel Pump - 1 No.
			2280 Lpm - Electric Pump - 1 No.
			180 Lpm - Jockey Pump - 1 No.
			450 Lpm Terrace Pump
			5

	Residential Building 'A-4 (15m And Above But Not Exceeding 35 M In Height)	29.25	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A. (With Pa Talk Back)
			25000 Ltr.- Terrace Tank
			900 Lpm Terrace Pump
6	Jr. Resident Boys Hostel (G+5)		
	Residential Building 'A-4 (15m And Above But Not Exceeding 35 M In Height)	19.80	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A.
			25000 Ltr.- Terrace Tank
		900 Lpm Terrace Pump	
7	Jr. Resident Girls Hostel (G+3)		
	Residential Building 'A-4 (Less Than 15m In Height)	13.50	Fire Extinguisher
			First Aid Hose Reel
			5000 Ltr.- Terrace Tank
		450 Lpm Terrace Pump	
8	Intern Nurse Hostel (G+5)		
	Residential Building 'A-4 (15m And Above But Not Exceeding 35 M In Height)	19.80	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A.
			25000 Ltr.- Terrace Tank
		900 Lpm Terrace Pump	
9	Intern Boys Hostel (G+6)		
	Residential Building 'A-4 (15m And Above But Not Exceeding 35 M In Height)	22.95	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A.
			25000 Ltr.- Terrace Tank
		900 Lpm Terrace Pump	
10	Intern Girls Hostel (G+4)		
	Residential Building 'A-4 (15m And Above But Not Exceeding 35 M In Height)	16.65	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A.
			25000 Ltr.- Terrace Tank
		900 Lpm Terrace Pump	
11	Ug Boys Hostel (G+9)		
	Residential Building 'A-4 (15m And Above but Not Exceeding 35 M In Height)	32.40	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A. (With Pa Talk Back)
			25000 Ltr.- Terrace Tank
		900 Lpm Terrace Pump	
12	Ug Girls Hostel (G+7)		
		26.10	Fire Extinguisher

	Residential Building 'A-4 (15m And Above but Not Exceeding 35 M In Height)		First Aid Hose Reel
			Down Comer
			M.O.E.F.A. (With Pa Talk Back)
			25000 Ltr.- Terrace Tank
			900 Lpm Terrace Pump
13	Principal Residence (G)		
	Residential Building 'A-4 (Less Than 15m In Height)	4.05	Fire Extinguisher
14	Type-5 Residence (S+5)		
	Residential Building 'A-4 (15m And Above but Not Exceeding 35 M In Height)	19.05	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A.
			25000 Ltr.- Terrace Tank
900 Lpm Terrace Pump			
15	Type-4 Residence (S+10)		
	Residential Building 'A-4 (15m And Above but Not Exceeding 35 M In Height)	34.80	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A. (With Pa Talk Back)
			25000 Ltr.- Terrace Tank
900 Lpm Terrace Pump			
16	Type-3 Residence (S+10)		
	Residential Building 'A-4 (15m And Above but Not Exceeding 35 M In Height)	34.80	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A. (With Pa Talk Back)
			25000 Ltr.- Terrace Tank
900 Lpm Terrace Pump			
17	Type-2 Residence (S+10)		
	Residential Building 'A-4 (15m And Above but Not Exceeding 35 M In Height)	34.80	Fire Extinguisher
			First Aid Hose Reel
			Down Comer
			M.O.E.F.A. (With Pa Talk Back)
			25000 Ltr.- Terrace Tank
900 Lpm Terrace Pump			

MODULAR OPERATION THEATERS (with SMS Technology)

GENERAL

The EPC Contractor shall carry out Design, Engineering, Supply, Installation, and Testing & Commissioning of Modular Operation Theatre. Modular Operation Theatre work shall be carried out as per rules & regulation of “CPWD GENERAL SPECIFICATIONS FOR **MODULAR OPERATION THEATRE 2022**” & respective IS codes that governs the requirement of installation of the Modular Operation Theatre. The voltage and frequency of the supply shall subject to variation permissible under Indian Electricity Act and Rules.

Modular OT should be as per Class 200 (CLEAN ROOM STANDARD), BSEN-5682, BSEN 12150 WITH R300mm standard & Design. For Quality assurance, ZED Certificate (Minimum Bronze) should be produced and Products should be manufactured by ISO 9001:2016, ISO 13485:2016 & ISO 7396-1-2016 certified company having enlistment with NSIC, MSME.

In an operation theatre for which the most integrated function is required, cleanliness and sterile area. Air inside the Class 100 MOT must be kept 99.97% pure all time with temperature ranging between 18°C - 21°C, humidity level 25% - 40% must be kept and the safety of facilities, equipment's and devices must be maintained any times. Furthermore, the working environment for medical staff such as Doctors and nurses must be considered from the view point of human engineering.

Only Seamless Modular Operation Theatre CLASS 200 - 3D ARCH SS 304 satisfying those conditions like consists of wall, ceiling, corner & 3D Corner panels, and it is capable of incorporating not only electrical equipment, medical equipment's, medical gas pipe system and lighting equipment's but all the necessary functions and equipment's at need. The Modular Operation Theatre as per NABH guidelines/ Standards must be remaining all the time under positive pressure up to 15 PSI & 20-25 air changes per hour. The highest quality seamless glass operating room must be as per Class 100 standard.

The table below shows Modular Operation theatre components.

Sl. No.	Description
	The MOT system comprises of Following:
1.	Wall Paneling System
2.	Ceiling Paneling System
3.	Laminar Air Flow System
4.	Internal VRV Ducting & Exhaust System
5.	PVC Flooring
6.	Hermetically Sealed Doors
7.	Touch Screen Control Panel
8.	Pressure Relief Dampers
9.	Hatch Box

10.	Operating List Board
11.	X-ray Film Viewer
12.	Scrub Station
13.	Storage Unit
14.	OT Pendants (Anesthetist & Surgeon)
15.	Peripheral lighting & Clean room luminaries
16.	Electrical Installation
17.	Distribution Box
18.	Isolation Panel System (IPS)
19.	Online UPS
20.	Medical Gas Lines Installations
21.	Site Modifications
22.	OT Light with camera, Monitor & Recorder

- **Responsibility of EPC Contractor**

- EPC -Contractor shall be responsible for complete design, construction, testing and commissioning of modular operation theatres based on seamless integration with modular concept for all OTs.
- EPC Contractor shall execute all required civil, electrical and peripheral lighting, plumbing, air-conditioning system (Ducting inside the OT), demolition and other works as may be required for complete installation and trouble-free functioning of the operation theatres as a part of the EPC Contract.
- The EPC Contractor shall be responsible for the complete works including the submission of Working Drawings, layout drawings and walk through view on the basis GFC Drawings.
- EPC Contractor shall be responsible for installation and commissioning of other medical equipment (like Integration Equipment, Monitors, Etc) in coordination with hospital authorities/UPPWD/Consultant
- The EPC Contractor should provide UPS power supply to all OTs minimum 20KVA per MOT
- EPC Contractor shall be responsible for free maintenance of modular operation theatres during DLP, warranty and CMC period inclusive of all consumables.
- EPC Contractor shall be responsible for installation, testing and commissioning of all equipment coming within the MOT as per technical specification of the tender.
- EPC Contractor should coordinate with MGPS and other EPC Contractor s for the successful completion of MOT associated services.
- EPC Contractor shall be responsible for maintaining suitable air conditioning inside the

operation theatre, Setting and monitoring of temperature and RH should be in the scope of EPC Contractor. The temp should be within the range of 18-20deg or 20-22deg as per requirement.

- EPC Contractor should provide factory test certificates for the material user for the construction of modular theatres.
- EPC Contractor should supply complete set of part manuals, service manuals for all the systems and subsystems to be supplied.
- Consignee/ User have to be trained for a week by the engineers from Original Equipment Manufacturer (OEM).
- Final electrical safety test, system test, and calibration should be done as per international standard by authorized persons using calibrated test equipment and declaration should be submitted by the vendor.
- OEM or his authorized agent should post a trained engineer who should be available at site during the DLP period for attending the complaint/service calls/maintenance.
- Regarding Outlets of the Anaesthesia & surgeon Pendants, EPC Contractor's has to supply same type of outlets as installed in the same building/block by MGPS supplier. Before shipment of the Pendants, EPC Contractor s should take necessary action for selecting the same standard outlets and outlets should be European CE approved or UL listed
- EPC Contractor must have a satisfactory installation of complete MOT as asked in tender anddemo may be taken for the same.
- Before panelling the whole wall should be complete with brick works, plastering, putty so that proper hygiene can be maintained
- UPS of MOTs should be placed in dedicated MOT UPS room preferably on same OT floor and also suitable backup of UPS should be provided along with MOT cost.
- Dedicated copper strip earthing should be provided for each MOT/OTs as per standard.
- EPC Contractor should provide hot and cold-water supply with suitable drain and 5/15 A switch sockets at each scrub location as per approved drawings from institute/UPPWD/Consultant
- EPC Contractor should provide required LAN cable, telephone line, etc for each OTs
- EPC Contractor should provide dedicated AHU & air conditioning with aluminum ducts with Nitrate insulation. All AHUs should have suitable pre-filter and fine filters. Duct sizes should be adequate enough to meet the flow and temp requirementof MOTs as per approved drawings.
- The work includes Installation, testing, commissioning of OT equipment, Medical Equipment,Communication Systems, civil works, electrical works, plumbing works, interior decoration, air conditioning ducting and other related works of the Operation Theatre required for the smooth and efficient functioning of the centre. These works shall comply

with all relevant safety and standards guidelines. The EPC Contractor is fully responsible for installation, testing and commissioning of all equipment mentioned in the tender. EPC Contractors are strongly advised to go through the site plans for assessment before the submission of tender offer.

- Inside MOT, only fire-safety sensor/instrument will be installed, no sprinkler will be installed inside the MOT.

SCOPE:

Wall Panelling System

- Design, Supply, Installation testing and commissioning of Wall Panels System as per specification.
- Wall panels should be installed with proper support structure with the modular OT concept.
- The Colour approvals should be taken from UPPWD/Consultant at the time of drawing approval.

• Ceiling Paneling System

- Design, Supply, Installation testing and commissioning of Ceiling Panelling System as per specification.
- Ceiling panels should be installed with proper support structure with the modular OT concept.
- The Color approvals should be taken from UPPWD/Consultant at the time of drawing approval.

• Laminar Air Flow System

- Design, Supply, Installation testing and commissioning of Laminar Air Flow System as per specification.
- The Filters and diffusers should be covered under DLP, warranty and CMC period.
- The system should be meet H14 class or better.

• PVC Flooring

- Supply, Installation testing and commissioning of PVC Flooring as per specification.
- EPC Contractor should take approval for colour/shade along with drawing approval.
- EPC Contractor should maintain the PVC flooring during the DLP, warranty and CMC period free of cost.

• Hermetically Sealed Doors & Window

- Supply, Installation testing and commissioning of Hermetically Sealed Doors as per

specification.

- EPC Contractor should install the Hermetically Sealed Doors (SLD) as per requirement and site conditions.
- The size of MOT main door should be minimum 1.8m (W) x 2.1m (H) and size of Scrub Door is 1.0m (W) x 2.1m (H). The Lead line doors should be installed in MOT for department where frequently C-Arm/ Mobile CT/etc will be used.
- Window should be installed as per site/consignee/UPPWD/Consultant requirement.

- **Touch Screen Control Panel**

- Supply, Installation testing and commissioning of Touch Screen Control Panel as per specification.
- It should be flush mounted on wall; the location will be finalized during drawing approval.

- **Pressure Relief Dampers**

- Supply, Installation testing and commissioning of Touch Pressure Relief Dampers as per specification.

- **Hatch Box**

- Supply, Installation testing and commissioning of Hatch Box as per specification
- It should be faced to dirty corridor only, also may be installed in between the OTs in case of transplant MOTs.

- **Operating List Board**

- Supply, Installation testing and commissioning of Operating List Board as per specification

X-Ray Film Viewer

- Supply, Installation testing and commissioning of X-ray Film Viewer as per specification.

- **Scrub Station**

- Supply, Installation testing and commissioning of Scrub Station as per specification
- It should be appropriate as per MOTs, dedicated scrubs should be provided for each OT.
- Supply, Installation testing and commissioning of Storage Units as per specification

- **OT Pendants (Anesthetist & Surgeon)**

- Supply, Installation testing and commissioning of OT Pendants (Anaesthetist & Surgeon) as per specification

- Pendants should be ceiling mounted with proper support.
- The gas outlets and switch & sockets (Indian Standard) should factory fitted on pendants.
- **Peripheral lighting & Clean room luminaries**
- Supply, Installation testing and commissioning of Peripheral lighting & Clean room luminaries as per specification
- Should be of LED type only and bulb should be covered under DLP, warranty and CMCperiod.
- **Electrical Installation**
- Supply, Installation testing and commissioning of Electrical Installation as per specification
- **Distribution Box (UPS Power and Raw Power)**
- Supply, Installation testing and commissioning of Distribution Box (UPS Power and Raw Power) as per specification
- Each MOT should have dedicated DBs for Raw & UPS power for easy operations of MOTs
- **Isolation Panel System (IPS)**
- Supply, Installation testing and commissioning of Isolation Panel System (IPS) as per specification
- **Online UPS**
- Supply, Installation testing and commissioning of Online UPS as per specification
- **Medical Gas Lines Installations**
- Supply, Installation testing and commissioning of MGPS Line to MOT as per specification
- **OT Light with camera, Monitor & Recorder**
- Supply, Installation testing and commissioning of OT Light with camera, Monitor & Recorderas per specification
- Recorder, Positive pressure system and monitor to be installed in all MOTs.

MEDICAL GAS PIPELINE SYSTEM

GENERAL

The EPC Contractor shall carry out Design, Engineering, Supply, Installation, and Testing & Commissioning of Medical Gas Pipeline System for 248 beds. Medical Gas Pipeline System work shall be carried out as per rules & regulation of “CPWD GENERAL SPECIFICATIONS FOR MEDICAL GAS PIPELINE SYSTEM 2022” & respective IS codes that governs the requirement of installation of the Medical Gas Pipeline System. The voltage and frequency of the supply shall subject to variation permissible under Indian Electricity Act and Rules.

The table below shows Medical Gas Pipeline System components.

Sl. No.	Description
	The MGPS system comprises of Following:
1.	Oxygen Manifold and Emergency oxygen manifold with automatic control panels
2.	Oxygen Flow meter with Humidifier Bottle
3.	Nitrous Oxide Manifold and Emergency NO2 Manifold with automatic control panel
4.	Co2 Manifold and Emergency Co2 Manifold with automatic control panel
5.	Medical Air Supply System (4 Bar & 7 Bar) complete.
6.	Medical Vacuum (suction) Supply System Complete.
7.	Vacuum Units (Ward / Theaters / Low flow)
8.	AGSS system Complete
9.	Distribution Piping Complete with Accessories.
10.	Gas Outlets with Probes
11.	Area Valve Service System & Line Isolation Valve
12.	Alarm Systems (Master & Area)
13.	Bed Head Panels (Vertical & Horizontal)
14.	High pressure tubes for O2, N2O, CO2, AGSS, Compressed Air & Vacuum, Etc.
15.	Electrical Wiring & Requirements
16.	Operation and Maintenance (During DLP)

- **Responsibility of Bidder**

- ❖ Bidder shall be responsible for complete design, supply, installation, testing and commissioning as a turnkey project including demolition, modification and construction, etc as applicable. The bidders are required to survey/study the site plan before furnishing the quotations.
- ❖ Bidder shall execute all required civil, electrical, plumbing, lighting, fire safety,

exhaust systems, false ceiling trap door/ cutout and repair and other works as may be required for complete installation and trouble-free functioning as a part of the 'Turn Key Project'.

- ❖ Dedicated Electrical Control panel for each component should be provided (i.e. Vacuum system, Air plant, AGSS, Manifolds, LMO, Etc). Bidder shall also provide dedicated earthing (Chemical type) for MGPS Plant room.
- ❖ Suitable dedicated trenching should be provided for MGPS lines for passing the MGPS pipes from Service Block to Hospital Block, Hospital Block to Other Blocks/Buildings, wherever MGPS Lines/Outlets are proposed. These trenching should be designed in such a manner that servicing/maintenance of MGPS Line should be possible in case of any problem.
- ❖ The bidder has to terminate/interconnect all the medical gas lines upto/to the OT/MOT.
- ❖ The bidder shall be responsible for the complete works including submission of working drawings, design matrix, flow calculations, loading drawings, and isometric views, etc along with detailed work schedule and materials. Bidder shall be responsible for design, supply, installation, testing and commissioning of medical gas pipeline supply system.
- ❖ The requirement mentioned in the specifications, DBR, tender are minimum requirement only, bidder has to follow the standards wherever applicable.
- ❖ Bidder shall be responsible for free maintenance of all components of Gas pipeline system during warranty period including all filters & consumables. Bidder shall be responsible for operations of MGPS during DLP Period along with free maintenance including consumables & filters.
- ❖ Bidder should provide factory test certificates for the materials used. Bidder should supply complete set of part manuals, service manuals and user manuals for all the systems and subsystems supplied. Final electrical safety test, system test, leakage and calibration should be done by authorized persons using calibrated test equipment as per standards.
- ❖ The offered Medical Gas Pipe Line System must follow Single Standard any one only from: NFPA 99c/HTM 02-01/ ISO 7396-1/DIN/EN except Copper Pipes(Note: Ventury type AGSS is not acceptable)
- ❖ All Gas Outlets in MOT (i.e. O₂, N₂O, MA4, MA7, Vacuum, CO₂, etc) will come with OT Pendants, Bidder has to provide pipe lines upto all MOTs for these services.
- ❖ All points will be given on bed head panel as per the IPHS & NHM.
- ❖ The following systems/Items must be from the same principal company/Manufacturer

(a) Control Panels & Manifold for O₂, N₂O & CO₂

(b) Medical Air Plant

(c) Medical Vacuum Plant

(d) AGSS Plant

(e) Area & Master Alarm

(f) All types Outlets

(g) Oxygen flow meter

(h) AVSU

(i) Line Isolation Valves

(j) High Pressure Tubes

- ❖ The third-party compliance certification after installation to be done for the standard followed i.e. HTM 02-01 /NFPA 99C/DIN/EN/ISO-7396-1 except copper pipe from the authorized agency. The cost for the same will be borne by the bidder.
- ❖ Necessary maintenance of the VIE, AV coil, controllers etc. is the responsibility of the bidder.
- ❖ The bidder should liaise with the Chief Controller of Explosives, Nagpur to get the essential safety clearance certificate. Service charge required for this work should be paid by the contractor and licence fee will be paid by the institute.
- ❖ Bidder should design the manifold room with proper space for filled and empty cylinders and Operator Room with Toilet. MGPS Plant Room (Medical Air Plant, Vc Plant & AGGS) should be Air Condition with proper arrangement of heat dissipation of compressor and pumps.
- ❖ Suitable foundation should be done in MGPS Plant room of minimum 500mm or more, anti- vibration pads should be provided for all compressors and pumps installed in MGPS Plant Room. Manifold room should also have minimum 200mm ironite **or as indicated in specification for** flooring with 1inch rubber mat should be installed in manifold room and loading/unloading platform.
- ❖ Bidder should provide proper road approach for truck/lorry to the Manifold room.
- ❖ Bidder should provide one suitable electric cabling to MGPS Plant room and further distribute through suitable control panels.
- ❖ Bidder should provide minimum below Gas outlet configuration location wise:
 - General Ward Bed (on Wall): O2-1 & Vc-1 for **two** beds of **6 bed ward**
 - Super Specialty Ward Bed (on Wall) : O2-1 & Vc-1 for each bed and MA-1 at one bed of each cubical(4Bed/6Bed/8Bed) Eg. Dept. like Neurology, Neurosurgery, Cardiology, CTVS, Burn, Pediatrics, etc.,
 - ICU/CCU Bed (on BHP) : O2-2, Vc-2 & MA4-2 for each bed Pre-Op

Bed/Emergency (on BHP) : O2-1, Vc-1 & MA4-1 for each bed HDU/Post-Op Bed (on BHP) : O2-2, Vc-2 & MA4- 1 for each bed Treatment/Procedure Room (On Wall): O2-1, Vc-1 and MA4-1 for each bed

- Endoscopy / Etc: O2-1, Vc-1, MA4-1, CO2-1, N2O-1
- Minor OT/Cath Lab/CT/LINAC/Etc (On BHP): O2-2, Vc-2, MA4-1, N2O-1 for each Room(For MRI Pipe line of same services should be provide upto MRI room)

- ❖ All the cylinders should be as per BIS/IS/ASME Standard and the filling of the same should be possible locally.
- ❖ Bidder should provide suitable raised Loading/Unloading Platform of suitable sized adjacent to manifold room, so that cylinder can be loaded & unloaded easily from the lorry/vehicle.
- ❖ Consignee/ User have to be trained for a week by the engineers from Original Equipment Manufacturer (OEM) before handing over the Operations to the Institute (Before DLP Expiry)

- **Oxygen Manifold and Emergency oxygen manifold with automatic control panels**

- ❖ Supply, Installation testing and commissioning of O2 Manifolds & Control Panels as per specification.
- ❖ Oxygen Manifold should be 2x10 with 2x6 Emergency Oxygen Manifold with automatic control panels in both manifolds (i.e. 2x20 & 2x10).
- ❖ The bidder should also provide the filled oxygen cylinders minimum two times of cylinder present in manifold.

- **Oxygen Flow meter with Humidifier Bottle**

- ❖ Supply, Installation testing and commissioning of Oxygen Flow meter with Humidifier Bottle as per specification.
- ❖ Oxygen Flow meter with Humidifier Bottle will be installed at each bed wherever O2 outlets are coming.

- **Nitrous Oxide Manifold and Emergency N2O Manifold with automatic control panel**

- ❖ Supply, Installation testing and commissioning of N2O Manifolds & Control Panels as per specification.
- ❖ N2O Manifold should be 2 x2 with 2x1 Emergency N2O Manifold with automatic control panels in both manifolds (i.e. 2x8 & 2x4).
- ❖ The bidder should also provide the filled cylinders minimum two times extra of cylinder present in manifold as explained in O2 Manifold.

- **CO2 Manifold and Emergency CO2 Manifold with automatic control panel**

- ❖ Supply, Installation testing and commissioning of CO2 Manifolds & Control Panels as per specification
- ❖ CO2 Manifold should be 2x4 with 2x2 Emergency CO2 Manifold with automatic

controlpanels in both manifolds (i.e. 2x4 & 2x2)

- ❖ The bidder should also provide the filled cylinders minimum two time extra of cylinderpresent in manifold as explained in O2 Manifold

- **Medical Air Plant (Package Unit) including electrical control panel**

- ❖ Supply, Installation, testing and commissioning medical air plant having a minimum capacity of **3000LPM** as Primary &**3000LPM** as standby or Total minimum Plant Capacity of **6000LPM** with minimum **1500L** Tank as per specification.
- ❖ The compressor should be of Oil-Less Screw Compressors /Scroll Compressors type only

- **Medical Vacuum Plant (Package unit) including electrical control panel:**

- ❖ Supply, Installation, testing and commissioning of Rotary Vane type medical vacuum plant having a minimum capacity of **3000 LPM** as primary and **3000 LPM** as standby with minimum**3000L** of tank as per specification

- **Ward Vacuum Units, Low Flow Ward Vacuum Unit & Theatre Vacuum Units**

- ❖ Supply, Installation testing and commissioning of Ward Vacuum Units, Low Flow Ward Vacuum Unit & Theatre Vacuum Units as per specification
- ❖ Ward vacuum unit will be installed at each bed wherever Vc Outlets are coming, low flowwill be installed at each paediatric and neonatal bed and theatre vacuum unit will be supplied the twice the number of Operation Theatres

- **AGSS system (Package unit) including electrical control panel:**

- ❖ Supply installation and commissioning of Duplex AGSS system having minimum 2500 LPM as primary and 2500 LPM standby with suitable operating switches in MOTs and tank, if required as per specification.
- ❖ Venturi type is not acceptable.

- **Distribution Piping Complete with Accessories**

- ❖ Supply, Installation, testing and commissioning of Cu Pipes and fittings including two quote painting as per specification

- **Gas Outlets with Probes Supply, Installation, testing and commissioning of Gas Outlets with probe as per specification**

- ❖ Configuration of the outlets should match the requirement as explained in responsibility

- **Area Valve Service Unit & Line Isolation Valve**

- ❖ Supply, Installation, testing and commissioning of Area valve service units and Line isolationvalve as per specification
- ❖ All areas should have AVSU for isolating the particular area for servicing purpose oremergency conditions. In any case one AVSU should not be allocated for more than 35 beds.
- ❖ All ICUs/HDUs/Pre OP/Post Op/Critical Areas and MOTs should have dedicated AVSUs

- ❖ Line Isolation valve should be provided above the false ceiling level at each division of mainpipeline/main raiser line and sub lines where AVSU are not installed.
- **Alarm Systems (Master & Area)**
 - ❖ Supply, Installation, testing and commissioning of MGPS Area Alarm and Master Alarm as per specification
 - ❖ Area Alarms should be installed for all areas and should be installed at Nursing station/ receptions/ registrations/ other visible areas. In any case one area alarm should not be allocated for more than 45 Beds
 - ❖ All ICUs/HDUs/Pre OP/Post Op/Critical Areas and MOTs should have dedicated Area Alarms
- **Bed Head Panels (Vertical & Horizontal)**
 - ❖ Supply, Installation, testing and commissioning of Bed Head Panels (Vertical & Horizontal) as per specification
 - ❖ BHP should be installed as per configuration given in bidder responsibility
 - ❖ Vertical or Horizontal BHP will be installed as per site condition/institute requirement.
- **High pressure tubes for O2, N2O, CO2, AGSS, Compressed Air & Vacuum, Etc.**
 - ❖ Supply, Installation, testing and commissioning as per specification
- **Electrical Wiring & Requirements**
 - ❖ Supply, Installation, testing and commissioning as per specification
- **High pressure tubes for O2, N2O, CO2, AGSS, Compressed Air & Vacuum, Etc.**
 - ❖ Supply, Installation, testing and commissioning as per specification
- **Operation and Maintenance (During DLP)**
 - ❖ Bidder shall depute manpower as per industry standard as minimum specified in specification
 - ❖ All shafts / ducts carrying service lines shall be provided with access platforms / ladders for easy maintenance.

NURSE CALL SYSTEM (FOR 248 BED)

GENERAL

The EPC Contractor shall carry out Design, Engineering, Supply, Installation, and Testing & Commissioning of Nurse Call System for 248 beds. Nurse Call System work shall be carried out as per rules & regulation of “CPWD GENERAL SPECIFICATIONS FOR NURSE CALL SYSTEM 2022” & respective NMC norms/IS codes that governs the requirement of installation of the Nurse Call System.

The scope of this specification cover works of Supplying, installation, testing and commissioning of Nurse Call System for each Bed including the following components on turnkey job basis:

- (i) Main Controllers/ IP Controllers /System switches
- (ii) Nurse Station Terminal
- (iii) External Large LCD Display at Nurse Station or Corridors Display
- (iv) Small Nurse Station/ Duty Room Station
- (v) Patient Handset without voice facility with Connection Module/ Bed Head Unit – for Wards/ Multiple bedded rooms
- (vi) Patient Hand set with voice facility with connection module/Bed Head unit: for private rooms – say Single/Double Bed room/Suite Room/VIP Room
- (vii) Patient call-cancel button without handset – (for remote area hospital, where safety of handset is an issue/ less requirement/ attendant is always available) (viii) Pull cord unit for WC/ Bath area.
- (ix) Lamp Module/ Zone Light/ Directional Light: Outside room/ ward
- (x) Doctor Call & Cancel Button (Code Blue):
- (xi) Room terminal with LC display– For Private Rooms (xii) Nurse Call Server
- (xiii) Backbone / Network switches
- (xiv) Central Monitoring Station with event database software
- (xv) Integration with IPBX System

CENTRAL STERILE SUPPLY DEPARTMENT(CSSD) & LAUNDRY

GENERAL

The EPC Contractor shall carry out Design, Engineering, Supply, Installation, and Testing & Commissioning of **Central Sterile Supply Department (CSSD) & Laundry** for 248 beds as per NMC Norms. Central Sterile Supply Department (CSSD) & Laundry work shall be carried out as per rules & regulation of Ministry of Health & Family Welfare “**GUIDELINES FOR CENTRAL STERILE SUPPLY DEPARTMENT (CSSD) & MECHANIZED LAUNDRY**” & respective IS codes that governs the requirement of installation of the Central Sterile Supply Department (CSSD) & Laundry. The voltage and frequency of the supply shall subject to variation permissible under Indian Electricity Act and Rules.

ELECTRICAL LOAD SHEET CALCULATIONS

MEDICAL COLLEGE BALLIA, U.P. (MEDICAL COLLEGE CAMPUS)				
ELECTRICAL LOAD CALCULATION ESS-01				
SR. NO	AREA DESCRIPTION	CONNECTED LOAD (KW)	D.F.	DEMAND LOAD (IN KW)
1	ACADEMIC (G+6) +ADMIN (G+4)			
	LIGHT LOAD	549.2	0.8	439.4
	POWER LOAD	1901.1	0.5	950.6
	HVAC LOAD	825.8	0.7	578.1
2	GUEST HOUSE (G+1)			
	LIGHT LOAD	19.6	0.8	15.7
	POWER LOAD	83.1	0.5	41.5
3	MP HALL (G+1)			
	LIGHT LOAD	34.0	0.8	27.2
	POWER LOAD	117.7	0.5	58.8
	HVAC LOAD	125.0	0.7	87.5
4	PRINCIPAL RESIDENCE (G)			
	LIGHT LOAD	5.0	0.8	4.0
	POWER LOAD	21.1	0.5	10.6
5	TYPE-05 (S+5)			
	LIGHT LOAD	51.1	0.8	40.9
	POWER LOAD	216.3	0.5	108.2
6	TYPE-04 (S+10)			
	LIGHT LOAD	70.6	0.8	56.4
	POWER LOAD	298.5	0.5	149.3
7	TYPE-03 (S+10)			
	LIGHT LOAD	51.6	0.8	41.3
	POWER LOAD	218.4	0.5	109.2
8	TYPE-02 (S+10)			
	LIGHT LOAD	39.9	0.8	31.9

	POWER LOAD	168.6	0.5	84.3
9	INTERN NURSE HOSTEL (G+5)			
	LIGHT LOAD	21.8	0.8	17.5
	POWER LOAD	92.4	0.5	46.2
10	INTERN GIRLS HOSTEL (G+4)			
	LIGHT LOAD	17.8	0.8	14.3
	POWER LOAD	75.4	0.5	37.7
11	INTERN BOYS HOSTEL (G+5)			
	LIGHT LOAD	24.3	0.8	19.4
	POWER LOAD	102.8	0.5	51.4
12	UG BOYS HOSTEL (G+9)			
	LIGHT LOAD	80.6	0.8	64.4
	POWER LOAD	340.8	0.5	170.4
13	UG GIRLS HOSTEL (G+7)			
	LIGHT LOAD	59.1	0.8	47.3
	POWER LOAD	250.1	0.5	125.0
14	SR. RESIDENT HOSTEL (G+8)			
	LIGHT LOAD	37.8	0.8	30.2
	POWER LOAD	159.8	0.5	79.9
15	JR. RESIDENT BOYS HOSTEL (G+5)			
	LIGHT LOAD	20.9	0.8	16.7
	POWER LOAD	88.4	0.5	44.2
16	JR. RESIDENT GIRLS HOSTEL (G+3)			
	LIGHT LOAD	14.2	0.8	11.4
	POWER LOAD	60.1	0.5	30.1
OTHER UTILITIES				
17	ESS BUILDING	5.00	0.8	4.00
18	LIFT LOAD 32 NOS.	384.00	0.8	307.20
19	EXTERNAL LIGHTING	20.00	0.8	16.00
20	FIRE FIGHTING PUMPS	120.00	0.1	12.00
21	DOMESTIC WATER PUMP	25.00	0.8	20.00
22	ETP/STP	30.00	0.8	24.00
	TOTAL LOAD (IN KW)			4024.11
FOR TRANSFORMAR & DG SET CALCULATIONS				
	OVERALL DIVERSITY @ 70%			2816.88
	IN TERMS OF KVA CONSIDERING 0.8 POWER FACTOR			3521.10
	CONSIDERING THE ALL-DAY EFFICIENCY OF TRANSFORMER TO BE 95% AS PER THE DEMAND LOAD IN KVA			3706.42
TOTAL DEMAND LOAD IS SAY 2500 KVA				
HENCE, WE PROPOSE 3 NO'S 1250KVA OIL TYPE TRANSFORMER				
HENCE, WE PROPOSE 2 NO'S 750 KVA SILENT DG SET				

MEDICAL COLLEGE BALLIA, U.P. (MEDICAL HOSPITAL CAMPUS)				
ELECTRICAL LOAD CALCULATION ESS-02				
SR. NO	AREA DESCRIPTION	CONNECTED LOAD (KW)	D.F.	DEMAND LOAD (IN KW)
1	HOSPITAL (2B+G+10)			
	LIGHT LOAD	483.6	0.8	386.8
	POWER LOAD	1673.8	0.5	836.9
	UPS LOAD	350.0	0.8	280.0
	LIFT LOAD	120.0	0.8	96.0
	HVAC LOAD	1305.5	0.7	913.9
	CSSD & WASHING	50.0	0.8	40.0
	MRI, CT SCAN, X-RAY & OTHER MACHINE LOAD	120.0	0.8	96.0
	OTHER UTILITIES			
2	FIRE FIGHTING PUMPS	120.00	0.1	12.00
3	DOMESTIC WATER PUMP & SUMP PUMP	20.00	0.8	16.00
4	ETP/STP	30.00	0.8	24.00
5	EXTERNAL LIGHTING	10.00	0.8	8.00
	TOTAL LOAD (IN KW)			2709.62
FOR TRANSFORMAR & DG SET CALCULATIONS				
	OVERALL DIVERSITY @ 70%			1896.73
	IN TERMS OF KVA CONSIDERING 0.8 POWER FACTOR			2370.92
	CONSIDERING THE ALL-DAY EFFICIENCY OF TRANSFORMER TO BE 95% AS PER THE DEMAND LOAD IN KVA			2495.70
TOTAL DEMAND LOAD IS SAY 2500 KVA				
HENCE, WE PROPOSE 2 NO'S 1250KVA OIL TYPE TRANSFORMER				
HENCE, WE PROPOSE 1 NO'S 750 KVA SILENT DG SET				

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.					
ACADEMIC BLOCK (B+G+6)					
S.NO.	LOCATION	FLOORING	SKIRTING/DADO	WALL	CEILING
1	Ramp to Basement, Driveway	150mm Thick C.C. pavement of mix M-25 concrete shall be laid and finished with screed board vibrator , vacuum dewatering process and finally finished by floating, brooming with wire brush etc.	1500 mm High Column Guard of minimum thickness of 10 mm rubberised material (100mmx100mm with backing ply of Grade SS-304)	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre
2	Entrance Area, Corridors, Lobby, staircase, lift lobby, porch, Connecting Corridor etc. (Common circulation area)	18mm thick Polished Granite	100 mm High Granite matching with the flooring in Staircase.	18mm thick Polished Granite upto Ceiling Height.- Lift Facia. Vitrified wall tiles upto 1500mm height in common circulation areas i.e corridor, Lobby etc. Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre - Above Dado/Skirting.	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre In corridors , common corridors, entrance lobby, lift / staircase lobby G.I. Metal False Ceiling - 600X600mm is to be provided
3	All Rooms unless specified	Double Charged Vitrified Tiles of min. size 600x600	100 mm High Vitrified Tiles matching with the flooring.	Acrylic emulsion paint above skirting/dado	1st Quality Acrylic distemper with wall putty
4	All Labs, Museum, embalming room, Dissection Hall etc.	Double Charged Vitrified Tiles of min. size 600x600	Ceramic Glazed Tiles of size 300x450 at Dado upto 1500 mm Height	Acrylic emulsion paint above skirting/dado	G.I. Metal False Ceiling - 600X600mm
5	Toilets	300x300mm Anti-Skid Ceramic Tiles.	Ceramic Glazed Tiles of size 300x450 at Dado upto 2400 mm Height	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre	G.I. Metal False Ceiling - 600X600mm
ADMIN BLOCK (B+G+4)					
S.NO.	LOCATION	FLOORING	SKIRTING/DADO	WALL	CEILING
1	Ramp to Basement, Driveway	150mm Thick C.C. pavement of mix M-25 concrete shall be laid and finished with screed board vibrator , vacuum dewatering process and finally finished by floating, brooming with wire brush etc.	1500 mm High Column Guard of minimum thickness of 10 mm rubberised material (100mmx100mm with backing ply of Grade SS-304)	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre
2	Entrance Area, Corridors, Lobby, staircase, lift lobby, porch, Connecting Corridor etc. (Common circulation area)	18mm thick Polished Granite	100 mm High Granite matching with the flooring in Staircase.	18mm thick Polished Granite upto Ceiling Height.- Lift Facia. Vitrified wall tiles upto 1500mm height in common circulation areas i.e corridor, Lobby etc. Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre - Above Dado/Skirting.	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre In corridors , common corridors, entrance lobby, lift / staircase lobby G.I. Metal False Ceiling - 600X600mm is to be provided
3	All Rooms unless specified	Double Charged Vitrified Tiles of min. size 600x600	100 mm High Vitrified Tiles matching with the flooring.	Acrylic emulsion paint above skirting/dado	1st Quality Acrylic distemper with wall putty
4	Principal Office	Double Charged Vitrified Tiles of min. size 600x600	Bamboo wood wall panneling upto 2400mm height.	textured paint (low V.O.C) above skirting/dado	G.I. Metal False Ceiling - 600X600mm
5	Toilets	300x300mm Anti-Skid Ceramic Tiles.	Ceramic Glazed Tiles of size 300x450 at Dado upto 2400 mm Height	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre	G.I. Metal False Ceiling - 600X600mm

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.		
	COMMON SPECIFICATION - ADMIN AND ACADEMIC BLOCK	
	WATER PROOFING	
	RCC Members (Raft, RCC Wall etc in Basement)	Mixing integral crystalline admixture for waterproofing treatment to RCC structures DSR item no . 22.22
	RCC Members (RCC Wall etc in Basement, Water Tanks, Roof slab)	Integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs,
	DOME AT TERRACE	To be constructed in RCC as per design
	ALL DOOR (EXCEPT TOILETS)	uPVC glazed/wire mesh doors comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler (where ever required) extruded profiles having minimum wall thickness 2.10 mm for Series R3 profiles - Casement Doors as per design.
	DOOR STOPPER	Brass hanging type floor door stopper
	HYDRAULIC DOOR CLOUSER (EXCEPT TOILET DOORS)	Aluminium die cast body tubular type universal hydraulic door closer (having brand logo with ISI, IS : 3564, embossed on the body, door weight upto 35 kg and door width upto 700 mm)
	TOILET DOORS	Wood Plastic Composite (WPC) Door Frame of Density between 750 to 1000 Kg Per Cum with frame size 65 x 100mm & 30mm thick Finished WPC Door shutter having minimum density of 650 kg/cum and laminated with PVC foil of minimum 14 microns thick etc.
	WINDOWS & VENTILATORS	uPVC glazed/wire mesh windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler (where ever required) extruded profiles having minimum wall thickness of 1.70 mm for Series R1 and R2 profiles and 2.10 mm for Series R3 and R4 profiles - Casement window double panels or as per design with fixed mullion with S.S. 304 friction hinges as per size and weight of sash, multi-point locking system, zinc alloy (zamak) powder coated handles. (with fly proof stainless steel grade 304 wire gauge) uPVC Fixed ventilator with min 03 partitions, one glazed & one exhaust fan and one with louvers.
	GLAZING IN WINDOW	The windows shall be glazed with sealed double glazed units (IGU) of 24 mm overall thickness, comprising 6 mm thick toughened glass on outer side + 12 mm air gap (filled with dehydrated air/argon gas) + 6.38 mm laminated glass (clear) on inner side, conforming to relevant IS standards. The laminated glass shall consist of two glass panes bonded with PVB interlayer for enhanced safety and acoustic performance. The IGU shall be factory-sealed using aluminium spacer filled with desiccant and secondary sealant, ensuring hermetic sealing. The glazing shall be fixed using EPDM gaskets on both sides along with necessary setting blocks, packers, and approved sealant.
	FIRE DOOR	Glazed Fire Resistant Door as per IS 3614 (Part-II) and Latest version thereof/Latest amendment thereof.
	DOOR/WINDOW FITTINGS	Stainless Steel Fittings (SS-304 Grade)
	RAILING	Stainless Steel of grade SS-304 at all Staircase, Ramps etc.
	LOUVERS	Alluminium Louvers in Ducts.
	STRUCTURAL GLAZING	Structure Glazing with hermetically-sealed 6-12- 6 mm insulated glass (double glazed) and Aluminium Extruded Tubular Sections
	GROVES - BASEMENT FLOORING	Grooves of size 6x15 mm in trimix flooring to provide construction / expansion joints with cutting machine with diamond cutting wheel including providing 6x15 mm back up rod and 25 mm wide masking tap filling joints with sealent etc. complete
	NUMBER ON COLUMN	Writing Number on Column in Painting Area as Per design, layout, marking Boxes and Providing Marking Tape and Painting writing Number with Enamel Paint with using Stansil in Box Shape
	EXPANSION JOINT	Floor, wall and roof joint confirming to DSR code 5.44.1 , 5.45.1 ,5.46.1 respectively

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.										
SCHEDULE OF FINISHES FOR MULTIPURPOSE HALL										
GROUND FLOOR										
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW		D/W FITTINGS
						FRAME	SHUTTER	FRAME	SHUTTER	
1	Office, Green Room, Store	Double Charged Vitrified Tiles of size 600x600mm	100 mm High Vitrified Tiles matching with the flooring.	1st Quality Acrylic distemper with wall putty above skirting/dado	600X600 G.I. Metal False Ceiling	Second Class Teak Wood Frame fixed in position with dash fasteners	ISI marked 35 mm thick flush door shutters with 1.0mm decorative high pressure laminated sheet both sides and lipping with 2nd class teak wood battens 25 mm thick.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
2	MP HALL, ENTRANCE, CORRIDOR, WINDOW SILLS, PLATFORMS	18mm thick Polished Granite of approved shade	18mm thick Polished Granite in approved shade/ Pattern - 100mm skirting	Bamboo wood wall panneling upto 2400mm height.	1st Quality Acrylic distemper with wall putty	Second Class Teak Wood Frame fixed in position with dash fasteners	ISI marked 35 mm thick flush door shutters with 1.0mm decorative high pressure laminated sheet both sides and lipping with 2nd class teak wood battens 25 mm thick.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
3	COURTS ,GYMS ETC	15 mm thk heavy duty rubber flooring above 62mm CC flooring	Same as flooring material , approved in all respects	1st Quality Acrylic distemper with wall putty	600X600 G.I. Metal False Ceiling	Second Class Teak Wood Frame fixed in position with dash fasteners	ISI marked 35 mm thick flush door shutters with 1.0mm decorative high pressure laminated sheet both sides and lipping with 2nd class teak wood battens 25 mm thick.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
4	STAGE	Wooden Flooring		Bamboo wood wall panneling upto 2400mm height.	600X600 G.I. Metal False Ceiling					
3	TOILETS	300x300mm Anti-Skid Ceramic Tiles.	Ceramic Glazed Tiles of size 300x450 at Dado upto 2400mm Height	Ceramic Glazed Tiles of size 300x450 at Dado upto 2400mm Height	600X600 G.I. Metal False Ceiling	Factory made single extruded WPC (Wood Polymer Composite) solid door Frames of size 65mmX100mm	30mm thick factory made single extruded WPC (Wood Polymer Composite) solid plain flush door shutter.	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.	S.S. 304 grade Fittings
4	STAIRCASE	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern	100 mm High Granite matching with the flooring in Staircase.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.	S.S. 304 grade Fittings
5	RAMP	Chequered terrazzo tiles 22 mm thick with graded marble chips of size up to 6 mm in floors.	-	-	-	-	-	-	-	-

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.										
SCHEDULE OF FINISHES FOR GUEST HOUSE										
GROUND FLOOR										
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW		D/W FITTINGS
						FRAME	SHUTTER	FRAME	SHUTTER	
1	ROOMS , DINING ROOM , CARETAKER ,ROOM , C.B.	Double Charged Vitrified Tiles of size 600x600mm	100 mm High Vitrified Tiles matching with the flooring.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Second Class Teak Wood Frame fixed in position with dash fasteners	ISI marked 35 mm thick flush door shutters with 1.0mm decorative high pressure laminated sheet both sides and lipping with 2nd class teak wood battens 25 mm thick.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
2	STORE, KITCHEN , DRY / COLD STORAGE , PANTRY	Anti skid /matt finished Vitrified Tiles of size 600x600mm	Ceramic Glazed Tiles of size 300x450 at Dado upto 2400mm Height	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Second Class Teak Wood Frame fixed in position with dash fasteners	ISI marked 35 mm thick flush door shutters with 1.0mm decorative high pressure laminated sheet both sides and lipping with 2nd class teak wood battens 25 mm thick.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
3	TOILETS	300x300mm Anti-Skid Ceramic Tiles.	Ceramic Glazed Tiles of size 300x450 at Dado upto 2400mm Height	Ceramic Glazed Tiles of size 300x450 at Dado upto 2400mm Height	600X600 G.I. Metal False Ceiling	Factory made single extruded WPC (Wood Polymer Composite) solid door Frames of size 65mmX100mm	30mm thick factory made single extruded WPC (Wood Polymer Composite) solid plain flush door shutter.	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.	S.S. 304 grade Fittings
4	STAIRCASE , CORRIDOR ,MEETING ROOM ,LOUNGE AREA	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern	100 mm High Granite matching with the flooring in Staircase.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.	S.S. 304 grade Fittings
5	PORCH	Chequered terrazzo tiles 22 mm thick with graded marble chips of size up to 6 mm in floors.	-	-	1st Quality Acrylic distemper with wall putty	-	-	-	-	-

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.										
SCHEDULE OF FINISHES FOR PRINCIPAL RESIDENCE										
GROUND FLOOR										
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW		D/W FITTINGS
						FRAME	SHUTTER	FRAME	SHUTTER	
1	GUEST ROOM , BED ROOMS , DRESS , SERVANT ROOM	Double Charged Vitrified Tiles of size 600x600mm	100 mm High Vitrified Tiles matching with the flooring.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Second Class Teak Wood Frame fixed in position with dash fasteners	ISI marked 35 mm thick flush door shutters with 1.0mm decorative high pressure laminated sheet both sides and lipping with 2nd class teak wood battens 25 mm thick.	Second Class Teak Wood Frame fixed in position with dash fasteners	2nd Class Teak Wood Glazed Shutter	S.S. 304 grade Fittings
2	KITCHEN	Anti skid /matt finished Vitrified Tiles of size 600x600mm	Ceramic Glazed Tiles of size 300x450 at Dado upto 3000 mm Height - in toilets , 2100 mm height in kitchen	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Second Class Teak Wood Frame fixed in position with dash fasteners	ISI marked 35 mm thick flush door shutters with 1.0mm decorative high pressure laminated sheet both sides and lipping with 2nd class teak wood battens 25 mm thick.	Second Class Teak Wood Frame fixed in position with dash fasteners	2nd Class Teak Wood Glazed Shutter	S.S. 304 grade Fittings
3	TOILETS	300x300mm Anti-Skid Ceramic Tiles.	Ceramic Glazed Tiles of size 300x450 at Dado upto 3000 mm Height	Ceramic Glazed Tiles of size 300x450 at Dado upto 2400mm Height	600X600 G.I. Metal False Ceiling	Factory made single extruded WPC (Wood Polymer Composite) solid door Frames of size 65mmX100mm	30mm thick factory made single extruded WPC (Wood Polymer Composite) solid plain flush door shutter.	Second Class Teak Wood Frame fixed in position with dash fasteners	2nd Class Teak Wood Glazed Shutter	S.S. 304 grade Fittings
4	GARAGE	62 MM THK CC flooring			1st Quality Acrylic distemper with wall putty					
5	PORCH	400x400mm Anti-Skid Pavit Pavement Tile (min 9.8mm thick) And 600x600 tactile tile in two shades (Yellow and Red) as per design	-	-	1st Quality Acrylic distemper with wall putty	-	-	-	-	-

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.										
SCHEDULE OF FINISHES FOR RESIDENCE BUILDING 1. TYPE -2 (S+10) 2. TYPE -3 (S+10) 3. TYPE -4 (S+10) 4. TYPE -5 (S+5)										
TYPICAL FLOORS										
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW		D/W FITTINGS
						FRAME	SHUTTER	FRAME	SHUTTER	
1	BEDROOM, MASTER BEDROOM, DRAWING ROOM, HALL	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	100 mm High Vitrified Tiles matching with the flooring.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	M.S. Tubular frame fixing with carbon steel galvanised dash fastener. The entrance & Balcony door frame will have double rebate doors with SS 304 wire mesh.	ISI marked 35 mm thick flush door shutters with 1.5mm decorative high pressure laminated sheet both sides, 25 mm thick minimum lipping and vision panel 200x300 mm.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
2	KITCHEN, PANTRY, BALCONY	Glazed Vitrified tiles Antiskid finish of size 600x600 with min thickness of 9mm.	Ceramic Glazed Tiles of size 300x450 with min thickness of 8mm at Dado upto Ceiling Height	Ceramic Glazed Tiles of size 300x450 with min thickness of 8mm at Dado upto Ceiling Height	1st Quality Acrylic distemper with wall putty	M.S. Tubular frame fixing with carbon steel galvanised dash fastener. The Balcony door frame will have double rebate doors with SS 304 wire mesh.	ISI marked 35 mm thick flush door shutters with 1.5mm decorative high pressure laminated sheet both sides, 25 mm thick minimum lipping and vision panel 200x300 mm.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
3	ENTRANCE, CORRIDOR, LIFT LOBBY	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern upto Ceiling Height.- Lift Facia and 100mm skirting in rest area.	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern upto Ceiling Height.- Lift Facia and 1st Quality Acrylic distemper with wall putty above skirting/dado in rest area	1st Quality Acrylic distemper with wall putty	M.S. Tubular frame fixing with carbon steel galvanised dash fastener. The entrance & Balcony door frame will have double rebate doors with SS 304 wire mesh.	ISI marked 35 mm thick flush door shutters with 1.5mm decorative high pressure laminated sheet both sides, 25 mm thick minimum lipping and vision panel 200x300 mm.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
4	TOILETS	300x300mm Anti-Skid Ceramic Tiles of min 8mm thickness	Ceramic Glazed Tiles of size 300x450 with min thickness of 8mm at Dado upto Ceiling Height	Ceramic Glazed Tiles of size 300x450 with min thickness of 8mm at Dado upto Ceiling Height with SS 304 fittings, Granite Counters, Rimless Counter Sunk Basins, Mirrors With Moulded PVC Frame	600X600 G.I. Metal False Ceiling	Wood Plastic Composite (WPC) Door Frame of Density between 750 to 1000 Kg Per Cum as per CPWD Specification with frame size 65 x 100mm as per CPWD DSR Item 26.86.5	30mm thick Finished WPC Door having minimum density of 650 kg/cum and laminated with PVC foil of minimum 14 microns thick as per CPWD DSR Item 26.87.1	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.	S.S. 304 grade Fittings
5	STAIRCASE	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern	100 mm High Granite matching with the flooring in Staircase.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.	S.S. 304 grade Fittings
6	STILT	Vacuum Dewatered Cement Concrete Flooring of 125 mm thickness (M-30)								
7	RAMP	Chequered terrazzo tiles 22 mm thick with graded marble chips of size up to 6 mm in floors.	-	-	-	-	-	-	-	-

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.										
SCHEDULE OF FINISHES FOR										
1. SENIOR RESIDENCE (G+8) 2. JUNIOR RESIDENCE GIRLS (G+3) 3. JUNIOR RESIDENCE BOYS (G+5) 4. UG BOYS HOSTEL (G+9) 5. UG GIRLS HOSTEL (G+7) 6. INTERN BOYS HOSTEL (G+6) 7. INTERN GIRLS HOSTEL (G+4) 8. INTERN NURSES HOSTEL (G+5)										
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW		D/W FITTINGS
						FRAME	SHUTTER	FRAME	SHUTTER	
1	RESIDENCES -- LIVING ROOM , KITCHEN , BEDROOM , WARDROBE. HOSTELS -- RECORD ROOM , VISITOR ROOM , STAFF ROOM , DINING HALL , KITCHEN , SERVANT ROOM , COMMON HALL , WR	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	100 mm High Vitrified Tiles matching with the flooring.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Sal Wood Frame fixed in position with hold fast lugs or with dash fasteners as per CPWD DSR Item 9.1.1	ISI marked 35 mm thick flush door shutters with 1.5mm decorative high pressure laminated sheet both sides, 25 mm thick minimum lipping	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
2	RESIDENCES -- PORCH , ENTRANCE LOBBY , BALCONY , COMMON HALL , CORRIDORS HOSTELS -- ENTRANCE LOBBY , BALCONY , CORRIDORS	Glazed Vitrified tiles Antiskid finish of size 600x600 with min thickness of 9mm.	100 mm High Vitrified Tiles matching with the flooring.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Sal Wood Frame fixed in position with hold fast lugs or with dash fasteners as per CPWD DSR Item 9.1.1	ISI marked 35 mm thick flush door shutters with 1.5mm decorative high pressure laminated sheet both sides, 25 mm thick minimum lipping	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.	S.S. 304 grade Fittings
3	RESIDENCES AND HOSTELS - STAIRCASE	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern	100 mm High Granite matching with the flooring in Staircase.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof. , Mumty door would be MS Sheet Door.	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.	S.S. 304 grade Fittings
4	RESIDENCES AND HOSTELS - TOILETS	300x300mm Anti-Skid Ceramic Tiles of min 8mm thickness	Ceramic Glazed Tiles of size 300x450 with min thickness of 8mm at Dado upto 2100 mm	Ceramic Glazed Tiles of size 300x450 with min thickness of 8mm at Dado upto 2100 mm Height with SS 304 fittings, Granite Counters, Rimless Counter Sunk Basins, Mirrors With Moulded PVC Frame	600X600 G.I. Metal False Ceiling	Wood Plastic Composite (WPC) Door Frame of Density between 750 to 1000 Kg Per Cum as per CPWD Specification with frame size 65 x 100mm as per CPWD DSR Item 26.86.5	30mm thick Finished WPC Door having minimum density of 650 kg/cum and laminated with PVC foil of minimum 14 microns thick as per CPWD DSR Item 26.87.1	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.	S.S. 304 grade Fittings
4	RAMP - RESIDENCES RAMP - HOSTELS	Chequered terrazzo tiles 22 mm thick with graded marble chips of size up to 6 mm in floors.	-	-	-	-	-	-	-	-

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.										
SCHEDULE OF FINISHES FOR ESS										
GROUND FLOOR										
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW		D/W FITTINGS
						FRAME	SHUTTER	FRAME	SHUTTER	
1	OFFICE	Double Charged Vitrified Tiles of size 600x600mm	100 mm High Vitrified Tiles macthing with the flooring.	1st Quality Acrylic distemper with wall putty above skirting/dado	1st Quality Acrylic distemper with wall putty	M.s. Tubular frame with ISI marked 35 mm thick flush door shutters with 1.0mm decorative high pressure laminated sheet both sides and lipping with 2nd class teak wood battens 25 mm thick.		M.s. Tubular frame with 5.50 mm thick glass pane and MS grill		S.S. 304 grade Fittings
2	LT. PANEL , HT. PANEL ,HT METER ROOM	Cement concrete flooring of 40 mm		1st Quality Acrylic distemper with wall putty above skirting/dado	2nd Quality Acrylic distemper with wall putty above skirting/dado	Rolling shutters		MS / Aluminium louvers		
3	TOILET	300x300mm Anti-Skid Ceramic Tiles.	Ceramic Glazed Tiles of size 300x450 at Dado upto 2100 mm Height	Ceramic Glazed Tiles of size 300x450 at Dado upto 2100 mm Height	1st Quality Acrylic distemper with wall putty	Factory made single extruded WPC (Wood Polymer Composite) solid door Frames of size 65mmX100mm	30mm thick factory made single extruded WPC (Wood Polymer Composite) solid plain flush door shutter.	M.s. Tubular frame with 5.50 mm thick glass pane and MS grill		
4	RAMP	Chequered terrazzo tiles 22 mm thick with graded marble chips of size up to 6 mm in floors.			1st Quality Acrylic distemper with wall putty					

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.									
SCHEDULE OF FINISHES FOR HOSPITAL BUILDING									
BASEMENT-1 & 2									
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW	
						FRAME	SHUTTER	FRAME	SHUTTER
1	PARKING AREA, RAMP TO BASEMENT, DRIVEWAY	150 MM THK Providing and laying C.C. pavement of mix M-25 with ready mixed concrete from batching plant. The ready mixed concrete shall be laid and finished with screed board vibrator , vacuum dewatering process and finally finished by floating, brooming with wire brush etc. complete as per specifications and directions of Engineer-in charge. (The panel shuttering work shall be paid for separately). (Note:- Cement content considered in this item is @ 330 kg/cum. Excess/less cement used as per design mix is payable/ recoverable separately). as per CPWD DSR Item 16.75	1500 mm High Column Guard of minimum thickness of 10 mm rubberised material (100mmx100mm with backing ply (Grade SS-304)	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	NA	NA	NA	NA
2	STORES , REGISTRATION & WAITING AREAS , ROOMS, CCSD , LAUNDARY AND PASSAGES	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2 , over dado - Distempering with 1st quality acrylic distemper with two or more coats upto ceiling height	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Sal Wood Frame fixed in position with hold fast lugs or with dash fasteners as per CPWD DSR Item 9.1.1	ISI marked 35 mm thick flush door shutters conforming to IS:2202 (Part-I) with 1.5mm decorative high pressure laminated sheet on both sides, 25 mm thick minimum lipping and vision panel 200x300 mm as per CPWD DSR Item 9.21.1 & DSR Item 9.127.1.	uPVC windows comprising of lead free mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm. , Double glass units in Automatically ventilated areas as per item DSR 25.3	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.
3	COMMON TOILETS (MALE & FEMALE)	300x300mm Anti-Skid Ceramic Tiles of min 7.8mm thickness as per CPWD DSR Item 11.39.	Ceramic Glazed Tiles of size 300x450 with min thickness of 7.8mm at Dado upto 2400 mm Height as per CPWD DSR Item 8.31.	Ceramic Glazed Tiles of size 300x450 with min thickness of 7.8mm at Dado upto 2400 mm Height as per CPWD DSR Item 8.31. . Distemping above dado to ceiling height.	G.I. Metal False Ceiling - 600X600mm and 0.5mm thick with 25mm hight made of GI sheet galvanising of 100gms both sides as per CPWD specification Item 12.19A & DSR Item 12.54.2	Wood Plastic Composite (WPC) Door Frame of Density between 750 to 1000 Kg Per Cum as per CPWD Specification with frame size 65 x 100mm as per CPWD DSR Item 26.86.5	30mm thick Finished WPC Door having minimum density of 650 kg/cum and laminated with PVC foil of minimum 14 microns thick as per CPWD DSR Item 26.87.1	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.
4	STAIRCASE, LIFT LOBBY	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern And 600x600 tactile tile in two shades (Yellow and Red as per design) as per CPWD DSR Item 11.56.1	100 mm High Granite matching with the flooring in Staircase as per CPWD DSR Item 8.9.1.2	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern upto Ceiling Height.- Lift Facia as per CPWD DSR Item 8.9.1.2	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Structure Glazing ,	Structure Glazing

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.									
SCHEDULE OF FINISHES FOR HOSPITAL BUILDING									
GROUND FLOOR									
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR FRAME	SHUTTER	WINDOW FRAME	SHUTTER
1	ALL RAMPS	Chequered terrazzo tiles 22 mm thick with graded marble chips of size up to 6 mm in floors.	N/A	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	NA	NA	NA	NA
2	REGISTRATION COUNTER, DISPENSARY, CENTRAL HOSPITAL PHARMACY , REPORT DISTRIBUTION, SAMPLE COLLECTION AREA	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2 , over dado - Distempering with 1st quality acrylic distemper with two or more coats upto ceiling height	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Alumnium door frame with approved z setion confirming to IS :733 and IS : 1285 as per CPWD DSR Item no 21.1.1.2	Alumnium door shutters (powder coated alumnium min. thickness of powder coating 50 micron) as per CPWD DSR Item no 21.1.2.2 , with glazing near reg. counter , dispensery , etc confirming to item no . 21.3.2 of CPWD DSR Internal partions of 2100 mm ht. in dispensary , sample collection area - with 12 mm particle board confirming to IS : 12823 as per item no 21.2.2 of CPWD DSR	Alumnium window / ventilation frame with approved z setion confirming to IS :733 and IS : 1285 as per CPWD DSR Item no 21.1.1.2	Alumnium window / ventillation shutters (powder coated alumnium min. thickness of powder coating 50 micron) as per CPWD DSR Item no 21.1.2.2 , with glazing near reg. counter , dispensery , etc confirming to item no . 21.3.2 of CPWD DSR Internal partions of 2100 mm ht. in dispensary , sample collection area - with 12 mm particle board confirming to IS : 12823 as per item no 21.2.2 of CPWD DSR
3	EXAMINATION ROOMS , WAITING AREA , STORE , DISPENSARY, STAFF ROOMS , COMMON PASSAGES	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2 , over dado - Distempering with 1st quality acrylic distemper with two or more coats upto ceiling height	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Sal Wood Frame fixed in position with hold fast lugs or with dash fasteners as per CPWD DSR Item 9.1.1	ISI marked 35 mm thick flush door shutters conforming to IS:2202 (Part-I) with 1.5mm decorative high pressure laminated sheet on both sides, 25 mm thick minimum lipping and vision panel 200x300 mm as per CPWD DSR Item 9.21.1 & DSR Item 9.127.1.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm. , Double glass units in Automatically ventillated areas.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.
4	STAIRCASE, LIFT LOBBY	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern And 600x600 tactile tile in two shades (Yellow and Red as per design) as per CPWD DSR Item 11.56.1	100 mm High Granite matching with the flooring in Staircase as per CPWD DSR Item 8.9.1.2	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern upto Ceiling Height.- Lift Facia as per CPWD DSR Item 8.9.1.2	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Structure Glazing ,	Structure Glazing
5	MAJOR O.T. & MINOR O.T.	Anti Static	As per Modular OT Specification	As per Modular OT Specification	Alluminium Plain Ceiling Tiles 600mmX600mm	Sal Wood Frame of 60x100 mm	ISI marked 35 mm thick flush door shutters conforming to IS:2202 (Part-I) with 1.5mm decorative high pressure laminated sheet on both sides, 25 mm thick minimum lipping and vision panel 200x300 mm as per CPWD DSR Item 9.21.1 & DSR Item 9.127.1.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm. , Double glass units in Automatically ventillated areas.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.
6	ATTACHED & COMMON TOILETS	300x300mm Anti-Skid Ceramic Tiles of min 7.8mm thickness as per CPWD DSR Item 11.39.	Ceramic Glazed Tiles of size 300x450 with min thickness of 7.8mm at Dado upto 2400 mm Height as per CPWD DSR Item 8.31.	Ceramic Glazed Tiles of size 300x450 with min thickness of 7.8mm at Dado upto 2400 mm Height as per CPWD DSR Item 8.31. , Distemprring above dado to ceiling height.	G.I. Metal False Ceiling - 600X600mm and 0.5mm thick with 25mm hight made of GI sheet galvanising of 100gms both sides as per CPWD specification Item 12.19A & DSR Item 12.54.2	Wood Plastic Composite (WPC) Door Frame of Density between 750 to 1000 Kg Per Cum as per CPWD Specification with frame size 65 x 100mm as per CPWD DSR Item 26.86.5	30mm thick Finished WPC Door having minimum density of 650 kg/cum and laminated with PVC foil of minimum 14 microns thick as per CPWD DSR Item 26.87.1	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.									
SCHEDULE OF FINISHES FOR HOSPITAL BUILDING									
FIRST FLOOR									
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW	
						FRAME	SHUTTER	FRAME	SHUTTER
1	ALL RAMPS	Chequered terrazzo tiles 22 mm thick with graded marble chips of size up to 6 mm in floors.	N/A	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	NA	NA	NA	NA
2	REGISTRATION COUNTER, DISPENSARY, SCRUB STATION	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2 , over dado - Distempering with 1st quality acrylic distemper with two or more coats upto ceiling height	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Alumnnium door frame with approved z section confirming to IS :733 and IS : 1285 as per CPWD DSR Item no 21.1.1.2	Alumnnium door shutters (powder coated aluminum min. thickness of powder coating 50 micron) as per CPWD DSR Item no 21.1.2.2 , with glazing near reg. counter , dispensery , etc confirming to item no . 21.3.2 of CPWD DSR Intenal partions of 2100 mm ht. in dispensary , sample collection area - with 12 mm particle board confirming to IS : 12823 as per item no 21.2.2 of CPWD DSR	Alumnnium window / ventilation frame with approved z setion confirming to IS :733 and IS : 1285 as per CPWD DSR Item no 21.1.1.2	Alumnnium window / ventilation shutters (powder coated aluminum min. thickness of powder coating 50 micron) as per CPWD DSR Item no 21.1.2.2 , with glazing near reg. counter , dispensery , etc confirming to item no . 21.3.2 of CPWD DSR Intenal partions of 2100 mm ht. in dispensary , sample collection area - with 12 mm particle board confirming to IS : 12823 as per item no 21.2.2 of CPWD DSR
3	ALL ROOMS AND OTHER AREAS , EXCEPT FOR LIFT LOBBY , STAIRCASE , OT ,AND COMMON TOILETS SAME IS TO BE FOLLOWED	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2 , over dado - Distempering with 1st quality acrylic distemper with two or more coats upto ceiling height	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Sal Wood Frame fixed in position with hold fast lugs or with dash fasteners as per CPWD DSR Item 9.1.1	ISI marked 35 mm thick flush door shutters conforming to IS:2202 (Part-I) with 1.5mm decorative high pressure laminated sheet on both sides, 25 mm thick minimum lipping and vision panel 200x300 mm as per CPWD DSR Item 9.21.1 & DSR Item 9.127.1.	uPVC windows comprising of lead free mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm. , Double glass units in Automatically ventillated areas.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.
4	STAIRCASE, LIFT LOBBY	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern And 600x600 tactile tile in two shades (Yellow and Red as per design) as per CPWD DSR Item 11.56.1	100 mm High Granite matching with the flooring in Staircase as per CPWD DSR Item 8.9.1.2	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern upto Ceiling Height.- Lift Facia as per CPWD DSR Item 8.9.1.2	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Structure Glazing ,	Structure Glazing
5	MAJOR O.T. & MINOR O.T.	Anti Static	As per Modular OT Specification	As per Modular OT Specification	Alluminium Plain Ceiling Tiles 600mmX600mm	Sal Wood Frame of 60x100 mm	ISI marked 35 mm thick flush door shutters conforming to IS:2202 (Part-I) with 1.5mm decorative high pressure laminated sheet on both sides, 25 mm thick minimum lipping and vision panel 200x300 mm as per CPWD DSR Item 9.21.1 & DSR Item 9.127.1.	uPVC windows comprising of lead free mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm. , Double glass units in Automatically ventillated areas.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.
6	ATTACHED & COMMON TOILETS	300x300mm Anti-Skid Ceramic Tiles of min 7.8mm thickness as per CPWD DSR Item 11.39.	Ceramic Glazed Tiles of size 300x450 with min thickness of 7.8mm at Dado upto 2400 mm Height as per CPWD DSR Item 8.31.	Ceramic Glazed Tiles of size 300x450 with min thickness of 7.8mm at Dado upto 2400 mm Height as per CPWD DSR Item 8.31. . Distemping above dado to ceiling height.	G.I. Metal False Ceiling - 600X600mm and 0.5mm thick with 25mm hight made of GI sheet galvanising of 100gms both sides as per CPWD specification Item 12.19A & DSR Item 12.54.2	Wood Plastic Composite (WPC) Door Frame of Density between 750 to 1000 Kg Per Cum as per CPWD Specification with frame size 65 x 100mm as per CPWD DSR Item 26.86.5	30mm thick Finished WPC Door having minimum density of 650 kg/cum and laminated with PVC foil of minimum 14 microns thick as per CPWD DSR Item 26.87.1	uPVC ventilators comprising of lead free mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.									
SCHEDULE OF FINISHES FOR HOSPITAL BUILDING									
SECOND FLOOR TO TENTH FLOOR									
S.NO.	SPACES	FLOORING	SKIRTING/DADO	WALL	CEILING	DOOR		WINDOW	
						FRAME	SHUTTER	FRAME	SHUTTER
1	ALL RAMPS	Chequered terrazzo tiles 22 mm thick with graded marble chips of size up to 6 mm in floors.	N/A	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	NA	NA	NA	NA
2	DISPENSARY / NURSE STATION (SECOND FLOOR TO TENTH FLOOR)	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2 , over dado - Distempering with 1st quality acrylic distemper with two or more coats upto ceiling height	G.I. Metal False Ceiling - 600X600mm and 0.5mm thick with 25mm hight made of GI sheet galvanising of 100gms both sides as per CPWD specification Item 12.19A & DSR Item 12.54.2	Alumnnium door frame with approved z section confirming to IS :733 and IS : 1285 as per CPWD DSR Item no 21.1.1.2	Alumnnium door shutters (powder coated aluminum min. thickness of powder coating 50 micron) as per CPWD DSR Item no 21.1.2.2 , with glazing near reg. counter , dispensery , etc confirming to item no . 21.3.2 of CPWD DSR Intenal partions of 2100 mm ht. in dispensary , sample collection area - with 12 mm particle board confirming to IS : 12823 as per item no 21.2.2 of CPWD DSR	Alumnnium window / ventilation frame with approved z section confirming to IS :733 and IS : 1285 as per CPWD DSR Item no 21.1.1.2	Alumnnium window / ventilation shutters (powder coated aluminum min. thickness of powder coating 50 micron) as per CPWD DSR Item no 21.1.2.2 , with glazing near reg. counter , dispensery , etc confirming to item no . 21.3.2 of CPWD DSR Intenal partions of 2100 mm ht. in dispensary , sample collection area - with 12 mm particle board confirming to IS : 12823 as per item no 21.2.2 of CPWD DSR
3	ALL ROOMS AND OTHER AREAS , EXCEPT FOR LIFT LOBBY , STAIRCASE , OT ,AND COMMON TOILETS SAME IS TO BE FOLLOWED	Double Charged Vitrified Tiles of size 600x600 with min thickness of 9mm.	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2	Vitrified wall Tiles of size 600 x 600 at Dado upto 1500 mm Height as per CPWD DSR Item 11.46.2 , over dado - Distempering with 1st quality acrylic distemper with two or more coats upto ceiling height	G.I. Metal False Ceiling - 600X600mm and 0.5mm thick with 25mm hight made of GI sheet galvanising of 100gms both sides as per CPWD specification Item 12.19A & DSR Item 12.54.2 Except in OT areas , Staircase and ramp area same is to be followed	Sal Wood Frame fixed in position with hold fast lugs or with dash fasteners as per CPWD DSR Item 9.1.1 , Mumty door is to be M.S. sheet door	ISI marked 35 mm thick flush door shutters conforming to IS:2202 (Part-I) with 1.5mm decorative high pressure laminated sheet on both sides, 25 mm thick minimum lipping and vision panel 200x300 mm as per CPWD DSR Item 9.21.1 & DSR Item 9.127.1.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm. , Double glass units in Automatically ventillated areas.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.
4	STAIRCASE, LIFT LOBBY	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern And 600x600 tactile tile in two shades (Yellow and Red as per design) as per CPWD DSR Item 11.56.1	100 mm High Granite matching with the flooring in Staircase as per CPWD DSR Item 8.9.1.2	18mm thick Polished Granite in Two Shades (Light And Dark) Pattern upto Ceiling Height.- Lift Facia as per CPWD DSR Item 8.9.1.2	Distempering with 1st quality acrylic distemper with two or more coats over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre as per CPWD DSR Item 13.41.1	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Fire Door As Per Is 3614 and Latest Version Thereof/ Latest Amendment Thereof.	Structure Glazing ,	Structure Glazing
5	MAJOR O.T. & MINOR O.T.	Anti Static	As per Modular OT Specification	As per Modular OT Specification	Alluminium Plain Ceiling Tiles 600mmX600mm	Sal Wood Frame of 60x100 mm	ISI marked 35 mm thick flush door shutters conforming to IS:2202 (Part-I) with 1.5mm decorative high pressure laminated sheet on both sides, 25 mm thick minimum lipping and vision panel 200x300 mm as per CPWD DSR Item 9.21.1 & DSR Item 9.127.1.	uPVC windows comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 2.10 mm. , Double glass units in Automatically ventillated areas.	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body, Using R3 series with frame having minimum wall thickness of 2.10 mm.
6	ATTACHED & COMMON TOILETS	300x300mm Anti-Skid Ceramic Tiles of min 7.8mm thickness as per CPWD DSR Item 11.39.	Ceramic Glazed Tiles of size 300x450 with min thickness of 7.8mm at Dado upto 2400 mm Height as per CPWD DSR Item 8.31.	Ceramic Glazed Tiles of size 300x450 with min thickness of 7.8mm at Dado upto 2400 mm Height as per CPWD DSR Item 8.31. , Distempring above dado to ceiling height.	G.I. Metal False Ceiling - 600X600mm and 0.5mm thick with 25mm hight made of GI sheet galvanising of 100gms both sides as per CPWD specification Item 12.19A & DSR Item 12.54.2	Wood Plastic Composite (WPC) Door Frame of Density between 750 to 1000 Kg Per Cum as per CPWD Specification with frame size 65 x 100mm as per CPWD DSR Item 26.86.5	30mm thick Finished WPC Door having minimum density of 650 kg/cum and laminated with PVC foil of minimum 14 microns thick as per CPWD DSR Item 26.87.1	uPVC ventilators comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler extruded profiles having minimum wall thickness of 1.90 mm.	Fixed ventilator with 03 partitions, one glazed & one exhaust fan and one with louvers having minimum wall thickness of 1.90 mm.

CONSTRUCTION OF AUTONOMOUS STATE MEDICAL COLLEGE AT BALLIA, U.P. INDIA ON EPC MODE.		
SCHEDULE OF FINISHES FOR HOSPITAL BUILDING		
COMMON SPECIFICATION		
1	MASONARY WORK	Brickwork with Red Bricks (First Class Brick)
2	SMOOTH SIDE ON BRICKWORK PLASTER	12mm thick 1:6 Plaster (1 Cement : 6 Coarse Sand)
3	ROUGH SIDE ON BRICKWORK PLASTER	15mm thick 1:6 Plaster (1 Cement : 6 Coarse Sand)
4	CEILING PLASTER	
5	UPTO PLINTH PLASTER	15mm thick 1:4 Plaster (1 Cement : 4 Coarse Sand) with waterproofing
6	WATER PROOFING	
a	RCC Members	Mixing integral crystalline admixture for waterproofing treatment to RCC structures DSR item no . 22.22
c	WATER TANK	Integral Crystalline Slurry of Hydrophilic in Nature.
7	EXTERNAL FINISHES	Premium acrylic exterior Paint over Priming coat of Exterior primer over 1 mm Cement based Putty & Structure Glazing with hermetically-sealed 6-12- 6 mm insulated glass (double glazed) and Aluminium Extruded Tubular Sections & HPL Panel Cladding as per Architectural views / Drawing
8	TERRACE	Brick Coba Treatment (With average thickness of 120 mm)
9	RAMPS	SS Railing and hand rails as described above (SS-304)
10	FIRE DOOR	Glazed Fire Resistant Door as per IS 3614 (Part-II) and Latest version thereof/Latest amendment thereof.
11	DOOR/WINDOW FITTINGS	Stainless Steel Fittings (SS-304 Grade)
12	CURTAIN RODS	Chromium Plated Brass Curtain Rod having Wall Thickness of 1.25mm & 20mm Dia
13	PLATFORM/ COUNTER SLAB	RCC Counter slabs with 18mmThick Polished Granite.
14	RAILING	Stainless Steel of grade SS-304 at all Staircase, Ramps etc.
15	GUARD HANDRAILS & CRASH RAIL	Stainless Steel of grade SS-304 at all Corridors, Staircase & Ramps, Waiting area etc. as per specified.
16	STRUCTURAL GLAZING	Aluminium Extruded Tubular Section for glazing support as per CPWD DSR -25.1 and semi grid utitized system for structural glazing as per CPWD DSR item no 25.2
17	EXPANSION JOINT	Floor , wall and roof joint confirming to DSR code 5.44.1 , 5.45.1 ,5.46.1 respectively
18	COLUMN & CORNER GUARD	Corner guard & Column Guard of minimum thickness of 1.6mm stainless steel (260x260) with backing ply (Grade SS-304)
19	CP FITTING	As per CPWD Specifications
20	URINAL	White Vitreous china flat back or wall corner type lipped front urinal basin.
21	WASH BASIN	White Vitreous China Wash Basin Size 550x400 mm with a Pair of 15 mm C.P. Brass Pillar Taps, 32 mm C.P. Brass Waste of Standard Pattern
22	WASH BASIN IN ATTACHED TOILET	White Vitreous China Table Top Wash Basin Size 750x400 mm (Oval/Rectangular as per approved) with a pair of 15 mm C.P. Brass Pillar Taps, 32 mm C.P. Brass Waste of Standard Pattern
23	W.C. IN ATTACHED TOILET	White Vitreous China Extended Wall Mounting Water Closet of Size 780x370x690 mm
24	EUROPEAN IN COMMON TOILET	White Vitreous China Pedestal Type Water Closet (European Type W.C. Pan) With Seat and Lid, 10 Litre Low Level White P.V.C. Flushing Cistern, Including Flush Pipe, with Manually Controlled Device (Handle Lever), Conforming to IS : 7231
25	INDIAN WC IN COMMON TOILET	White Vitreous China Orissa Pattern W.C. Pan of Size 580x440 mm with Integral Type Foot Rests.
26	LAB SINKS	White Vitreous China Laboratory Sink of Size 600x450x200 mm
27	KITCHEN SINKS	Stainless Steel A ISI 304 (18/8) Kitchen Sink with drain board of Size 510x1040 mm bowl depth 250 mm
28	TOILET ACCESSORIES	
a	MIRROR	Superior Quality Glass of Required Shape and Size with Plastic Moulded Frame with 12 mm thick Marine Ply Backing.
b	SOAP CONTAINER	Chromium Plated Stainless Steel (SS-304 Grade)
c	TOWEL RAIL	Chromium Plated Stainless Steel (SS-304 Grade)
29	INTERNAL WATER SUPPLY PIPES	CPVC Pipes / As per CPWD Specification.
30	INTERNAL DRAINAGE PIPES	UPVC Pipes / Hoppless CI pipe As per CPWD Specification.
31	INTERNAL SEWARAGE PIPES	UPVC Pipes / Hoppless CI pipe As per CPWD Specification.
32	EXTERNAL WATER SUPPLY	CPVC Pipes / GI pipes / As per CPWD Specification.
33	EXTERNAL DRAINAGE PIPES	RCC NP2 & RCC NP3 Pipes
34	EXTERNAL SEWER LINE	RCC NP3 Pipes
35	PLINTH PROTECTION	50mm thick of Cement Concrete 1:3:6 (1 Cement : 3 Coarse Sand : 6 Stone Aggregate 20mm nominal size) over 75mm thick dry brick ballast 40mm nominal size (900mm wide)
36	ROADS	with 260 mm thick M-40 grade Cement Concrete (CC) ,75 mm thick Water Bound Macadam,100 mm thick Granular Sub-Base (GSB), 75 mm thick Plain Cement Concrete (PCC) of mix 1:4:8 complete in all respects
37	STROM WATER DRAIN	Walls and base of Cement concrete mix 1:1.5:3 (or equivalent grade), on 75 mm thick Plain Cement Concrete (PCC) of mix 1:4:8, covering with M.S. grating
38	FOOTPATH AND PARKING	With 80 mm thick M-30 paver blocks ,150 mm thick GSB and 100 mm thick PCC (1:4:8), precoated galvanized iron profile sheets of total coated thickness of 0.50 mm fixed over steel roof trusses and vertical M.S. framing members for covered shed parking
39	BOUNDARY WALL	Boundary wall of overall height 1800 mm comprising 230 mm thick brick masonry with M.S. angle framework fixed above in front part and concertina coil fencing on the rear and side portions.
40	UGT AND STP	As per CPWD Specifications