



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

**As Executing Agency of  
Environment, Forest & Climate Change Department,  
Government of Uttar Pradesh  
E-Tender For  
“Design, Engineering and Procurement for  
Construction of Forestry and Horticulture University At  
District Gorakhpur,  
Uttar Pradesh, INDIA on EPC basis”**

**Tender No.: 100(SE)/General/Technical Cell/2026  
dt. 28-04-2026**

**Volume-IV  
DESIGN BASIS REPORT (DBR)  
(June, 2026)**

E-mail ID: [technicalcellepcmission@gmail.com](mailto:technicalcellepcmission@gmail.com)

## **Table of Contents: -**

1.	BACKGROUND	3
2.	PROJECT OVERVIEW	4
3.	SITE DETAILS	5
4.	PROJECT PROPOSAL	19
5.	PROJECT SUMMARY	20
6.	SALIENT FEATURES OF THE DESIGN	26
7.	PROPOSED FACILITY	28
8.	ARCHITECTURE FINISHES DETAILS	26
9.	DOOR WINDOW FINISHES	50
10.	SCHEDULE OF FINISHES	63
11.	DBR OF STRUCTURE	74
12.	DBR OF PLUMBING AND FIRE FIGHTING	91
13.	DBR OF ELECTRICAL	108
14.	DBR OF HVAC	178
15.	DBR OF FURNITURE	193

# CONSTRUCTION OF FORESTRY AND HORTICULTURE UNIVERSITY at GORAKHPUR, UTTAR PRADESH

## Design Basis report

### BACKGROUND

**Gorakhpur** is an important district headquarters in the state of Uttar Pradesh, located in the eastern part of the state near the Indo-Nepal border. The city holds significant historical, cultural, and regional importance and has developed as a major administrative, educational, and commercial hub for the surrounding areas. Gorakhpur is situated at an approximate distance of about 270 kilometers from the state capital, Lucknow, and is well connected to major cities such as Varanasi, Patna, and Lucknow through an extensive network of national highways, railways, and air connectivity, making it a strategically accessible location for institutional development.

Gorakhpur and its surrounding region are characterized by fertile alluvial plains, abundant water resources, and a favorable agro-climatic profile, making it highly suitable for agriculture, horticulture, and forestry-related activities. The region has traditionally supported diverse cropping patterns and possesses significant potential for the development of advanced horticultural practices, agro-forestry systems, and research-based agricultural innovations. Establishment of a dedicated Forestry and Horticulture University in this region is therefore of strategic importance for promoting education, research, and extension services in these sectors.

In recent years, Gorakhpur has witnessed steady urban and institutional growth, with improvements in civic infrastructure, educational facilities, healthcare services, and public amenities. With increasing emphasis on sustainable development, climate resilience, and scientific land use, there is a growing need for specialized institutions that can support research, skill development, and dissemination of modern techniques in Forestry and Horticulture.

This Design Basis Report (DBR) is being prepared as a comprehensive design document outlining the planning and design considerations adopted for the proposed university project, providing an overview of the project scope defined for the EPC developer. The report covers the conceptual planning framework of the campus, including academic blocks, research facilities, administrative buildings, residential zones, experimental fields, nurseries, and allied infrastructure. It highlights the key aspects outlined in the terms of reference and presents the salient features of the project through drawings and 3D visualizations.

The DBR has been developed based on the Project Brief, including inputs provided by the client, while also taking into account local statutory regulations, agro-climatic conditions, environmental considerations, availability of construction materials, and appropriate construction technologies. Special emphasis has been given to sustainable planning principles, efficient land use, water management, and integration of green infrastructure in line with the functional requirements of a Forestry and Horticulture University.

## **Project Overview**

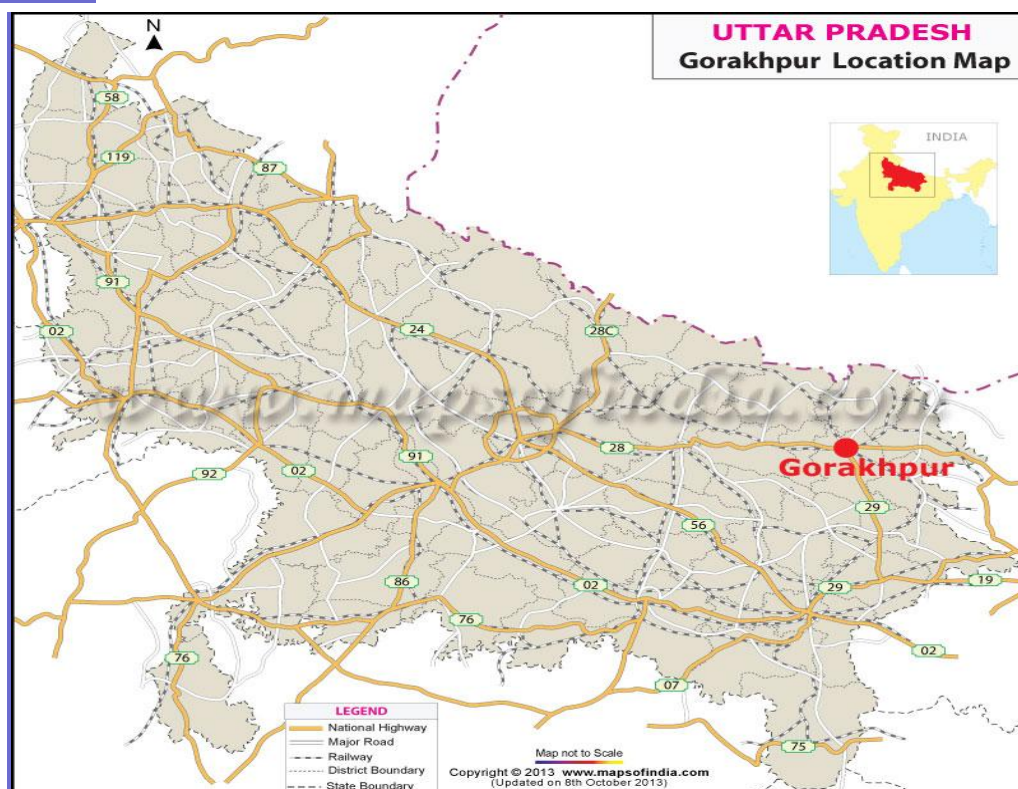
The Government of Uttar Pradesh has undertaken several initiatives to strengthen higher education and research infrastructure across the State by establishing institutions that promote academic excellence, innovation, and sustainable development. However, there remains a growing need for specialized institutions focusing on horticulture, forestry, and allied sciences, particularly in regions with strong agricultural potential. Such institutions play a crucial role in advancing scientific research, promoting sustainable land use practices, and supporting farmers and rural communities through knowledge dissemination and skill development.

Keeping this objective in view, the Government of Uttar Pradesh envisages the **“Construction of Forestry and Horticulture University at Gorakhpur, Uttar Pradesh, India on EPC basis.”** The proposed university will be developed with state-of-the-art academic, research, residential, and allied facilities in accordance with the relevant standards and guidelines, ensuring a comprehensive environment for education, research, and innovation.

The primary aim of the project is to provide quality higher education in horticulture, forestry, and allied disciplines, combined with practical training, research, and extension activities. The university is envisaged to function as a center of excellence, fostering advancements in areas such as crop diversification, agro-forestry systems, climate-resilient agriculture, and sustainable resource management. It will also facilitate capacity building and knowledge transfer to farmers, students, and professionals, thereby supporting regional and national agricultural development.

The establishment of the Forestry and Horticulture University at Gorakhpur will significantly contribute to strengthening educational and research infrastructure in the region, while also generating opportunities for innovation, employment, and rural development. The project is expected to play a vital role in enhancing productivity, promoting environmental sustainability, and supporting the socio-economic growth of the surrounding areas.

### **LOCATION**





## 1. Site Details

The Land of proposed site for **Construction of Forestry and Horticulture University at district Gorakhpur, Uttar Pradesh, INDIA** is approx. 46.84 Acres (189619.81 Sqm).

### BUILDING AREA STATEMENT AND FACILITY SHEET

A.	Details of Buildings:					
S.NO	BUILDING	AREA	No of Block	TOTAL PLINTH AREA	UNIT	FACILITIES
1	TYPE 6 - 1 UNIT					
	GROUND FLOOR	383.00				BEDROOMS (x3) + DINING ROOM + LIVING ROOM + FAMILY LOUNGE + OFFICE + WAITING LOUNGE + SERVANT ROOM + KITCHEN + STORE ROOM + POWER ROOM + TOILETS + VERANDAH
	Total	383.00	1	383.00	SQM	
2	TYPE 5 - 28 Unit					
	STILT FLOOR	1189.17				CAR PARKING + LOBBY + ELECTRICAL ROOM + LIFT LOBBY + STAIRCASE ACCESS
	FIRST FLOOR	1189.17				4 UNITS OF 4BHK (BEDROOMS (x3) + GUEST ROOM / OFFICE + DINING AREA + LIVING ROOM + KITCHEN + STORE + TOILETS) + LOBBY + LIFT LOBBY
	SECOND FLOOR	1189.17				-do-
	THIRD FLOOR	1189.17				-do-
	FOURTH FLOOR	1189.17				-do-
	FIFTH FLOOR	1189.17				-do-
	SIXTH FLOOR	1189.17				-do-
	SEVENTH FLOOR	1189.17				-do-
	Total	9513.36	1	9513.36	SQM	
3	TYPE-4 (2 -BLOCKS 32 Unit Each Block)					
	STILT FLOOR	884.72				SERVANT ROOM (x2) + TOILETS (x2) + LIFT LOBBY + STAIRCASE + CAR PARKING

	FIRST FLOOR	884.72				4 UNITS OF 3 BHK (BEDROOM(x2), DRAWING ROOM, KITCHEN, LIVING/DINING AREA, GUEST ROOM/OFFICE, AND A SERVANT ROOM) + LIFT LOBBY + STAIRCASE
	SECOND FLOOR	884.72				-do-
	THIRD FLOOR	884.72				-do-
	FOURTH FLOOR	884.72				-do-
	FIFTH FLOOR	884.72				-do-
	SIXTH FLOOR	884.72				-do-
	SEVENTH FLOOR	884.72				-do-
	EIGHTH FLOOR	884.72				-do-
	<b>Total</b>	<b>7962.48</b>	<b>2</b>	<b>15924.96</b>	<b>SQM</b>	
<b>4</b>	<b>TYPE-3 (\$+14 - 1 BLOCK) (56 UNITS)</b>					
	STILT FLOOR	605.36				LIFT LOBBY + LIFT + STAIRCASE + PARKING AREA
	FIRST FLOOR	605.36				4 UNITS OF 2 BHK (LIVING/DINING + BEDROOM (x2)+ KITCHEN + TOILETS)+ LIFT LOBBY + LIFT + STAIRCASE
	SECOND FLOOR	605.36				-do-
	THIRD FLOOR	605.36				-do-
	FOURTH FLOOR	605.36				-do-
	FIFTH FLOOR	605.36				-do-
	SIXTH FLOOR	605.36				-do-
	SEVENTH FLOOR	605.36				-do-
	EIGHTH FLOOR	605.36				-do-
	NINETH FLOOR	605.36				-do-
	TENTH FLOOR	605.36				-do-
	ELEVENTH FLOOR	605.36				-do-
	TWELVETH FLOOR	605.36				-do-
	THIRTEENTH FLOOR	605.36				-do-
	FOURTEENTH FLOOR	605.36				-do-
	<b>Total</b>	<b>9080.40</b>	<b>1</b>	<b>9080.4</b>	<b>SQM</b>	
<b>5</b>	<b>TYPE-3 (\$+13 - 1 BLOCK) (52 UNITS)</b>					

	STILT FLOOR	605.36				LIFT LOBBY + LIFT + STAIRCASE + PARKING AREA
	FIRST FLOOR	605.36				4 UNITS OF 2 BHK (LIVING/DINING + BEDROOM (x2)+ KITCHEN + TOILETS)+ LIFT LOBBY + LIFT + STAIRCASE
	SECOND FLOOR	605.36				-do-
	THIRD FLOOR	605.36				-do-
	FOURTH FLOOR	605.36				-do-
	FIFTH FLOOR	605.36				-do-
	SIXTH FLOOR	605.36				-do-
	SEVENTH FLOOR	605.36				-do-
	EIGHTH FLOOR	605.36				-do-
	NINETH FLOOR	605.36				-do-
	TENTH FLOOR	605.36				-do-
	ELEVENTH FLOOR	605.36				-do-
	TWELVETH FLOOR	605.36				-do-
	THIRTEENTH FLOOR	605.36				-do-
	<b>Total</b>	<b>8475.04</b>	<b>1</b>	<b>8475.04</b>	<b>SQM</b>	
<b>6</b>	<b>TYPE-2 (5 - BLOCKS S+10) 40 UNITS EACH BLOCK</b>					
	STILT FLOOR	454.00				LIFT LOBBY + LIFT + STAIRCASE + PARKING AREA
	FIRST FLOOR	454.00				4 UNITS OF 2 BHK (BED ROOM (X2) + KITCHEN + LOUNGE/DINING + BATH + TOILET) + LIFT LOBBY + LIFT + STAIRCASE
	SECOND FLOOR	454.00				-do-
	THIRD FLOOR	454.00				-do-
	FOURTH FLOOR	454.00				-do-
	FIFTH FLOOR	454.00				-do-
	SIXTH FLOOR	454.00				-do-
	SEVENTH FLOOR	454.00				-do-
	EIGHTH FLOOR	454.00				-do-
	NINETH FLOOR	454.00				-do-
	TENTH FLOOR	454.00				-do-
	<b>Total</b>	<b>4994.00</b>	<b>5</b>	<b>24970.00</b>	<b>SQM</b>	

<b>7</b>	<b>UG PG HOSTEL BOYS (360 SEATER)</b>					
	GROUND FLOOR	1391.41				DINING HALL + KITCHEN + WET STORAGE + DEEP FREEZER + WASHING AREA + LOADING/UNLOADING AREA + TOILETS + ROOMS (x13-Triple Occupancy) + SPECIALLY ABLED ROOM + VISITOR ROOM + WARDEN OFFICE + LIFTS + LIFT LOBBIES + CORRIDOR+ DOUBLE HEIGHTED ENTRANCE LOBBY + STAIRCASES
	FIRST FLOOR	1039.33				ROOMS (x16-Triple Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	SECOND FLOOR	1302.31				ROOMS (x18-Triple Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	THIRD FLOOR	1302.31				-do-
	FOURTH FLOOR	1302.31				-do-
	FIFTH FLOOR	1302.31				-do-
	SIXTH FLOOR	1302.31				ROOMS (x18-Double Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	SEVENTH FLOOR	1302.31				-do-
	<b>Total</b>	<b>10244.60</b>	<b>1</b>	<b>10244.60</b>	<b>SQM</b>	
<b>8</b>	<b>UG PG HOSTEL GIRLS (285 SEATER)</b>					
	GROUND FLOOR	1391.41				DINING HALL + KITCHEN + WET STORAGE + DEEP FREEZER + WASHING AREA + LOADING/UNLOADING AREA + TOILETS + ROOMS (x13-Triple Occupancy) + SPECIALLY ABLED ROOM + VISITOR ROOM + WARDEN OFFICE + LIFTS + LIFT LOBBIES + CORRIDOR+ DOUBLE HEIGHTED ENTRANCE LOBBY + STAIRCASES
	FIRST FLOOR	1039.33				ROOMS (x16-Triple

						Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	SECOND FLOOR	1302.31				ROOMS (x18-Triple Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	THIRD FLOOR	1302.31				-do-
	FOURTH FLOOR	1302.31				-do-
	FIFTH FLOOR	1302.31				ROOMS (x18-Double Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	<b>Total</b>	<b>7639.98</b>	<b>1</b>	<b>7639.98</b>	<b>SQM</b>	
<b>9</b>	<b>DIPLOMA HOSTEL BOYS (70 SEATER)</b>					
	GROUND FLOOR	806.00				DINING HALL + KITCHEN + STOREKEEPER'S ROOM + WASH AREA + DRY STORAGE + WET STORAGE + DEEP FREEZER + TOILETS + SPECIALLY ABLED ROOM + DOUBLE HEIGHTED ENTRANCE LOBBY + VISITORS ROOM + WARDEN OFFICE + ROOMS(x5 – Triple Occupancy)
	FIRST FLOOR	477.00				ROOMS(X8 – Triple Occupancy) + TOILETS + BALCONIES + CORRIDORS + STAIRCASES
	SECOND FLOOR	540.00				ROOMS(X10 – Triple Occupancy) + TOILETS + LIFT LOBBY + BALCONIES + CORRIDORS+ STAIRCASES
	<b>Total</b>	<b>1823.00</b>	<b>1</b>	<b>1823.00</b>	<b>SQM</b>	
<b>10</b>	<b>DIPLOMA HOSTEL GIRLS(70 SEATER)</b>					
	GROUND FLOOR	806.00				DINING HALL + KITCHEN + STOREKEEPER'S ROOM + WASH AREA + DRY STORAGE + WET STORAGE + DEEP FREEZER + TOILETS + SPECIALLY ABLED ROOM + DOUBLE HEIGHTED ENTRANCE LOBBY +

						VISITORS ROOM + WARDEN OFFICE + ROOMS(x5 – Triple Occupancy)
	FIRST FLOOR	477.00				ROOMS(X8 – Triple Occupancy) + TOILETS + BALCONIES + CORRIDORS + STAIRCASES
	SECOND FLOOR	540.00				ROOMS(X10 – Triple Occupancy) + TOILETS + LIFT LOBBY + BALCONIES + CORRIDORS+ STAIRCASES
	<b>Total</b>	<b>1823.00</b>	<b>1</b>	<b>1823.00</b>	<b>SQM</b>	
<b>11</b>	<b>RESEARCH HOSTEL BOYS (66 SEATER)</b>					
	G.F.	789.37				ROOMS (x13) + SPECIALLY ABLED ROOM + VISITOR ROOM + WARDEN OFFICE + TOILETS +LIFTS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	1.F.	765.62				ROOMS (x16) + TOILETS + LIFT + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	2.F.	826.95				ROOMS (x18) + TOILETS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	3.F.	826.95				ROOMS (x18) + TOILETS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	<b>Total</b>	<b>3208.89</b>	<b>1</b>	<b>3208.89</b>	<b>SQM</b>	
<b>12</b>	<b>RESEARCH HOSTEL GIRLS (44 SEATER)</b>					
	GROUND FLOOR	789.37				ROOMS (x13) + SPECIALLY ABLED ROOM + VISITOR ROOM + WARDEN OFFICE + TOILETS +LIFTS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	FIRST FLOOR	765.62				ROOMS (x16) + TOILETS + LIFT + LIFT LOBBY + STAIRCASES + 1800 MM

						AND 3000 MM WIDE CORRIDORS
	SECOND FLOOR	826.95				ROOMS (x18) + TOILETS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
		<b>2381.94</b>	<b>1</b>	<b>2381.94</b>	<b>SQM</b>	
<b>13</b>	<b>ADMIN BLOCK</b>					
	GROUND FLOOR	2367.51				Main Entrance, Registrar Room, Registrar Office (Waiting + Secretary + Ante + Confidential Room), Conference Room, Kitchens, Cafeteria, Lifts, Lift Lobbies, Staff Offices, Administrative Officer's Office, Office, Deputy Registrar, Assistant Registrar, Student Grievance Cell, Secretary, Security Officer, Stenographers, Kitchen & Serving Area, Waiting Lounge, JR Assistants – Toilets.
	FIRST FLOOR	2221.80				Director's Office, Vice Chancellor Office, Dean Offices (x3), Meeting Room, Confidential Room, Secretary, Staff Offices, Record Room, Cashier, Assistant Accounts Officer, Accounts Officer, Stenographers, Cashier, JR Assistants, Pantries, Waiting Areas, Toilets
	SECOND FLOOR	2218.97				Examination Controller, Assistant Registrars, Deputy Registrars, Security Officer, Secretary, Conference Room, Record Room, Stenographers, JR Assistants, Pantries, Fresh Copy Storage, Copy Rechecking Section, Accounts Officer, Toilets, Lifts, Lift Lobbies.

	THIRD FLOOR	2062.24				Conference Room, Karmik Department, Officers' Room, Record Room, Secretary, Medical Officer, Office, Jr. Assistant, Publication Department, Stenographer, Toilets, Pantries, Lifts, Lift Lobbies,
	<b>Total</b>	<b>8870.52</b>	<b>1</b>	<b>8870.52</b>	<b>SQM</b>	
<b>14</b>	<b>ACADEMIC BLOCK</b>					
	GROUND FLOOR	3670.00				Double Height Entrance Lobby, Reception, Assistant Professor, Staff Office, Toilets, Classrooms, Laboratories, Lab. Assistant, Prep Room, Lecture Theatres, Lifts, Lift Lobbies, Examination Hall, Seminar Hall, Corridors, Staircases, Tutorial Rooms, Lobby, Associate Professor, Professor, Landscaped Courtyard
	FIRST FLOOR	2280.00				Assistant Professor, Staff Office, Toilets, Classrooms, Laboratories, Lecture Theatres, Lifts, Lift Lobbies, Staircases, Research Scholars Room, Tutorial Rooms, Associate Professor, Professor
	SECOND FLOOR	2680.00				Research Scholars Room, Girls Common Room, Boys Common Room, Library, Assistant Professor, Staff Office, Toilets, Classrooms, Laboratories, Lecture Theatre, Lifts, Lift Lobbies, Tutorial Rooms, Professor, Associate Professor.
	THIRD FLOOR	2360.00				Lecture Theatre + Laboratories + Classrooms + Professor Cabin + Assistant & Associate Professor Cabins + Library + Boys' Common Room + Girls' Common Room + Staff Room + Toilets +



						Lobbies + Lift Lobbies + Staircases (Terrace Below)
	<b>Total</b>	<b>10990.00</b>	<b>2</b>	<b>21980.00</b>	<b>SQM</b>	
<b>15</b>	<b>LIBRARY</b>					
	GROUND FLOOR	1616.44				Entrance Lobby + Book Issue and Return Counter + Baggage Counter + Support Staff + Librarian + Photocopy + Book Binding + Toilets
	FIRST FLOOR	1444.53				Staff Reading Area + Reading Area + E-Library + Seminar + Audio Visual Presentation Room + Toilets + Landscape Terrace
	SECOND FLOOR	1444.53				Staff Reading Area + Reading Area + E-Library + Seminar + Audio Visual Presentation Room + Toilets + Landscape Terrace
	<b>Total</b>	<b>4505.50</b>	<b>1</b>	<b>4505.50</b>	<b>SQM</b>	
<b>16</b>	<b>MULTIPUPOSE HALL</b>					
	GROUND FLOOR	2550.50				MULTIPURPOSE HALL, CHANGING ROOM AND TOILET RECEPTION + SECURITY + VISITOR ROOM + COMMON LOUNGE + PANTRY + KITCHEN + DINING AREA + OFFICE OF CARE TAKER + MULTIPLE GUEST ROOMS + LANDSCAPED COURTYARD
	<b>Total</b>	<b>2550.50</b>	<b>1</b>	<b>2550.50</b>	<b>SQM</b>	
<b>17</b>	<b>GUEST HOUSE</b>					
	GROUND FLOOR	1210.00				Waiting area, Rooms, Restaurant & Pantry, Kitchen, Entrance lobby, Pond, Office, Housekeeping, Porch, Pantry, Corridors
	<b>Total</b>	<b>1210.00</b>	<b>1</b>	<b>1210.00</b>	<b>SQM</b>	

<b>18</b>	<b>HEALTH CENTER</b>					
	GROUND FLOOR	1264.45				OT, CHANGE ROOMS FOR DOCTORS & STAFF, CONSOLE ROOM, ULTRA SOUND ROOM, EXAMINATION ROOM, CONSULTANT ROOM, REGISTRATION AREA, RECOVERY ROOM, NURSE STATION, GENERAL WARD, DUTY ROOMS FOR DOCTORS & STAFF, x-RAY ROOM,
	<b>Total</b>	<b>1264.45</b>	<b>1</b>	<b>1264.45</b>	<b>SQM</b>	
<b>19</b>	<b>FACILITY CENTER</b>					
	GROUND FLOOR	514.44				SHOPS, CUSTOMER WAITING AREA, SR. MANAGER'S ROOM, STRONG ROOM, BANK BRANCH, RECORD ROOM, SERVER ROOM, POST OFFICE, TOILETS, CORRIDORS
	<b>Total</b>	<b>514.44</b>	<b>1</b>	<b>514.44</b>	<b>SQM</b>	
<b>20</b>	<b>MAINTENANCE OFFICE</b>					
	GROUND FLOOR	291.17				MECHENICAL SUPERVISOR, CIVIL SUPERVISOR, MANAGER ROOM, MEETING ROOM, PLUMBING SUPERVISOR, ELECTRICAL SUPERVISOR, STORE ROOM, TOILET
	<b>Total</b>	<b>291.17</b>	<b>1</b>	<b>291.17</b>	<b>SQM</b>	
<b>21</b>	<b>POLICE CHOWKI</b>					
	GROUND FLOOR	86.86				RECORD ROOM, ROOM, LOBBY, CHOWKI IN-CHARGE ROOM, TOILET
	<b>Total</b>	<b>86.86</b>	<b>1</b>	<b>86.86</b>	<b>SQM</b>	
<b>22</b>	<b>PUMP HOUSE</b>					
	GROUND FLOOR	70.92				
	<b>Total</b>	<b>70.92</b>	<b>4</b>	<b>283.68</b>	<b>SQM</b>	

23	ESS					
	GROUND FLOOR	431.27				
	<b>Total</b>	<b>431.27</b>	<b>1</b>	<b>431.27</b>	<b>SQM</b>	
24	KISAN KALYAN KENDRA, BEE-KEEPING, MUSHROOM SPAWN UNIT & PRODUCTION UNIT					
	GROUND FLOOR	1250.00				RECEPTION & WAITING, INFORMATION CENTER, BACK OFFICE, EXHIBITION HALL, MUSHROOM FARMING HALL, BIO- FERTILIZER HALL, GRAFTED SAPLINGS & SEEDING HALL, TOILETS.
	BEEKEEPING UNIT	200.00				
	MUSHROOM PRODUCT UNIT	200.00				
	MUSHROOM SPAWN UNIT	200.00				
	<b>Total</b>	<b>1850.00</b>	<b>1</b>	<b>1850.00</b>	<b>SQM</b>	
			<b>TOTAL AREA</b>	<b>139306.56</b>	<b>SQM</b>	

**B. Site Development works:-**

(i)	UGT	3,00,000 Litre
(ii)	Gate with Guard room	2 Nos
(ii)	Boundary wall	Length :- 3130.00 Meter Height :- 1.80 mt. & 600 mm High Grill
(iii)	C.C Roads	Road 6.0 Wide 3269 Meter , Road 4.5 Wide 1656 Meter
(iv)	Road side Pathway	Pathway 6538 M
(v)	Drain	Drain width :- 300,450, 600, 750 mm , length :- (300+2000+4000+2000) =Total 8300 Meter
(vi)	Rain water Harvesting	30 Nos.
(vii)	STP	625 KLD
(viii)	WTP	650 KLD
(ix)	Bore well	4 Nos
(x)	External water supply & Sewerage	Job
(x)	Campus Filling	Job
(xi)	Signages	Job
(xiii)	<b>Landscape and Horticulture</b>	
(a)	Green area	19816 Sq.m
(b)	Trees Plant	1300 Nos
(c)	Shrubs Plant	400 Nos

(d)	Ground edging Plant	400 Nos
(e)	SS planter 18" dia	100 Nos
(x)	Parking	7500 Sqm
(xvi)	Hi-Tech Nursery, Banana tissue culture & Department of Agriculture & Farmers	Job

### **SITE DEVELOPMENT AREA**

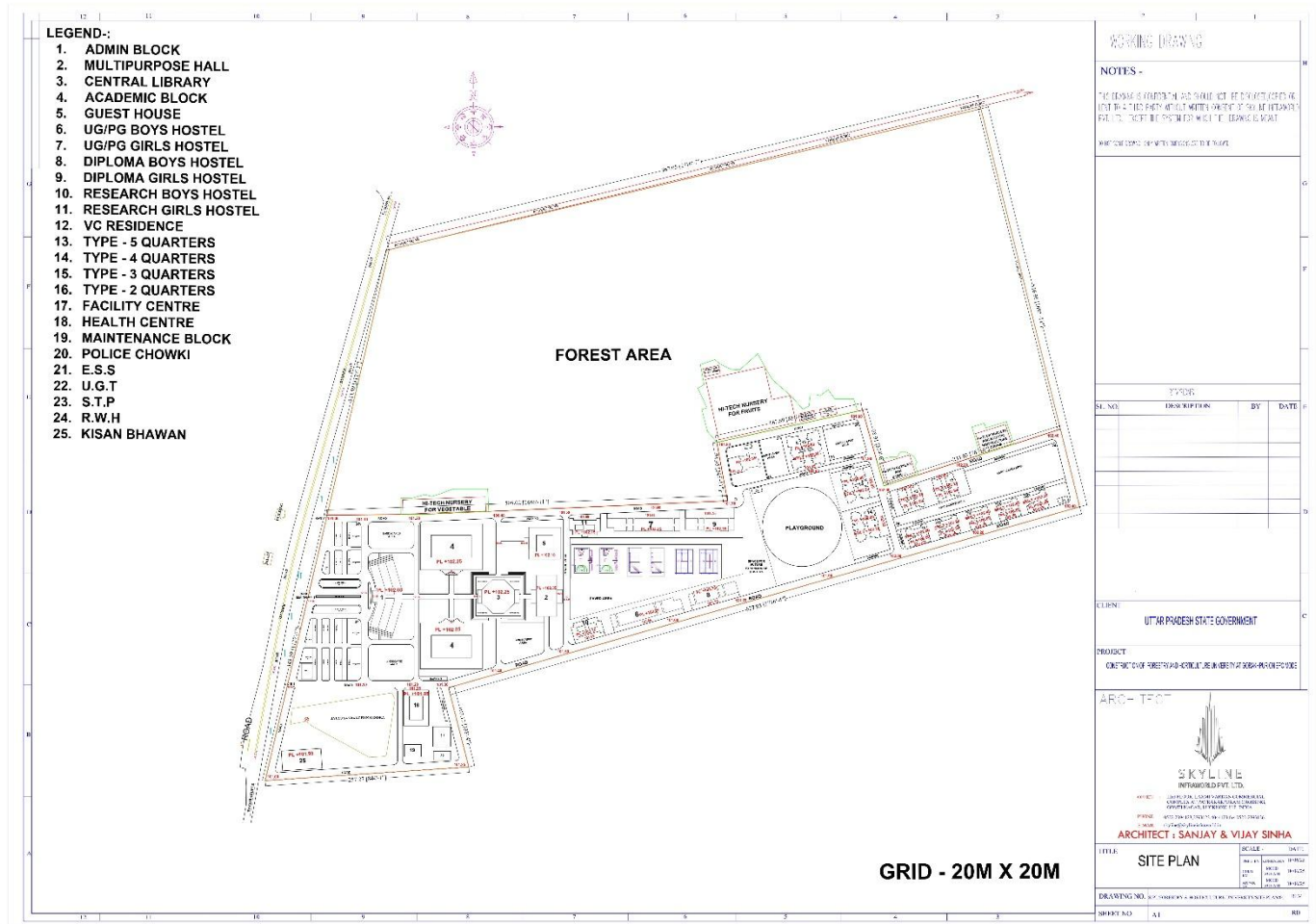
- Campus Filling (as required per Contour plan-NGL, RL, PL)- 279500 cum. (aprox.)
- PARKING AREA-7500 SQM
- GREEN AREA–19816 SQM
- ROAD AREA– 27066 SQM
- PATHWAY – 9807 SQM

### **IMPORTANT NOTE:**

- A.** The following areas shall not be reckoned with for working out the plinth area & other facilities and their cost shall be deemed to be included in the overall quoted cost of works as per IS 3681:2002
- 1) Lift wells (except one floor), Staircase wells (except one floor), Shafts, Lift machine rooms, Stair mummties, Chajjas, Water tank storage elevated platform, handicap ramp etc.
  - 2) Covered balconies, Cantilever projections, Refuse terrace area, Entrance porch.
  - 3) Architectural Features like boxing, pergolas etc.
  - 4) External Façade such as Wet/Dry stone cladding, Structural glazing, Pump rooms, Underground structures including UG Tanks, STPs, WTPs, Bore wells, fencings etc.
  - 5) Road works, Pathways, Surface parking's, surrounding grading of area, Kerb stones, Horticulture, Paved area etc.
- B.** Any decrease in the area with respect to the prescribed area shall be recovered proportionately. However additional cost on account of increase in area over and above prescribed area upto +2% shall not be

payable and deemed to be included in the quoted rate. No area shall be increased without approval of client/state govt. The drawings consisting any increase in area submitted by contractor shall be deemed to be within the area mentioned.

## SITEPLAN



## SALIENT FEATURE

- ORIENTATION AND LAYOUT FOR OPTIMAL SUNLIGHT EXPOSURE
- PARKING WILL BE RESTRICTED TO DEFINED POCKETS
- THE MAIN SPINE WILL BE SEPARATED FROM ACADEMIC ZONE.
- SERIES OF PEDESTRIAN PATHS WILL INTERCONNECT BUILDINGS IN CAMPUS.

## **2. PROJECT PROPOSAL**

The campus is to be developed to meet the requirements as per the Client requirements. The project Design Component includes: -

- ADMINATRATIVE BLOCK
- ACADEMIC BLOCKS
- CENTRAL LIBRARY.
- MULTIPURPOSE HALL
- GUEST HOUSE
- FACILITY CENTRE
- INFIRMARY(HEALTH CENTRE)
- HI-TECH NURSERIES, BANANA TISSUE CULTURE & KISAN KALYAN KENDRA
- VC RESIDENCE
- TYPE-5 RESIDENTIAL BLOCKS
- TYPE-4 RESIDENTIAL BLOCKS
- TYPE-3 RESIDENTIAL BLOCKS
- TYPE-2 RESIDENTIAL BLOCKS
- UG/PG BOYS & GIRLS HOSTELS
- DIPLOMA BOYS & GIRLS HOSTELS
- RESEARCH BOYS & GIRLS HOSTELS
- LANDSCAPING & HORTICULTURE
- SPORTS GROUNDS & COURTS
- SERVICES BUILDING
- POLICE OFFICE
- MAINTAINANCE OFFICE

### 3. PROJECT SUMMARY

**Total Plinth Area = 139306.56 SQ.MT.+ External Development**

	Details of Buildings:				
S.NO	BUILDING	No of Block	PLINTH AREA	BUILTUP AREA	UNIT
1	TYPE 6 - 1 UNIT				
	Total	1	383.00	422.08	SQM
2	TYPE 5 - 28 Unit				
	7.F.				
	Total	1	9513.36	9677.35	SQM
3	TYPE-4 (2 -BLOCKS 32 Unit Each Block)				
	Total	2	15924.96	16060.94	SQM
4	TYPE-3 (S+14 - 1 BLOCK) (56 UNITS)				
	Total	1	9080.4	9177.58	SQM
5	TYPE-3 (S+13 - 1 BLOCK) (52 UNITS)				
	Total	1	8475.04	8572.22	SQM
5	TYPE-2 (5 - BLOCKS S+10) 40 UNITS EACH BLOCK				
	Total	5	24970.00	25090.77	SQM
6	UG PG HOSTEL BOYS (360 SEATER)				
	Total	1	10244.60	10805.62	SQM
7	UG PG HOSTEL GIRLS (285 SEATER)				
	Total	1	7639.98	8201.00	SQM
8	DIPLOMA HOSTEL BOYS (70 SEATER)				
	Total	1	1823.00	1886.17	SQM
9	DIPLOMA HOSTEL GIRLS(70 SEATER)				
	Total	1	1823.00	1886.17	SQM
10	RESEARCH HOSTEL BOYS (66 SEATER)				
	Total	1	3208.89	3430.80	SQM
11	RESEARCH HOSTEL GIRLS (44 SEATER)				
	Total	1	2381.94	2603.85	SQM

<b>12</b>	<b>ADMIN BLOCK</b>				
	<b>Total</b>	<b>1</b>	<b>8870.52</b>	<b>10702.06</b>	<b>SQM</b>
<b>13</b>	<b>ACADEMIC BLOCK</b>				
	<b>Total</b>	<b>2</b>	<b>21980.00</b>	<b>22341.00</b>	<b>SQM</b>
<b>14</b>	<b>LIBRARY</b>				
	<b>Total</b>	<b>1</b>	<b>4505.50</b>	<b>4626.47</b>	<b>SQM</b>
<b>15</b>	<b>MULTIPUPOSE HALL</b>				
	<b>Total</b>	<b>1</b>	<b>2550.50</b>	<b>2550.50</b>	<b>SQM</b>
<b>16</b>	<b>GUEST HOUSE</b>				
	<b>Total</b>	<b>1</b>	<b>1210.00</b>	<b>1288.7</b>	<b>SQM</b>
<b>17</b>	<b>HEALTH CENTER</b>				
	<b>Total</b>	<b>1</b>	<b>1264.45</b>	<b>1264.45</b>	<b>SQM</b>
<b>18</b>	<b>FACILITY CENTER</b>				
	<b>Total</b>	<b>1</b>	<b>514.44</b>	<b>514.44</b>	<b>SQM</b>
<b>19</b>	<b>MAINTENANCE OFFICE</b>				
	<b>Total</b>	<b>1</b>	<b>291.17</b>	<b>291.17</b>	<b>SQM</b>
<b>20</b>	<b>POLICE CHOWKI</b>				
	<b>Total</b>	<b>1</b>	<b>86.86</b>	<b>86.86</b>	<b>SQM</b>
<b>21</b>	<b>PUMP HOUSE</b>				
	<b>Total</b>	<b>4</b>	<b>283.68</b>	<b>283.68</b>	<b>SQM</b>
<b>22</b>	<b>ESS</b>				
	<b>Total</b>	<b>1</b>	<b>431.27</b>	<b>431.27</b>	<b>SQM</b>
<b>23</b>	<b>KISAN KALYAN KENDRA, BEE-KEEPING,MUSHROOM SPAWN UNIT &amp; PRODUCTION UNIT</b>				
	<b>Total</b>	<b>1</b>	<b>1850.00</b>	<b>1850.00</b>	<b>SQM</b>
		<b>TOTAL AREA</b>	<b>139306.56</b>	<b>144045.15</b>	<b>SQM</b>



**B. Site Development works:-**

S. No.	DESCRIPTION	UNIT	QUANTITY
(i)	UGT	LITRE	300,000
(ii)	Gate with Guard room	NOS.	2
(ii)	Boundary wall	METRE	3130
		METRE	Height :- 1.80 mt. & 600 mm High Grill
(iii)	C.C Roads	METRE	Road 6.0 Wide 3270 , Road 4.5 Wide 1656
(iv)	Road side Pathway	METRE	6540
(v)	Drain	METRE	Drain width :- 300,450, 600, 750 mm , length :- (300+2000+4500+1500) =Total 8300
(vi)	STP	KLD	650
(vii)	WTP	KLD	650
(viii)	Bore well	NOS.	4
(ix)	External water supply & Sewerage	JOB	1
(x)	Campus Filling	JOB	As per the Contour Plan and levels(Approx 279500m3)
(xi)	Signages	JOB	1
(xii)	Landscape and Horticulture		
(a)	Green area	SQM	19816
(b)	Trees Plant	NOS.	1300
(c)	Shrubs Plant	NOS.	400
(d)	Ground edging Plant	NOS.	400
(e)	SS planter 18" dia	NOS.	100
(xiii)	Parking	SQM	7500
(xvi)	Hi-Tech Nursery, Banana tissue culture & Department of Agriculture & Farmers	JOB	1
	EXTERNAL PLUMBING		
i	EXTERNAL SEWERAGE SYSTEM	METRE	150 mm dia. RCC pipe = 100 250 mm dia. RCC pipe = 2,500 300 mm dia. RCC pipe = 1,000 TOTAL = 3600

ii	EXTERNAL WATER SUPPLY SYSTEM	METRE	65 mm dia. CPVC pipe = 400 80 mm dia. CPVC pipe = 1,200 100 mm dia. CPVC pipe = 6,000 TOTAL = 7600
iii	RAIN WATER DRAINAGE WORK	METRE	150 mm RCC pipe = 100 250 mm RCC pipe = 750 300 mm RCC pipe = 2,500 450 mm RCC pipe = 1,000 TOTAL = 4350
iv	HARVESTING PITS	NOS.	30
v	DRAIN	METRE	Drain 300 wide = 300 Drain 450 wide = 2,000 Drain 600 wide = 4,500 Drain 750 wide = 1,500 TOTAL = 8300
vi	DRAINAGE SUMP PUMP	LPM	100 LPM One Working One Standby
	EXTERNAL ELECTRICAL DEVELOPMENT		
i	HT Work	KV	33
ii	Transformer = 4x2,000 KVA	KVA	8000
iii	DG Set (4X500KVA)	KVA	2000
iv	Solar Power backup	KWP	400

#### **4. SALIENT FEATURES OF THE DESIGN**

- **Functional Planning and Zoning:**

The Forestry and Horticulture University campus has been planned with clear functional zoning to integrate academic, administrative, residential, and recreational facilities. The zoning comprises Administrative Block, two Academic Blocks, Central Library, Multipurpose Hall, Guest House, Health Centre, Facility Centre, Police Chauki, and residential buildings for staff and students, including VC Residence, Type-5 and Type-4 Towers, Type-3 and Type-2 Towers, UG/PG Hostels, Diploma Hostels, and Research Scholars Hostels. The zoning ensures smooth circulation, functional separation of activities, privacy in residential areas, and optimal utilization of the available land.

- **Administrative and Academic Facilities:**

The Administrative Block and Academic Blocks are designed to accommodate offices, classrooms, seminar halls, laboratories, faculty rooms, and research facilities. Efficient circulation, accessibility, and functional adjacency have been ensured for staff, students, and visitors.

- **Central Library:**

The Central Library has been planned to provide comprehensive academic resources, reading rooms, digital learning facilities, and study areas. Special attention has been given to natural light, ventilation, and user comfort.

- **Multipurpose Hall:**

A multipurpose hall has been designed for indoor sports, cultural activities, seminars, conferences, and institutional functions. Adequate space, structural safety, and acoustics have been incorporated.

- **Guest House:**

The Guest House accommodates visiting faculty, dignitaries, and short-term guests with comfortable lodging, modern amenities, and functional spaces.

- **Health Centre:**

The Health Centre provides essential medical services for students, staff, and visitors, including emergency care, consultation rooms, and proper sanitation facilities.

- **Facility Centre:**

The Facility Centre houses essential campus services such as an in-campus bank, post office, and other support facilities required for smooth functioning of the university.

- **Police Chauki:**

The Police Chauki ensures campus security, monitoring, and emergency response to maintain a safe and secure environment.

- **Residential Buildings:**

Residential facilities include:

- **VC Residence** for the Vice Chancellor.
- **Type-5 Tower (S+7)** for Professors/Associate Professor/Dean and equivalent.
- **Type-4 Towers (2 no., S+8)** for Assistant Professor/Administrative Officers and equivalent.

- **Type-3 Towers (S+14 & S+13)** for Non Teaching and Teaching officers and equivalent.
- **Type-2 Towers (5 no., S+10)** for lower-level central government employees, junior staff, or small families.
- **UG/PG Hostels and Diploma Hostels** for male and female students.
- **Research Scholars Hostels** for male and female scholars.

These buildings are designed to ensure privacy, safety, recreational spaces, and functional convenience for residents.

• **Sports Infrastructure:**

Outdoor sports facilities including Volleyball, Basketball, and Lawn Tennis courts have been planned to promote physical fitness, training, and recreational activities. Adequate supporting amenities such as seating, pathways, and lighting have been incorporated.

• **Fire Safety Provisions:**

All buildings have been designed with fire detection systems, firefighting arrangements, and safe evacuation routes in accordance with applicable codes and safety standards.

• **Seismic Resistant Design:**

The structural design of all buildings considers seismic forces, following relevant Indian Standard Codes, to ensure safety, stability, and durability.

• **Energy Efficient Design:**

Energy-efficient systems including LED lighting, optimized electrical installations, and other conservation measures have been incorporated to reduce operational energy consumption.

• **Eco-Friendly Campus Planning:**

The campus design preserves open spaces and integrates landscaping with lawns, trees, shrubs, horticultural zones, and forestry elements to enhance environmental quality, educational value, and research opportunities.

• **Adequate Natural Light and Ventilation:**

Buildings are oriented and designed to maximize natural light and cross-ventilation, enhancing indoor comfort while reducing dependency on artificial lighting and mechanical ventilation.

## 5. Proposed Facility

A.	Details of Buildings:	
S.NO	BUILDING	FACILITIES
1	<b>TYPE 6 - 1 UNIT</b>	
	GROUND FLOOR	BEDROOMS (x3) + DINING ROOM + LIVING ROOM + FAMILY LOUNGE + OFFICE + WAITING LOUNGE + SERVANT ROOM + KITCHEN + STORE ROOM + POWER ROOM + TOILETS + VERANDAH
2	<b>TYPE 5 - 28 Unit</b>	
	STILT FLOOR	CAR PARKING + LOBBY + ELECTRICAL ROOM + LIFT LOBBY + STAIRCASE ACCESS
	FIRST FLOOR	4 UNITS OF 4BHK (BEDROOMS (x3) + GUEST ROOM / OFFICE + DINING AREA + LIVING ROOM + KITCHEN + STORE + TOILETS) + LOBBY + LIFT LOBBY
	SECOND FLOOR	-do-
	THIRD FLOOR	-do-
	FOURTH FLOOR	-do-
	FIFTH FLOOR	-do-
	SIXTH FLOOR	-do-
	SEVENTH FLOOR	-do-
3	<b>TYPE-4 (2 -BLOCKS 32 Unit Each Block)</b>	
	STILT FLOOR	SERVANT ROOM (x2) + TOILETS (x2) + LIFT LOBBY + STAIRCASE + CAR PARKING
	FIRST FLOOR	4 UNITS OF 3 BHK (BEDROOM(x2), DRAWING ROOM, KITCHEN, LIVING/DINING AREA, GUEST ROOM/OFFICE, AND A SERVANT ROOM) + LIFT LOBBY + STAIRCASE
	SECOND FLOOR	-do-
	THIRD FLOOR	-do-
	FOURTH FLOOR	-do-
	FIFTH FLOOR	-do-
	SIXTH FLOOR	-do-
	SEVENTH FLOOR	-do-
	EIGHTH FLOOR	-do-
4	<b>TYPE-3 (S+14 - 1 BLOCK) (56 UNITS)</b>	
	STILT FLOOR	LIFT LOBBY + LIFT + STAIRCASE + PARKING AREA
	FIRST FLOOR	4 UNITS OF 2 BHK (LIVING/DINING + BEDROOM (x2)+ KITCHEN + TOILETS)+ LIFT LOBBY + LIFT + STAIRCASE
	SECOND FLOOR	-do-
	THIRD FLOOR	-do-
	FOURTH FLOOR	-do-
	FIFTH FLOOR	-do-

	SIXTH FLOOR	-do-
	SEVENTH FLOOR	-do-
	EIGHTH FLOOR	-do-
	NINETH FLOOR	-do-
	TENTH FLOOR	-do-
	ELEVENTH FLOOR	-do-
	TWELVETH FLOOR	-do-
	THIRTEENTH FLOOR	-do-
	FOURTEENTH FLOOR	-do-
<b>5</b>	<b>TYPE-3 (S+13 - 1 BLOCK) (52 UNITS)</b>	
	STILT FLOOR	LIFT LOBBY + LIFT + STAIRCASE + PARKING AREA
	FIRST FLOOR	4 UNITS OF 2 BHK (LIVING/DINING + BEDROOM (x2)+ KITCHEN + TOILETS)+ LIFT LOBBY + LIFT + STAIRCASE
	SECOND FLOOR	-do-
	THIRD FLOOR	-do-
	FOURTH FLOOR	-do-
	FIFTH FLOOR	-do-
	SIXTH FLOOR	-do-
	SEVENTH FLOOR	-do-
	EIGHTH FLOOR	-do-
	NINETH FLOOR	-do-
	TENTH FLOOR	-do-
	ELEVENTH FLOOR	-do-
	TWELVETH FLOOR	-do-
	THIRTEENTH FLOOR	-do-
<b>6</b>	<b>TYPE-2 (5 - BLOCKS S+10) 40 UNITS EACH BLOCK</b>	
	STILT FLOOR	LIFT LOBBY + LIFT + STAIRCASE + PARKING AREA
	FIRST FLOOR	4 UNITS OF 2 BHK (BED ROOM (X2) + KITCHEN + LOUNGE/DINING + BATH + TOILET) + LIFT LOBBY + LIFT + STAIRCASE
	SECOND FLOOR	-do-
	THIRD FLOOR	-do-
	FOURTH FLOOR	-do-
	FIFTH FLOOR	-do-
	SIXTH FLOOR	-do-
	SEVENTH FLOOR	-do-
	EIGHTH FLOOR	-do-
	NINETH FLOOR	-do-
	TENTH FLOOR	-do-
	<b>Total</b>	

<b>7</b>	<b>UG PG HOSTEL BOYS (360 SEATER)</b>	
	GROUND FLOOR	DINING HALL + KITCHEN + WET STORAGE + DEEP FREEZER + WASHING AREA + LOADING/UNLOADING AREA + TOILETS + ROOMS (x13-Triple Occupancy) + SPECIALLY ABLED ROOM + VISITOR ROOM + WARDEN OFFICE + LIFTS + LIFT LOBBIES + CORRIDOR+ DOUBLE HEIGHTED ENTRANCE LOBBY + STAIRCASES
	FIRST FLOOR	ROOMS (x16-Triple Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	SECOND FLOOR	ROOMS (x18-Triple Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	THIRD FLOOR	-do-
	FOURTH FLOOR	-do-
	FIFTH FLOOR	-do-
	SIXTH FLOOR	ROOMS (x18-Double Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	SEVENTH FLOOR	-do-
<b>8</b>	<b>UG PG HOSTEL GIRLS (285 SEATER)</b>	
	GROUND FLOOR	DINING HALL + KITCHEN + WET STORAGE + DEEP FREEZER + WASHING AREA + LOADING/UNLOADING AREA + TOILETS + ROOMS (x13-Triple Occupancy) + SPECIALLY ABLED ROOM + VISITOR ROOM + WARDEN OFFICE + LIFTS + LIFT LOBBIES + CORRIDOR+ DOUBLE HEIGHTED ENTRANCE LOBBY + STAIRCASES
	FIRST FLOOR	ROOMS (x16-Triple Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	SECOND FLOOR	ROOMS (x18-Triple Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
	THIRD FLOOR	-do-
	FOURTH FLOOR	-do-
	FIFTH FLOOR	ROOMS (x18-Double Occupancy) + TOILETS + LIFT LOBBIES + CORRIDOR + BALCONIES + STAIRCASE
<b>9</b>	<b>DIPLOMA HOSTEL BOYS (70 SEATER)</b>	
	GROUND FLOOR	DINING HALL + KITCHEN + STOREKEEPER'S ROOM + WASH AREA + DRY STORAGE + WET STORAGE + DEEP FREEZER + TOILETS + SPECIALLY ABLED ROOM + DOUBLE HEIGHTED ENTRANCE LOBBY + VISITORS ROOM + WARDEN OFFICE + ROOMS(x5 – Triple Occupancy)
	FIRST FLOOR	ROOMS(X8 – Triple Occupancy) + TOILETS + BALCONIES + CORRIDORS + STAIRCASES
	SECOND FLOOR	ROOMS(X10 – Triple Occupancy) + TOILETS + LIFT LOBBY + BALCONIES + CORRIDORS+ STAIRCASES
<b>10</b>	<b>DIPLOMA HOSTEL GIRLS(70 SEATER)</b>	
	GROUND FLOOR	DINING HALL + KITCHEN + STOREKEEPER'S ROOM + WASH AREA + DRY STORAGE + WET STORAGE + DEEP FREEZER + TOILETS + SPECIALLY ABLED ROOM + DOUBLE HEIGHTED ENTRANCE LOBBY + VISITORS ROOM + WARDEN OFFICE + ROOMS(x5 – Triple Occupancy)

	FIRST FLOOR	ROOMS(X8 – Triple Occupancy) + TOILETS + BALCONIES + CORRIDORS + STAIRCASES
	SECOND FLOOR	ROOMS(X10 – Triple Occupancy) + TOILETS + LIFT LOBBY + BALCONIES + CORRIDORS+ STAIRCASES
<b>11</b>	<b>RESEARCH HOSTEL BOYS (66 SEATER)</b>	
	G.F.	ROOMS (x13) + SPECIALLY ABLED ROOM + VISITOR ROOM + WARDEN OFFICE + TOILETS +LIFTS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	1.F.	ROOMS (x16) + TOILETS + LIFT + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	2.F.	ROOMS (x18) + TOILETS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	3.F.	ROOMS (x18) + TOILETS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
<b>12</b>	<b>RESEARCH HOSTEL GIRLS (44 SEATER)</b>	
	GROUND FLOOR	ROOMS (x13) + SPECIALLY ABLED ROOM + VISITOR ROOM + WARDEN OFFICE + TOILETS +LIFTS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	FIRST FLOOR	ROOMS (x16) + TOILETS + LIFT + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
	SECOND FLOOR	ROOMS (x18) + TOILETS + LIFT LOBBY + STAIRCASES + 1800 MM AND 3000 MM WIDE CORRIDORS
<b>13</b>	<b>ADMIN BLOCK</b>	
	GROUND FLOOR	Main Entrance, Registrar Room, Registrar Office (Waiting + Secretary + Ante + Confidential Room), Conference Room, Kitchens, Cafeteria, Lifts, Lift Lobbies, Staff Offices, Administrative Officer's Office, Office, Deputy Registrar, Assistant Registrar, Student Grievance Cell, Secretary, Security Officer, Stenographers, Kitchen & Serving Area, Waiting Lounge, JR Assistants – Toilets.
	FIRST FLOOR	Director's Office, Vice Chancellor Office, Dean Offices (x3), Meeting Room, Confidential Room, Secretary, Staff Offices, Record Room, Cashier, Assistant Accounts Officer, Accounts Officer, Stenographers, Cashier, JR Assistants, Pantries, Waiting Areas, Toilets
	SECOND FLOOR	Examination Controller, Assistant Registrars, Deputy Registrars, Security Officer, Secretary, Conference Room, Record Room, Stenographers, JR Assistants, Pantries, Fresh Copy Storage, Copy Rechecking Section, Accounts Officer, Toilets, Lifts, Lift Lobbies.
	THIRD FLOOR	Conference Room, Karmik Department, Officers' Room, Record Room, Secretary, Medical Officer, Office, Jr. Assistant, Publication Department, Stenographer, Toilets, Pantries, Lifts, Lift Lobbies,
<b>14</b>	<b>ACADEMIC BLOCK</b>	
	GROUND FLOOR	Double Height Entrance Lobby, Reception, Assistant Professor, Staff Office, Toilets, Classrooms, Laboratories, Lab. Assistant, Prep Room, Lecture Theatres, Lifts, Lift Lobbies, Examination Hall, Seminar Hall, Corridors, Staircases, Tutorial Rooms, Lobby, Associate Professor, Professor, Landscaped Courtyard
	FIRST FLOOR	Assistant Professor, Staff Office, Toilets, Classrooms, Laboratories, Lecture Theatres, Lifts, Lift Lobbies, Staircases, Research Scholars



		Room, Tutorial Rooms, Associate Professor, Professor
	SECOND FLOOR	Research Scholars Room, Girls Common Room, Boys Common Room, Library, Assistant Professor, Staff Office, Toilets, Classrooms, Laboratories, Lecture Theatre, Lifts, Lift Lobbies, Tutorial Rooms, Professor, Associate Professor.
	THIRD FLOOR	Lecture Theatre + Laboratories + Classrooms + Professor Cabin + Assistant & Associate Professor Cabins + Library + Boys' Common Room + Girls' Common Room + Staff Room + Toilets + Lobbies + Lift Lobbies + Staircases
	TERRACE	TERRACE GARDEN
<b>15</b>	<b>LIBRARY</b>	
	GROUND FLOOR	Entrance Lobby + Book Issue and Return Counter + Baggage Counter + Support Staff + Librarian + Photocopy + Book Binding + Toilets
	FIRST FLOOR	Staff Reading Area + Reading Area + E-Library + Seminar + Audio Visual Presentation Room + Toilets + Landscape Terrace
	SECOND FLOOR	Staff Reading Area + Reading Area + E-Library + Seminar + Audio Visual Presentation Room + Toilets + Landscape Terrace
<b>16</b>	<b>MULTIPURPOSE HALL</b>	
	GROUND FLOOR	MULTIPURPOSE HALL, CHANGING ROOM AND TOILET RECEPTION + SECURITY + VISITOR ROOM + COMMON LOUNGE + PANTRY + KITCHEN + DINING AREA + OFFICE OF CARE TAKER + MULTIPLE GUEST ROOMS + LANDSCAPED COURTYARD
<b>17</b>	<b>GUEST HOUSE</b>	
	GROUND FLOOR	Waiting area, Rooms, Restaurant & Pantry, Kitchen, Entrance lobby, Pond, Office, Housekeeping, Porch, Pantry, Corridors
<b>18</b>	<b>HEALTH CENTER</b>	
	GROUND FLOOR	OT, CHANGE ROOMS FOR DOCTORS & STAFF, CONSOLE ROOM, ULTRA SOUND ROOM, EXAMINATION ROOM, CONSULTANT ROOM, REGISTRATION AREA, RECOVERY ROOM, NURSE STATION, GENERAL WARD, DUTY ROOMS FOR DOCTORS & STAFF, x-RAY ROOM,
<b>19</b>	<b>FACILITY CENTER</b>	
	GROUND FLOOR	SHOPS, CUSTOMER WAITING AREA, SR. MANAGER'S ROOM, STRONG ROOM, BANK BRANCH, RECORD ROOM, SERVER ROOM, POST OFFICE, TOILETS, CORRIDORS
<b>20</b>	<b>MAINTENANCE OFFICE</b>	
	GROUND FLOOR	MECHANICAL SUPERVISOR, CIVIL SUPERVISOR, MANAGER ROOM, MEETING ROOM, PLUMBING SUPERVISOR, ELECTRICAL SUPERVISOR, STORE ROOM, TOILET
<b>21</b>	<b>POLICE CHOWKI</b>	
	GROUND FLOOR	RECORD ROOM, ROOM, LOBBY, CHOWKI IN-CHARGE ROOM, TOILET
<b>22</b>	<b>KISAN KALYAN KENDRA, BEE-KEEPING, MUSHROOM SPAWN UNIT &amp; PRODUCTION UNIT</b>	
	GROUND FLOOR	RECEPTION & WAITING, INFORMATION CENTER, BACK OFFICE, EXHIBITION HALL, MUSHROOM FARMING HALL, BIO-FERTILIZER HALL, GRAFTED SAPLINGS & SEEDING HALL, TOILETS.
	BEEKEEPING UNIT	MIAN HALL
	MUSHROOM PRODUCT UNIT	MIAN HALL
	MUSHROOM SPAWN UNIT	MIAN HALL

# **ARCHITECTURAL FINISHES**

## **VC RESIDENCE**

**GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN FRONT VERANDAH AND STAIRCASE (STEPS & LANDING)**

**GRANITE IN KITCHEN & TOILET PLATFORMS**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM/ AS APPROVED) VITRIFIED TILES IN AREAS BEDROOMS, DRAWING ROOM, DINNING ROOM, KITCHEN STENOROOM, SERVANT ROOM, POWDER ROOM, etc.**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS.**

**KOTA FLOORING - 20 MM KOTA STONE FLOORING ON THE BASE MORTAR OF GRADE M10 IN UTILITY & STORE**

**CC FLOORING - 40 MM COMPLETE M-15 CC FLOORING WITH FLOATING COAT OF NEAT CEMENT IN COVERED PARKING AREA**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**French Polish on teak wood frames**

**SS WORK - SS (304 GRADE) HANDRAILS of STAIRCASE**

**FLY PROOF SS WIRE GAUZE IN WOODEN DOOR/WINDOW SHUTTERS**

**MS WORK - MS GRILL IN OPENINGS OF WOODEN FRAMES OF WINDOWS**

**MS DOOR FRAME & SHUTTER FOR MUMTY DOOR**

**TERRACE WATERPROOFING - BRICK BAT COBA**

**Modular Kitchen (Type-6, 3500×2500×600 mm with tall unit): Providing and fixing modular kitchen with prelaminated MDF carcass (BWR plywood in sink/wet area), MDF shutters, approved quality hardware, complete with all fittings and fixtures.**

## **TYPE-5 RESIDENCE**

### **ARCHITECTURAL FINISHES**

**GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE**

**FLOORING IN ENTRANCE LOBBY, CORRIDORS, LIFT LOBBY AND STAIRCASE LOBBY**

**GRANITE IN KITCHEN & TOILET PLATFORMS AND IN WINDOW SILL.**

**WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT FACIA & LIFT DOOR JAMB.**

**VERIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM/ AS APPROVED) VITRIFIED TILES IN ENTRANCE FOYER, SERVANT ROOM, LIVING/DINING ROOM, BEDROOMS, GUEST ROOM, DRESSER, etc., AREAS.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN TOILETS, SERVANT TOILET AND BALCONIES.**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF TOILETS AND BALCONIES.**

**KOTA FLOORING - 20 MM KOTA STONE FLOORING IN STEPS & LANDINGS, STORE and FHC AREAS**

**CC FLOORING - 52 mm thick cement concrete flooring with concrete hardener topping, under layer 40 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and top layer 12 mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6 mm nominal size) by volume, hardening compound mixed @ 2 litre per 50 kg of cement or as per manufacturer's specifications, IN PARKING AREA**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**French Polish on teak wood frames**

**Two Coats Enamel Paint on MS Work**

**SS WORK - SS (304 GRADE) HANDRAILS of STAIRCASE AND BALCONY RAILINGS**

**MS WORK - MS GRILL IN FOR WINDOWS & VENTILATORS**

**MS DOOR FRAME & SHUTTER FOR MUMTY DOORS**

**TERRACE WATERPROOFING - BRICK BAT COBA**

**Modular Kitchen (Type-5, 3350×1860×600 mm with tall unit): Providing and fixing modular kitchen with prelaminated MDF carcass (BWR plywood in sink/wet area), MDF shutters, approved quality hardware, complete with all fittings and fixtures.**

**FALSE CEILING- CALCIUM SILICATE FOR TOILET AREA**

## **TYPE-4 RESIDENCE**

### **ARCHITECTURAL FINISHES**

**GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN ENTRANCE LOBBY, CORRIDORS, LIFT LOBBY AND STAIRCASE LOBBY**

**GRANITE IN KITCHEN & TOILET PLATFORMS AND IN WINDOW SILL**

**WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT FACIA & LIFT DOOR JAMB.**

**VERIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN ENTRANCE FOYER, SERVANT ROOM, LIVING/DINING ROOM, BEDROOMS, GUEST ROOM, DRESSER, etc., AREAS.**

**VITRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN TOILETS, SERVANT TOILET AND BALCONIES**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF TOILETS AND BALCONIES.**

**KOTA FLOORING - 20 MM KOTA STONE FLOORING ON STEPS & LANDINGS, STORE and FHC AREAS**

**CC FLOORING - 52 mm thick cement concrete flooring with concrete hardener topping, under layer 40 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and top layer 12 mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6 mm nominal size) by volume, hardening compound mixed @ 2 litre per 50 kg of cement or as per manufacturer's specifications, IN PARKING AREA**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**French Polish on teak wood frames**

**Two Coats Enamel Paint on MS Work**

**SS WORK - SS (304 GRADE) HANDRAILS of STAIRCASE AND BALCONY RAILINGS**

**MS WORK - MS GRILL IN FOR WINDOWS & VENTILATORS**

**MS DOOR FRAME & SHUTTER FOR MUMTY DOORS**

**TERRACE WATERPROOFING - BRICK BAT COBA**

**FALSE CEILING- CALCIUM SILICATE FOR TOILET AREA**

## **TYPE-3 RESIDENCE**

### **ARCHITECTURAL FINISHES**

**GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN ENTRANCE LOBBY, CORRIDORS, LIFT LOBBY AND STAIRCASE LOBBY**

**GRANITE IN KITCHEN & TOILET PLATFORMS AND IN WINDOW SILL**

**WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT FACIA & LIFT DOOR JAMB.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN BEDROOMS, STUDY ROOM, DRAWING ROOM, KITCHEN, LOBBY, etc., AREAS.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN TOILETS AND BALCONIES.**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF TOILETS AND BALCONIES.**

**KOTA FLOORING - 20 MM KOTA STONE FLOORING ON STEPS & LANDINGS, STORE AREAS**

**CC FLOORING - 52 mm thick cement concrete flooring with concrete hardener topping, under layer 40 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and top layer 12 mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6 mm nominal size) by volume, hardening compound mixed @ 2 litre per 50 kg of cement or as per manufacturer's specifications, IN PARKING AREA**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**French Polish on teak wood frames**

**Two Coats Enamel Paint on MS Work**

**SS WORK - SS (304 GRADE) HANDRAILS of STAIRCASE AND BALCONY RAILINGS**

**MS WORK - MS GRILL IN FOR WINDOWS & VENTILATORS**

**MS DOOR FRAME & SHUTTER FOR MUMTY DOORS**

**TERRACE WATERPROOFING - BRICK BAT COBA**

**FALSE CEILING- CALCIUM SILICATE FOR TOILET AREA**

## **TYPE-2 RESIDENCE**

GRANITE IN KITCHEN & TOILET PLATFORMS AND IN WINDOW SILL  
WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT FACIA & LIFT DOOR JAMB

VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN BEDROOMS, STUDY ROOM, DRAWING ROOM, KITCHEN, LOBBY, etc., AREAS.

VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN TOILETS AND BALCONIES.

MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF TOILETS AND BALCONIES.

KOTA FLOORING - 20 MM KOTA STONE FLOORING ON STEPS & LANDINGS, STORE AREAS

CC FLOORING - 52 mm thick cement concrete flooring with concrete hardener topping, under layer 40 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and top layer 12 mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6 mm nominal size) by volume, hardening compound mixed @ 2 litre per 50 kg of cement or as per manufacturer's specifications, IN PARKING AREA

Paint: Two Coats Acrylic Plastic Emulsion (Internal)

Two Coats Enamel Paint on MS Work and Saal Wood

SS WORK - SS (304 GRADE) HANDRAILS of STAIRCASE AND BALCONY RAILINGS

MS WORK - MS GRILL IN FOR WINDOWS & VENTILATORS  
MS DOOR FRAME & SHUTTER FOR MUMTY DOORS

TERRACE WATERPROOFING - BRICK BAT COBA

FALSE CEILING- CALCIUM SILICATE FOR TOILET AREA

## **UG/PG BOYS & GIRLS HOSTEL**

### **ARCHITECTURAL FINISHES**

GRANITE IN KITCHEN & TOILET PLATFORMS AND IN WINDOW SILL.

WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT FACIA & LIFT DOOR JAMB

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN KITCHEN, DINING HALL ALL ROOMS, FHC, etc.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN TOILETS AND DWF.**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS, WASH AREA, WET STORAGE SITOUT/BALCONIES AND DWF.**

**KOTA FLOORING - 20 MM KOTA STONE FLOORING ON ENTRANCE LOBBY, LIFT LOBBIES, CORRIDORS, FRONT ENTRANCE, DINING HALL ENTRANCE, LOADING-UNLOADING BAY, STAIRCASE LOBBY, STEPS & LANDINGS, etc.**

**PRECAST CC CHEQUERED TILE FLOORING - IN AREAS OF ALL RAMPS**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**Two Coats Enamel Paint on MS Work and Saal Wood**

**SS WORK - SS (304 GRADE) HANDRAILS of STAIRCASE AND BALCONY/SITOUT RAILINGS**

**MS WORK - MS GRILL IN FOR WINDOWS & VENTILATORS**

**MS DOOR FRAME & SHUTTER FOR MUMTY DOORS**

**TERRACE WATERPROOFING - BRICK BAT COBA**

**FALSE CEILING- CALCIUM SILICATE FOR TOILET AREA**

## **DIPLOMA BOYS & GIRLS HOSTEL**

### **ARCHITECTURAL FINISHES**

**GRANITE IN KITCHEN & TOILET PLATFORMS AND IN WINDOW SILL**

**WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT FACIA & LIFT DOOR JAMB.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN KITCHEN, DINING HALL ALL ROOMS, WARDEN OFFICE, STORE KEEPER, COMMON HALL, etc.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN TOILETS, WET&DRY STORAGE, DEEP FREEZER ROOM, AND DWF.**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS, WASH AREA, WET STORAGE SITOUT/BALCONIES AND DWF.**

**KOTA FLOORING – 20 MM KOTA STONE FLOORING ON DRY STORAGE, SROTE KEEPER, CORRIDORS, ENTRANCE LOBBY, ENTRANCE LANDING, STEPS & LANDINGS, etc.**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**Two Coats Enamel Paint on MS Work and Saal Wood**

**SS WORK – SS (304 GRADE) HANDRAILS of STAIRCASE AND BALCONY/SITOUT RAILINGS**

**MS WORK – MS GRILL IN FOR WINDOWS & VENTILATORS**

**MS DOOR FRAME & SHUTTER FOR MUMTY DOORS**

**TERRACE WATERPROOFING – BRICK BAT COBA**

**FALSE CEILING- CALCIUM SILICATE FOR TOILET AREA**

## **RESEARCH BOYS & GIRLS HOSTEL**

### **ARCHITECTURAL FINISHES**

**GRANITE IN KITCHEN & TOILET PLATFORMS AND IN WINDOW SILL**

**WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT FACIA & LIFT DOOR JAMB.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN ALL ROOMS, WARDEN OFFICE, etc.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN TOILETS.**

**MATTE TILE FLOORING – MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS.**

**KOTA FLOORING – 20 MM KOTA STONE FLOORING ON ENTRANCE LOBBY, CORRIDORS, ENTRANCE LANDING, STEPS & LANDINGS, etc.**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**Two Coats Enamel Paint on MS Work and Saal Wood**

**SS WORK – SS (304 GRADE) HANDRAILS of STAIRCASE AND BALCONY/SITOUT RAILINGS**

**MS WORK – MS GRILL IN FOR WINDOWS & VENTILATORS**

**MS DOOR FRAME & SHUTTER FOR MUMTY DOORS**

**TERRACE WATERPROOFING – BRICK BAT COBA**



**FALSE CEILING- CALCIUM SILICATE FOR TOILET AREA**

## **ADMINISTRATIVE BLOCK**

### **ARCHITECTURAL FINISHES**

**GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN FRONT ENTRANCE LANDING & STEPS, BACK ENTRANCE LANDING & STEPS, ALL LOBBIES, ALL CORRIDORS, LIFT LOBBY AND STAIRCASE LOBBY**

**GRANITE IN KITCHEN & TOILET PLATFORMS AND IN WINDOW SILL**

**WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT FACIA & LIFT DOOR JAMB.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN ALL OFFICES/WORKING AREAS, WAITING LOUNGES/AREA, VIP LOUNGE, STORAGE ROOMS, KITCHENS, ANTE ROOMS, PANTRIES, DWF, etc.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN ENTRANCE LOBY, ALL LOBBIES, AND ALL TOILETS.**

**MATTE TILE FLOORING – MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS.**

**WOODEN FLOORING – 12 MM ENGINEERED WOODEN FLOORING ON THE BASE OF CC FLOOR OF GRADE M10 IN AREAS OF CONFERENCE ROOMS AND MEETING ROOMS**

**KOTA FLOORING – 20 MM KOTA STONE FLOORING ON FRONT RAMP AND BACKSIDE RAMP.**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**French Polish on teak wood frames**

**SS WORK – SS (304 GRADE) HANDRAILS of STAIRCASE, RAILINGS AND WINDOW GRILLS**

**TERRACE WATERPROOFING – BRICK BAT COBA**

**FALSE CEILING- ALUMINIUM FALSE CEILING FOR SECRETARY ROOM, WAITING AREA, REGISTRAR ROOM, ANTE ROOMS, FRONT ENTRANCE LOBBY, DEAN OFFICE, PS ROOM, MEETING ROOM, VC's SECRETARY ROOM, VC OFFICE, DIRECTOR OFFICE, EXAMINATION CONTROLLER's OFFICE, EXAMINATION CONTROLLER's SECRETARY OFFICE, VIP LOUNGE AREA, OFFICERS' ROOM, CONFERENCE ROOMS**

**CALCIUM SILICATE FOR ALL TOILET AREA**

FRP JAALI AS PER DRAWING

## **ACADEMIC BLOCKS**

### **ARCHITECTURAL FINISHES**

GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN PORCH, ENTRANCE LOBBY, STAIRCASE STEPS & LANDINGS, FRONT ENTRANCE LANDING & STEPS, BACK ENTRANCE LANDING & STEPS, CENTRAL ENTRANCE LANDING & STEPS, ALL LOBBIES, ALL CORRIDORS, LIFT LOBBY AND STAIRCASE LOBBY

GRANITE ON KITCHEN & TOILET PLATFORMS, WINDOW SILL AND PLANTERS TOP.

WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT LOBBIES, LIFT DOOR JAMBS AND PLANTERS.

VITRIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN ALL OFFICES/WORKING AREAS, CLASSROOMS, LABORATORIES, EXAMINATION HALLS, SEMINAR HALLS, BOYS' & GIRLS' COMMON ROOMS, LIBRARY, RESEARCH SCHOLARS' ROOMS etc.

VITRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN ENTRANCE LOBBY, ALL LOBBIES, AND ALL TOILETS.

MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS.

WOODEN FLOORING - 12 MM ENGINEERED WOODEN FLOORING ON THE BASE OF CC FLOOR OF GRADE M10 IN AREAS OF LECTURE THEATRE

OPTRA-ACOUSTICAL WALL PANELLING- ON THE WALLS OF LECTURE THEATRES

PRECAST CC CHEQUERED TILE FLOORING - IN AREA OF COURTYARD ENTRANCE

Paint: Two Coats Acrylic Plastic Emulsion (Internal)

French Polish on teak wood frames

SS WORK - SS (304 GRADE) HANDRAILS of STAIRCASE, RAILINGS AND WINDOW GRILLS

TERRACE GARDEN - BOTH BLOCKS

FALSE CEILING- ALUMINIUM FALSE CEILING FOR PORCH, ENTRANCE LOBBY, LECTURE THEATRES, EXAMINATION HALLS, SEMINAR HALLS, AND LIBRARY.

CALCIUM SILICATE FOR ALL TOILET AREA

## **CENTRAL LIBRARY**

### **ARCHITECTURAL FINISHES**

GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN ENTRANCE AREA, PASSAGE, CENTRAL LOBBIES, STAIRCASE AREAS.

GRANITE ON KITCHEN & TOILET PLATFORMS, AND WINDOW SILL.

WALL DADO - COMBINATION OF LIGHT AND DARK SHADE GRANITE IN LIFT LOBBIES, LIFT DOOR JAMBS.

VERIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN BAGGAGE COUNTER AREA, BOOK ISSUE & RETURN AREA, SUPPORT STAFF AREA, BOOK BINDING AREA, LIBRARIAN AREA, PHOTOCOPY AREA, READING AREA, PASSAGES, KITCHEN, PANTRY AREA, CAFETERIA, E-LIBRARY AREA, AV PRESENTATION AREA, SEMINAR AREA, STAFF READING AREA.

VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN WASH AREA, DWFS AND ALL TOILETS.

MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS, DWF AND LANDSCAPE AREA IN FRONT & BACK.

KOTA FLOORING - 20 MM KOTA STONE FLOORING ON WET AND DRY STORE

Paint: Two Coats Acrylic Plastic Emulsion (Internal)

French Polish on teak wood frames

SS WORK - SS (304 GRADE) HANDRAILS OF STAIRCASE, RAILINGS AND WINDOW GRILLS

TERRACE WATERPROOFING - BRICK BAT COBA

FALSE CEILING- ALUMINIUM FALSE CEILING FOR ENTRANCE AREA, PASSAGE, CENTRE LOBBY, AND CENTRAL STAIRCASE.

CALCIUM SILICATE FOR BAGGAGE COUNTER AREA, BOOK ISSUE-RETURN AREA, SUPPORT STAFF AREA, BOOK BINDING AREA, LIBRARIAN AREA, PHOTOCOPY AREA, READING AREA, KITCHEN, PANTRY, CAFETERIA, E-LIBRARY, AV PRESENTATION, SEMINAR AREA, STAFF READING AREA.

## **MULTIPURPOSE HALL**

### **ARCHITECTURAL FINISHES**

GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE

**FLOORING IN LOBBY, PASSAGE, VERANDAHS STEPS.**

**GRANITE ON KITCHEN & TOILET PLATFORMS, AND WINDOW SILL.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN CAFETERIA, KITCHEN, ROOM, AND GREEN ROOM.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN ENTRANCE LOBBY, CHANGE ROOMS, AND ALL TOILETS.**

**MATTE TILE FLOORING – MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS, AND CHANGE ROOMS.**

**WOODEN FLOORING – 12 MM ENGINEERED WOODEN FLOORING ON THE BASE OF CC FLOOR OF GRADE M10 IN AREAS OF MAIN HALL & STAGE.**

**OPTRA-ACOUSTICAL WALL PANELLING- ON THE WALLS OF MAIN HALL & STAGE**

**KOTA FLOORING – 20 MM KOTA STONE FLOORING ON DRY STORES**

**PRECAST CC CHEQUERED TILE FLOORING – IN AREAS OF ALL RAMPS**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**Two Coats Enamel on MS Work**

**French Polish on teak wood frames**

**SS WORK – SS (304 GRADE) RAILINGS AND WINDOW GRILLS**

**TERRACE WATERPROOFING – BRICK BAT COBA**

**FALSE CEILING- ALUMINIUM FALSE CEILING FOR MAIN HALL & STAGE, LOBBY, CAFETERIA, KITCHEN, ROOMS, PASSAGES, AND VERANDAHS.**

**CALCIUM SILICATE FOR ALL TOILETS AND GREEN ROOMS**

**MS TRUSS WITH POLYCARBONATE SHEET(16MM) ROOFING – OVER THE AREAS OF MAIN HALL AND STAGE.**

## **GUEST HOUSE**

### **ARCHITECTURAL FINISHES**

**GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN PORCH, ENTRANCE LOBBY, CORRIDORS, STAICASE LOBBY, PASSAGES,**

**WAITING AREA, STEPS & LANDINGS.**

**GRANITE ON KITCHEN & TOILET PLATFORMS, AND WINDOW SILL.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES IN HOUSE KEEPING, RESTAURANT & PANTRY, KITCHEN, COOKS' ROOM, OFFICE, ROOMS, LIVING ROOM, LOBBIES.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED) VITRIFIED TILES DADO IN ALL TOILETS.**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS.**

**CC FLOORING(M-15, 40mm THICK)- IN POND AREA AND POND STEPS**

**KOTA FLOORING - 20 MM KOTA STONE FLOORING ON ECLECTRICAL ROOM**

**PRECAST CC CHEQUERED TILE FLOORING - IN AREAS OF ALL RAMPS**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**French Polish on teak wood frames**

**SS WORK - SS (304 GRADE) RAILINGS AND WINDOW GRILLS**

**TERRACE WATERPROOFING - BRICK BAT COBA**

**FALSE CEILING- ALUMINIUM FALSE CEILING FOR OFFICE, ROOMS, LIVING ROOM, LOBBIES.**

**CALCIUM SILICATE FOR ALL TOILETS**

## **HEALTH CENTRE**

### **ARCHITECTURAL FINISHES**

**GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN PASSAGES, LOBBIES, CORRIDORS, ENTRANCE LOBBY, PORCH, STEPS 7 LANDINGS.**

**GRANITE ON KITCHEN & TOILET PLATFORMS, AND WINDOW SILL.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES IN DOCTORS' CHANGE ROOM, NURSES' CHANGE ROOM, CLASS-IV CHANGE ROOM, CONSOLE ROOM, ULTRA SOUND ROOM, CHANGE ROOM, X-RAY ROOM, CONSULTANT ROOM, CABIN, REGISTRATION AREA, RECOVERY ROOM, CU ROOM, NURSE STATION, DU ROOM, GENERAL WARD, DOCTOR DUTY ROOM, AND NURSE DUTY ROOM.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES DADO IN ALL TOILETS, DWF, INSTRUMENT WASH AND SCRUB.**

**MATTE TILE FLOORING – MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS, INSTRUMENT WASH, AND SCRUB AREA.**

**KOTA FLOORING – 20 MM KOTA STONE FLOORING ON SUB. STERILE STORE**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**French Polish on teak wood frames**

**SS WORK – SS (304 GRADE) RAILINGS AND WINDOW GRILLS**

**TERRACE WATERPROOFING – BRICK BAT COBA**

**FALSE CEILING- ALUMINIUM FALSE CEILING FOR PORCH AND ENTRANCE LOBBY.**

**CALCIUM SILICATE FOR ALL TOILETS, DWF, SCRUB AREA AND INSTRUMENT WASH**

## **FACILITY CENTRE**

### **ARCHITECTURAL FINISHES**

**GRANITE FLOORING - COMBINATION OF LIGHT AND DARK SHADE GRANITE STONE FLOORING IN CORRIDORS.**

**GRANITE ON KITCHEN & TOILET PLATFORMS, STEPS & LANDINGS AND WINDOW SILL.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES IN SHOPS, CUSTOMER WAITING, SENIOR MANAGER, STRONG ROOM, BRANCH, OFFICE, BANK HEAD, E-LOBBY, RECORD ROOM, SERVER ROOM, POST MASTER, ROOMS, AND VERANDAH.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES DADO IN ALL TOILETS.**

**MATTE TILE FLOORING – MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS.**

**KOTA FLOORING – 20 MM KOTA STONE FLOORING ON ELECTRICAL ROOM.**

**PRECAST CC CHEQUERED TILE FLOORING – IN AREAS OF ALL RAMPS**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**French Polish on teak wood frames**

TERRACE WATERPROOFING – BRICK BAT COBA

FALSE CEILING-CALCIUM SILICATE FOR ALL TOILETS

## **MAINTAINANCE OFFICE**

### **ARCHITECTURAL FINISHES**

GRANITE ON KITCHEN & TOILET-PANTRY-ENQUIRY PLATFORMS AND WINDOW SILL.

VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES IN PANTRY, MECHANICAL SUPERVISOR, CIVIL SUPERVISOR, MANAGER ROOM, MEETING ROOM, ENQUIRY DESK, OFFICE, PLUMBING SUPERVISOR, AND ELECTRICAL SUPERVISOR.

VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES DADO IN ALL TOILETS AND DWF.

MATTE TILE FLOORING – MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS AND DWF.

KOTA FLOORING – 20 MM KOTA STONE FLOORING ON DWF, STORE ROOM, LOBBIES, CORRIDOR.

PRECAST CC CHEQUERED TILE FLOORING – IN AREAS OF ALL RAMPS

Paint: Two Coats Acrylic Plastic Emulsion (Internal)

Two Coats Textured Exterior Paint (External)

French Polish on teak wood frames

SS WORK – SS (304 GRADE) RAILINGS

TERRACE WATERPROOFING – BRICK BAT COBA

FALSE CEILING-CALCIUM SILICATE FOR ALL TOILETS

## **POLICE CHAUKI**

### **ARCHITECTURAL FINISHES**

GRANITE ON KITCHEN & TOILET PLATFORMS AND WINDOW SILL.

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES IN RECORD ROOM, ROOM AND CHAUKI INCHARGE ROOM.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES DADO IN ALL TOILETS.**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS.**

**KOTA FLOORING - 20 MM KOTA STONE FLOORING ON LOBBY.**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**Two Coats Textured Exterior Paint (External)**

**French Polish on teak wood frames**

**TERRACE WATERPROOFING - BRICK BAT COBA**

**FALSE CEILING-CALCIUM SILICATE FOR ALL TOILETS**

## **KISAN KALYAN KENDRA**

### **ARCHITECTURAL FINISHES**

**GRANITE ON KITCHEN & TOILET PLATFORMS AND WINDOW SILL.**

**VERTIFIED TILE FLOORING-DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES IN BACK OFFICE, OFFICE CABINS AND INFORMATION CENTRE.**

**VETRIFIED TILE DADO - DOUBLE CHARGED VITRIFIED TILE (600X600/800X800 MM AS APPROVED 10 MM THICK) VITRIFIED TILES DADO IN ALL TOILETS AND DWF.**

**MATTE TILE FLOORING - MATT FINISHED TILES (300X300X9.8 MM/AS APPROVED) IN AREAS OF ALL TOILETS AND DWF.**

**KOTA FLOORING - 20 MM KOTA STONE FLOORING ON RECEPTION & WAITING, STAIRCASE, LOBBY & CORRIDOR AND EXIBITION HALL.**

**CC FLOORING (M-15, 40 MM THICK) - GRAFTED SAMPLING & SEEDINGS, BIO-FERTILIZER ROOM AND MUSHROOM FARMING.**

**PRECAST CC CHEQUERED TILE FLOORING - IN AREAS OF ALL RAMPS**

**SS WORK - SS (304 GRADE) RAILINGS FOR STEPS & RAMPS**



**Paint:** Two Coats Acrylic Plastic Emulsion (Internal)  
Two Coats Textured Exterior Paint (External)  
French Polish on teak wood frames

**TERRACE WATERPROOFING – BRICK BAT COBA**

## **BEE-KEEPING UNIT**

### **ARCHITECTURAL FINISHES**

**CC FLOORING (M-15, 40 MM THICK) – MAIN HALL.**

**PRECAST CC CHEQUERED TILE FLOORING – IN AREAS OF ALL RAMPS**

**MS WORK – MS DOOR/WINDOW FRAME & SHUTTER**

**Paint:** Two Coats Acrylic Plastic Emulsion (Internal)  
Two Coats Textured Exterior Paint (External)  
Two Coats of Enamel Paint on MS Work

**TERRACE WATERPROOFING – BRICK BAT COBA**

## **MUSHROOM SPAWN UNIT**

### **ARCHITECTURAL FINISHES**

**CC FLOORING (M-15, 40 MM THICK) – MAIN HALL.**

**PRECAST CC CHEQUERED TILE FLOORING – IN AREAS OF ALL RAMPS**

**MS WORK – MS DOOR/WINDOW FRAME & SHUTTER**

**Paint:** Two Coats Acrylic Plastic Emulsion (Internal)  
Two Coats Textured Exterior Paint (External)  
Two Coats of Enamel Paint on MS Work

**TERRACE WATERPROOFING – BRICK BAT COBA**

## **MUSHROOM PRODUCTION UNIT**

### **ARCHITECTURAL FINISHES**

**CC FLOORING (M-15, 40 MM THICK) – MAIN HALL.**

**PRECAST CC CHEQUERED TILE FLOORING – IN AREAS OF ALL RAMPS**

**MS WORK – MS DOOR/WINDOW FRAME & SHUTTER**

**Paint: Two Coats Acrylic Plastic Emulsion (Internal)**

**Two Coats Textured Exterior Paint (External)**

**Two Coats of Enamel Paint on MS Work**

**TERRACE WATERPROOFING – BRICK BAT COBA**

## DOOR & WINDOWS

### V.C. Residence:

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Second class Teak-wood frame
(ii)	Shutter	35 mm thick flush door shutters with decorative Laminated on both side And external extra door shutter of wire gauge shutters(35 mm) of second class teak wood using galvanized MS wire gauge with tubular type hydraulic door closer IS 3564 marked and speed adjustment
(iii)	Windows	Three Track UPVC window (with m.s grill)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 35mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.
(vii)	Frameless glass door shutter	Entrance door
(viii)	Stair Doors	Two-hour fire rated metal and Glazed door with Fire rated accessories.

### Type-5 Residence:

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Second class Teak-wood frame
(ii)	Shutter	35 mm thick flush door shutters with decorative Laminated on both side And external extra door shutter of wire gauge shutters(35 mm) of second class teak wood using galvanized MS wire gauge with tubular type hydraulic door closer IS 3564 marked and speed adjustment.
(iii)	Windows	Three Track UPVC window with 5.5mm Glass & (with m.s grill)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.

### Type-4 Residence:

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Second class Teak-wood frame
(ii)	Shutter	35 mm thick flush door shutters with decorative Laminated on both side And external extra door shutter of wire gauge shutters(35 mm) of second class teak wood using galvanized MS wire gauge with tubular type hydraulic door closer IS 3564 marked and speed adjustment.
(iii)	Windows	Three Track UPVC window with 5.5mm Glass & (with m.s grill)

(iv)	Ventilators	Ventilator Casement window UPVC
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.

### **Type-3 & Type-2 Residence:**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Saal wood Frame .
(ii)	Shutter	35 mm thick flush door shutters Non- decorative And external extra door shutter of wire gauge shutters(35 mm) of second class teak wood using galvanized MS wire gauge with tubular type hydraulic door closer IS 3564 marked and speed adjustment
(iii)	Windows	Three Track UPVC window with 5.5mm Glass & (with m.s grill)
(iv)	Ventilators	Ventilator Casement window UPVC
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.

### **All Hostels:**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Saal wood Frame .
(ii)	Shutter	35 mm thick flush door shutters non- decorative.
(iii)	Windows	Two Track UPVC window with 5.5mm Glass & (with m.s grill covered with SS flyproof net)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.

### **Administrative Block:**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Second class teak wood frame
(ii)	Shutter	35 mm thick flush door shutters with decorative Laminated on both side
(iii)	Windows	Three Track UPVC window (with m.s grill covered with SS flyproof net)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	WPC Frame - & WPC 35mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.
(vii)	Frameless glass door shutter	Entrance door
(viii)	Stair Doors	Two-hour fire rated metal and Glazed door with Fire rated accessories.

**Academic Blocks:**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Second class teak wood frame+ Powder coated Aluminum Section frame
(ii)	Shutter	35 mm thick flush door shutters with decorative Laminated on both side
(iii)	Windows	Three Track UPVC window (with m.s grill)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.
(vii)	Frameless glass door shutter	Entrance door
(viii)	Stair Doors	Two-hour fire rated metal and Glazed door with Fire rated accessories.

**Central Library**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Second class teak wood frame+ Powder coated Aluminum Section frame
(ii)	Shutter	35 mm thick flush door shutters with decorative Laminated on both side
(iii)	Windows	Three Track UPVC window (with m.s grill)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	WPC Frame - & WPC 35mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.
(vii)	Frameless glass door shutter	Entrance door
(viii)	Stair Doors	Two-hour fire rated metal and Glazed door with Fire rated accessories.

**Multipurpose Hall:**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Second class teak wood frame+ Powder coated Aluminum Section frame
(ii)	Shutter	35 mm thick flush door shutters with decorative Laminate on both side
(iii)	Windows	Three Track UPVC window (with m.s grill)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.
(vii)	Frameless glass door shutter	Entrance door
(viii)	Stair Doors	Two-hour fire rated metal and Glazed door with Fire rated accessories.

**Guest House:**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Second Class Teak wood frame
(ii)	Shutter	35 mm thick flush door shutters with decorative Laminated on both side
(iii)	Windows	Three Track UPVC window (with m.s grill)
(iv)	Ventilators	Two Track UPVC (with m.s grill covered with SS flyproof net)
(v)	Frame & Shutter in toilets	WPC Frame - & WPC 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Brass fittings.
(vii)	Frameless glass door shutter	Entrance door
(viii)	Stair Doors	Two-hour fire rated metal and Glazed door with Fire rated accessories.

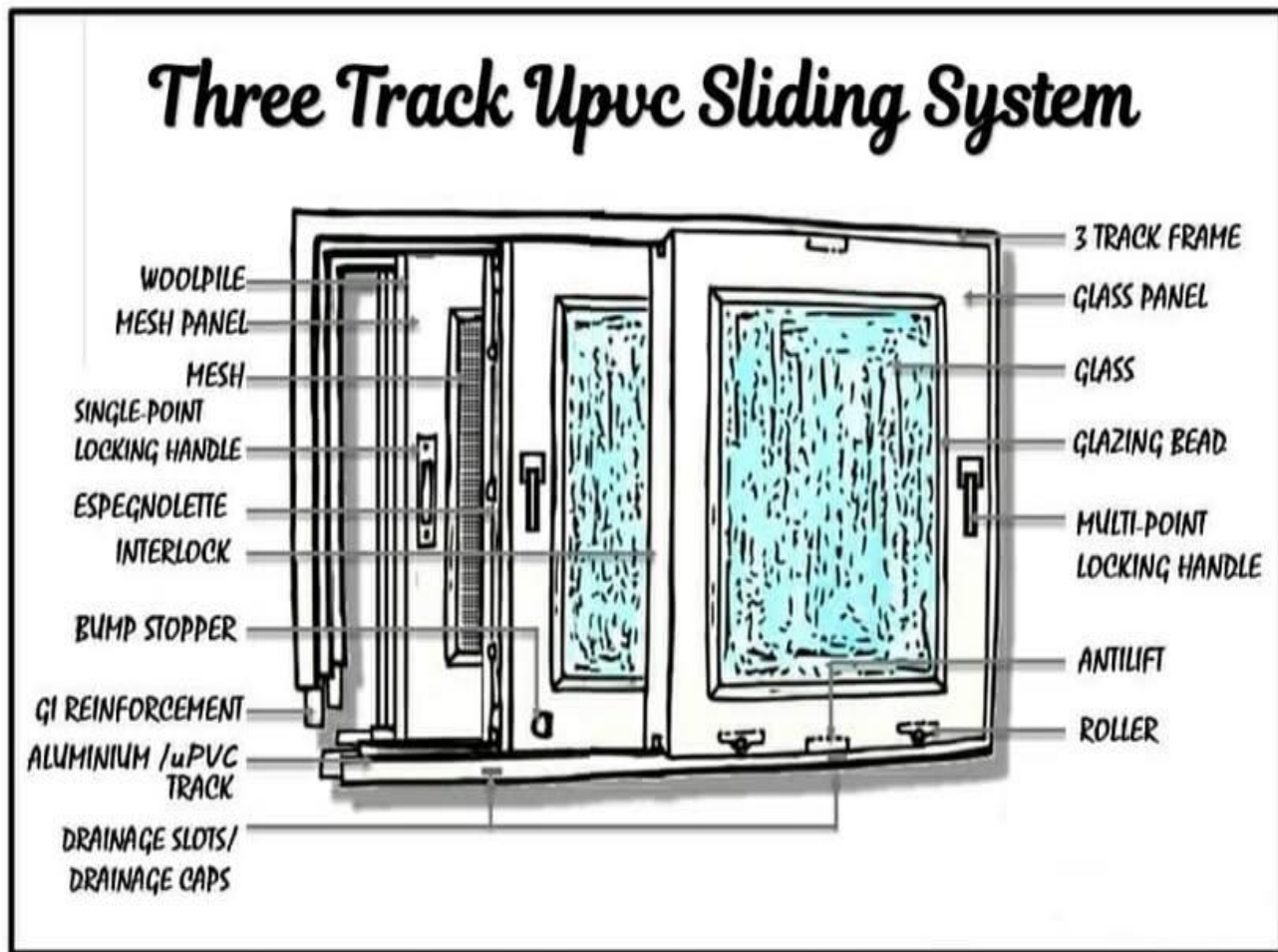
**Health Centre:**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Saal wood frame
(ii)	Shutter	35 mm thick flush door shutters with Non decorative.
(iii)	Windows	Three Track UPVC Window with DGU Glass & (with m.s grill)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Aluminium fittings.
(vii)	Stair Doors	Two-hour fire rated metal and Glazed door with Fire rated accessories.

**Facility Centre, Maintenance Office, Police Chauki & Services Building:**

<b>1.</b>	<b>Door and Windows</b>	
(i)	Frame of Doors	Saal wood frame
(ii)	Shutter	35 mm thick flush door shutters with Non decorative.
(iii)	Windows	Three Track UPVC Window with DGU Glass & (with m.s grill)
(iv)	Ventilators	Two Track UPVC (with m.s grill)
(v)	Frame & Shutter in toilets	FRP Frame - & FRP 30mm thick. Shutter.
(vi)	Fittings	Stainless Steel fittings (Grade 304) and Aluminium fittings.
(vii)	Stair Doors	Two-hour fire rated metal and Glazed door with Fire rated accessories.

## UPVC WINDOWS : with DGU GLASSES



### Fire RATED DOORS 120 MIN RATING )

Standard & certification: Hollow metal Insulated fire rated Grain Tek doors as per IS 3614, tested for 120 minutes of stability, integrity and 30 minutes insulation, satisfying the test criteria of IS / ISO 834-1. Pressed galvanized Grain Tek steel confirming to IS 277 with the following specification.

Frame: Door frame shall be single rebate grooved profile of size 125 x 55mm made out of 1.60mm (16gauge) minimum thick galvanized Grain Tek steel sheet. Frames shall be mitered and field assembled with self-tabs. Frames to have in build grooved sealing system and shall be site fitted with fire rated EPDM gasket as standard. All provision should be mortised, drilled and tapped for receiving appropriate hardware. Frames should be provided with back plate bracket and anchor fasteners for installation on a finished plastered masonry wall opening. Frames shall be filled with fire rated puff and the gaps shall be sealed with silicon sealant.

Shutter: Door leaf shall be 46mm thick fully flush double skin door, insulated with or

without vision lite. Door leaf shall be manufactured from 1.2 mm (18 gauge) minimum thick galvanized GrainTek steel sheet. The internal construction of the door should be rigid reinforcement pads for receiving appropriate hardware. The infill material shall be 96kg high density mineral wool insulation material. Intumescent seals 15x2mm to be provided all around the door in addition to the grooved smoke seal. All doors shall be factory prepped for receiving appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers. The edges should be interlocked with a bending radius of 1.4mm. For pair of doors integrated astragals has to be provided on the meeting stile for both active and inactive leaf. Vision lite wherever applicable should be provided as per manufacturers' recommendation with a clip-on arrangement. Vision glass: The glass should be 6 mm clear borosilicate fire rated schott glass of relevant rating of the door. Max glass size shall not exceed 0.06 sq.mt Finish: All doors and frames shall be wood stained and lacquered finish and shall have passed minimum 500 hours of salt spray test.



## External Finishes

1. Exposed Brickwork in all external walls.
2. Exposed brick wall to be sealed by silicon based transparent deep penetrating sealer liquid.
3. No paint to be applied on the sealer to maintain the façade of Exposed Brick wall

## SPORTS FACILITIES

### 1. VOLLEYBAL GROUND(2 NO)

- Interlocking Polypropylene Tiles on the play area
- Net post on each side of the centre for placing the volleyball net

### 2. BASKETBALL COURT(2 NO)

- Interlocking Polypropylene Tiles on the play area
- Kerbs Edge Border

### 3. LAWN TENNIS(2 NO)

- As per International Tennis Federation Standard Lawn Tennis Court measuring 23.77mx10.97m with net height of 0.9m at center.

## SIGNAGE

Signage is defined as any form of graphic display or visual communication intended to convey information, direction, identification, regulatory guidance, or safety instructions to users within the university campus.

For the development of the Forestry and Horticulture University, signage specifications shall be designed to ensure clear wayfinding, environmental awareness, operational identification, and safety compliance for students, faculty, staff, researchers, and visitors. The signage system shall facilitate efficient navigation across various functional zones of the campus.

The campus facilities covered under the signage system include, but are not limited to: Vice Chancellor (VC) Residence; Type-5, Type-4, Type-3, and Type-2 residential quarters; Undergraduate (UG) and Postgraduate (PG) Boys' and Girls' Hostels; Diploma Boys' and Girls' Hostels; Research Scholars' Boys' and Girls' Hostels; Administrative Block; Central Library Block; Multi-Purpose Hall; Guest House; Health Centre; Facility Centre (including Bank, Post Office, and Shops); Maintenance Office; Police Chauki; Services Building; and Kisan Kalyan Kendra.

In addition to built infrastructure, appropriate informational and interpretive signage shall be considered for horticulture fields, nurseries, plantations, and forestry areas to support academic, research, and extension activities.

All signage shall comply with applicable Indian standards, including relevant building codes, fire and life safety regulations, and accessibility guidelines. Signage shall be designed to ensure clear visibility, legibility, and ease of comprehension for all users, including first-time visitors.

The signage system shall include:

- Directional signage for vehicular and pedestrian movement
- Identification signage for buildings, residences, and facilities
- Informational and interpretive signage for academic and field areas
- Regulatory and safety signage, including fire exits, hazard warnings, and restricted zones

Signage shall be strategically located at entrances, junctions, pathways, building approaches, and other critical decision points to enable smooth navigation and maintain safety and discipline within the campus.

All signage elements shall follow a uniform and cohesive design language, incorporating standardized symbols, appropriate typography, high-contrast colour schemes, and durable, weather-resistant materials suitable for outdoor and semi-outdoor conditions. Materials shall be capable of withstanding climatic variations, moisture, UV exposure, and environmental wear typical of Forestry and Horticulture campuses.

Wherever required, signage shall be provided in bilingual format (English and Hindi) to ensure accessibility and inclusivity.

Overall, the signage system shall function as an integrated campus-wide wayfinding and communication network, enabling efficient movement, enhancing user experience, and supporting the safe and organized functioning of the Forestry and Horticulture University.

## LANDSCAPE CONCEPT

The physical character of a Forestry and Horticulture University campus is fundamentally shaped by its landscapes, ecological systems, and open spaces. Such an academic environment must not only be safe and well-organized but also ecologically responsive, educationally enriching, and supportive of research, field-based learning, and community engagement.

The aim of the landscape program is to create a campus environment that seamlessly integrates academic infrastructure, residential zones, research fields, and extension facilities, while providing open spaces that promote learning, experimentation, interaction, and well-being of students, faculty, researchers, and visitors.

Given the specialized nature of the institution, the landscape itself shall function as a **living laboratory**, supporting horticultural practices, forestry research, biodiversity conservation, and sustainable land-use demonstration.

The guiding principles shaping the landscape of the campus are as follows:

□ **Academic and Institutional Identity**

A strong sense of place shall be created, reflecting the university's role as a centre of excellence in horticulture, forestry, and allied sciences. Landscapes shall reinforce the academic character through demonstration plots, thematic gardens, and research-based plantations.

□ **Grandeur with Functionality**

Open spaces shall be designed at an appropriate scale to accommodate institutional activities such as gatherings, outdoor academic sessions, exhibitions, and extension programs, while maintaining human-scale usability and comfort.

□ **Sustainability and Ecological Responsibility**

Landscape planning shall be based on sustainable principles, including efficient water management systems, rainwater harvesting, use of native and climate-resilient plant species, soil conservation, and preservation of existing vegetation. Shaded pathways, green buffers, and microclimate-responsive design shall be incorporated to enhance environmental comfort.

□ **Integration of Academic, Residential, and Research Zones**

The landscape shall visually and functionally connect academic blocks, hostels, residential quarters, research farms, nurseries, and public-use facilities such as the Kisan Kalyan Kendra and Facility Centre. This integration shall ensure smooth movement and a cohesive campus experience.

□ **Educational and Interpretive Value**

Plantation areas, nurseries, and forestry zones shall include interpretive landscapes that provide educational value, showcasing plant species, cultivation techniques, and ecological systems for students, researchers, and visiting stakeholders.

The site landscape planning shall weave together various public, semi-public, and specialized spaces of the campus—including academic courtyards, residential greens, research plots, orchards, nurseries, pedestrian

pathways, water bodies, and gathering spaces—into a coherent and interconnected layout that encourages walkability and interaction.

At the same time, the planning approach shall ensure that the campus remains safe, organized, and vibrant, offering well-defined green spaces for relaxation, informal learning, and social engagement. The landscape shall support the diverse academic, residential, research, and outreach functions of the university, while enhancing ecological balance and long-term environmental sustainability.

Overall, the landscape shall not only enhance the visual and spatial quality of the campus but also actively contribute to its academic mission, serving as an integral component of teaching, research, and extension activities in Forestry and Horticulture.

All the plants covered with MS flat iron tree guard 6 cm dia and 2 m high .

- Trees plant – 1300 nos
- Shrubs Plant -400
- Hedge Plant – 400 nos

Above Plant Includes some plant as listed below.

- LOCALFLORAANDFAUNATOBEUSED

Raphis palm 3' - 4' height	NOS.	100
Foxtail palm 8' - 10' height	NOS.	100
Tabebuia 2'-3' ht	NOS.	100
Palm cycas Revolura 2"-3" dia	NOS.	100
Golden duranta ( hedge )	RMT	100
Toparies height 5 - 6 ' height		
Golden bottle brush	NOS.	80
Casurina	NOS.	80
Ficus Resonalt	NOS.	80
Areca palm 4' - 5' height	NOS.	80
Draceana varieties	NOS.	80
Croton varities	NOS.	80
Deffenbachia	NOS.	80
Aglonema	NOS.	80
Fishtail palm	Nos.	80
Champagne palm 1 - 2 m foliage	Nos.	80
SHRUS (have several woody item)		
Coral Hibiscus 2'-3' ht	Nos.	50
Massanda Pink 2'-3' ht	Nos.	50
Kachnar 5'-6' ht	Nos.	50
Bottle Brush 5'-6' ht	Nos.	50
Ixora 2'-3' ht	Nos.	50
Ficus black Tapor 3'-4' ht	Nos.	50
Ficus Prestige Boll 3'-4' ht	Nos.	50
Hamelia 2'-3' ht	Nos.	50

Ground edging Plant		
Eranthemum	Rmt	100
Verbena	Rmt	100
Setcreasea	Rmt	100
Verbena Mix	Rmt	100

- Other as approved by Client/Consultant.

## VISION FOR THE PROJECTS

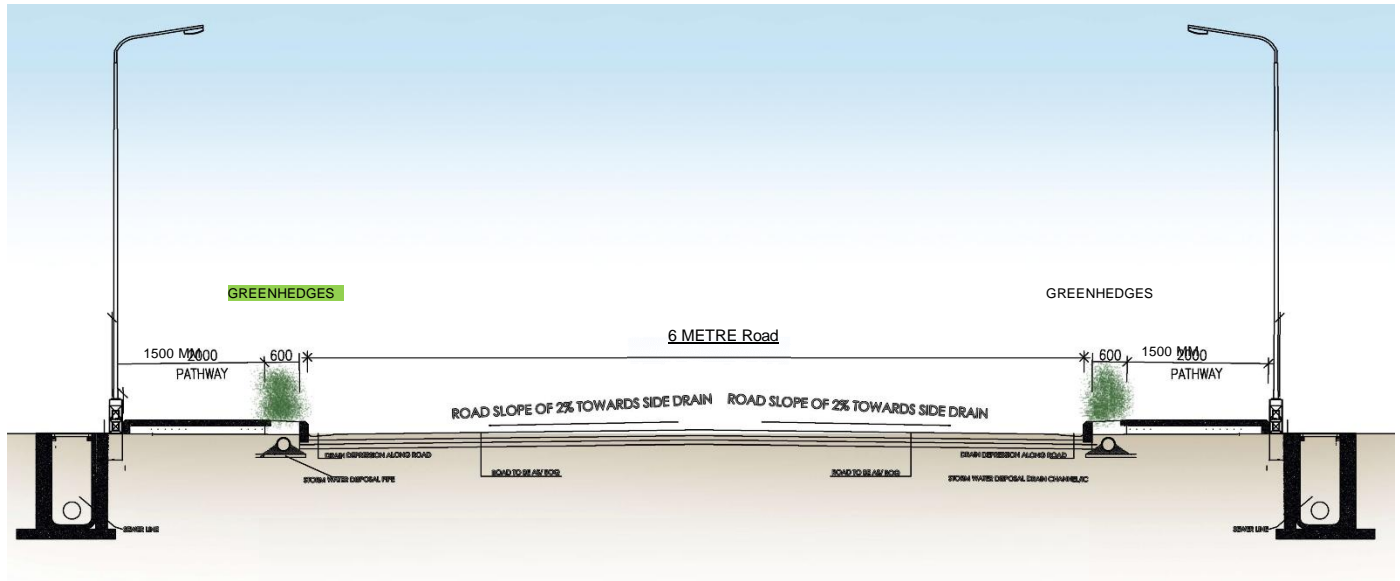
- 1) **Support the educational mission of the school** by promoting academic excellence, discipline, physical development, and overall growth of students.
- 2) **Develop the program in general conformance with the approved campus layout plan**, integrating academic, residential, and sports facilities.
- 3) **Incorporate the institutional vision** with regard to sustainability, accessibility, safety, maintainability, and appropriate use of information and communication technology
- 4) **Develop a fiscally responsible plan** ensuring efficient utilization of resources while maintaining quality infrastructure for education and co-curricular activities.

## LANDSCAPE PROGRAMME

The landscape program would intervene at the following levels:

- Site planning
- Land Conservation and management
- Water Management
- Vegetation management

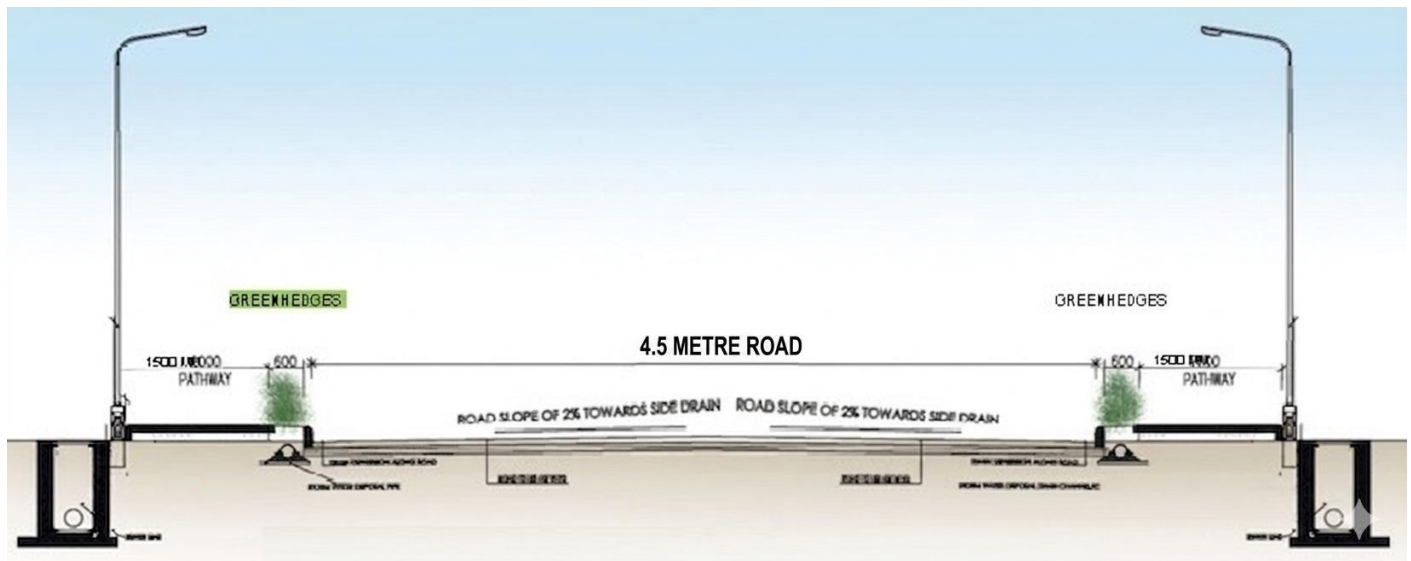
## C C ROAD SECTION



### 6 METRE ROAD – 6 M CC ROAD PLUS DRAIN AND PATHWAY BOTH SIDE

#### LAYERS :

1. CONSOLIDATION BY ROAD ROLLER OF 8 TO 12 TONNE
2. GRANULAR SUBBASE OF 100 MM
3. WMM – 75 MM
4. C.C (M-30)– 170 MM WITH REQUIRED EXPANSION JOINT WITH FILLER



### 4.5 METRE ROAD – 4.5 M CC ROAD PLUS DRAIN AND PATHWAY BOTH SIDE

#### LAYERS :

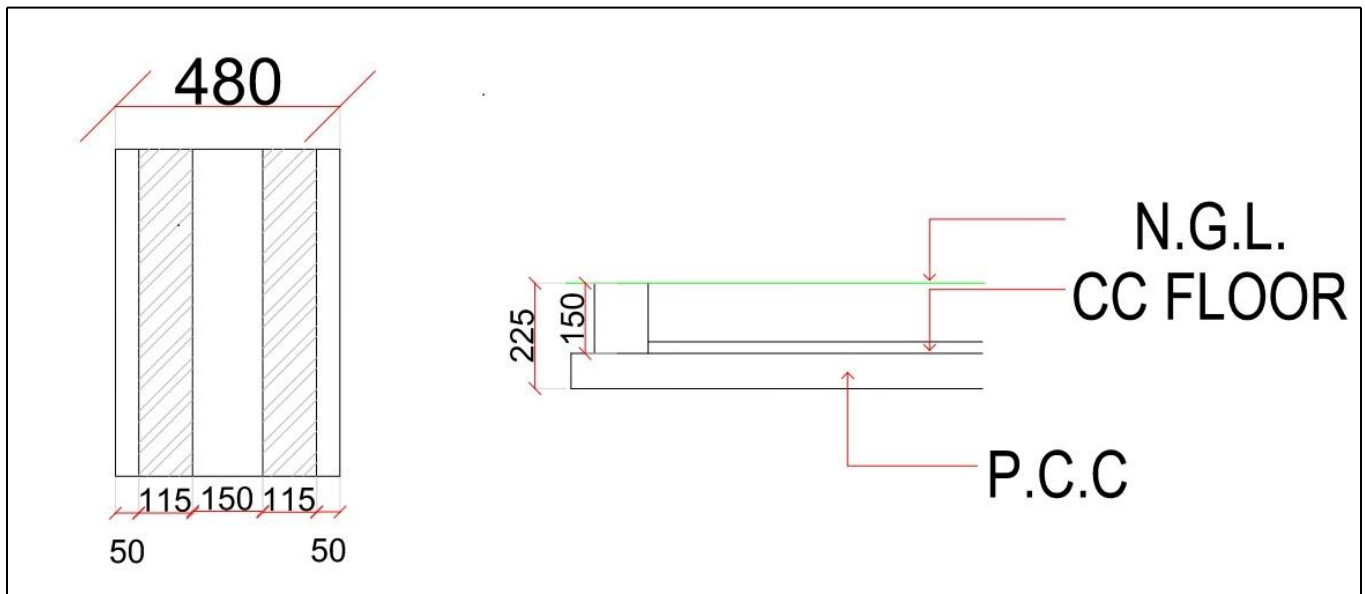
1. CONSOLIDATION BY ROAD ROLLER OF 8 TO 12 TONNE
2. GRANULAR SUBBASE OF 100 MM
3. WMM – 75 MM
4. C.C (M-30)– 170 MM WITH REQUIRED EXPANSION JOINT WITH FILLER

## CHEQURUED Floor Tiles

**Chequerred Precast Cement Concrete Tile 22 mm thick in footpath & courtyard, jointed with neat cement slurry mixed to match the shade of tiles, including rubbing and cleaning etc. complete, on 20 mm thick bed of cement mortar 1:4 (1 cement 4 coarse sand) light shade pigment using white cement.**

**Specially designed to assist the visually impaired internal and external.**

## APRON DRAIN



**Apron drain along the plinth line of each building to effectively collect and convey storm water away from the building, comprising PCC bed of required thickness, brick masonry side walls as per design, CC flooring (25mm thick) between side walls, finished with cement plaster (top coat finish of neat cement) finish on internal surfaces for smooth flow, including necessary slope towards outfall, grating covers at suitable intervals, and connection to the main storm water drainage system, complete in all respects as per details above.**

## SCHEDULE OF FINISHES

<b>A</b>	<b>ADMINISTRATIVE BLOCK</b>	
(i)	Foundation	
(ii)	Foundation Type	Raft Foundation
(iii)	Anti termite Treatment	Inside and all Around The building
(iv)	Basement	N/A
(v)	Sand Filling	Under Floors 150 mm thickness
(vi)	Structure	RCC Framed earthquake resistant structure
(vii)	Expansion joint	N/A
(viii)	Building Plinth Height	ADMINISTRATIVE BLOCK – 900 mm
(ix)	Substructure Brickwork	Common Burnt Clay Bricks
(x)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(xi)	Superstructure Brick work (External)	Exposed Bricks
(xii)	Vertical Corridors Width	Corridor width 4000 mm has been provided.
(xiii)	Horizontal Corridors Width	Corridor width 1800 mm has been provided.
<b>B.</b>	<b>Flooring</b>	
(i)	C.C flooring	Cut-out
(ii)	Chequered Tile	All ramps
(iii)	Vitrified Floor tiles	N/A
(iv)	Vitrified Wall tiles	Toilet 2400 mm High dado & Entrance Lobby 2400mm
(v)	Matt finished Vitrified Floor tiles	All toilet area.
(vi)	Granite	All Common areas (stair case, entrance lobby, corridor, Porch)
(vii)	Granite Cladding	Lift Fasia 2.40 M high, window jamb & platform
(viii)	Wooden flooring	Conference Halls
<b>C.</b>	<b>Railing</b>	
		SS Railing (Grade 304) In staircases and Courtyard.
<b>D.</b>	<b>Brick Koba Treatment</b>	
		All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
(ii)	Aluminum Metal Ceiling	All Common area, Halls & Rooms.
<b>G.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(vi)	French spirit polishing	Wooden Frames



<b>A</b>	<b>ACADEMIC BLOCK</b>	
(i)	Foundation	
(ii)	Foundation Type	Raft Foundation
(iii)	Anti termite Treatment	Inside and all Around The building
(iv)	Basement	N/A
(v)	Sand Filling	Under Floors 150 mm thickness
(vi)	Structure	RCC Framed earthquake resistant structure
(vii)	Expansion joint	N/A
(viii)	Building Plinth Height	ACADEMIC BLOCK – 900 mm
(ix)	Substructure Brickwork	Common Burnt Clay Bricks
(x)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(xi)	Superstructure Brick work (External)	Exposed Bricks
(xii)	Internal Corridors Width	Corridor width 3000 mm has been provided.
(xiii)	External Corridors Width	Corridor width 1500 mm has been provided.
<b>B.</b>	<b>Flooring</b>	
(i)	Chequered Tile	All ramps
(ii)	Vitrified Wall tiles	Toilet 2400 mm High dado & Entrance Lobby 2400mm
(iii)	Matt finished Vitrified Floor tiles	<u>All toilet area.</u>
(iv)	Granite	Classrooms, Professors', Assistant Professors', Associate Professors', Staff offices, Lecture Theatre, Laboratory, Library and All Common areas (stair case, entrance lobby, corridor, Porch)
(v)	Granite Cladding	Lift Fasia 2.40 M high, window jamb & platform
<b>C.</b>	<b>Railing</b>	
		SS Railing (Grade 304) In staircases and Courtyard.
<b>D.</b>	<b>Brick Koba Treatment</b>	
		All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
(ii)	GI Clip in Metal Ceiling System	All Common area, Halls & Rooms.
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(Vi)	French spirit polishing	Wooden Frames

<b>A</b>	<b>CENTRAL LIBRARY</b>	
(i)	Foundation	
(ii)	Foundation Type	Raft Foundation
(iii)	Anti termite Treatment	Inside and all Around The building
(iv)	Basement	N/A
(v)	Sand Filling	Under Floors 150 mm thickness
(vi)	Structure	RCC Framed earthquake resistant structure
(vii)	Expansion joint	N/A
(viii)	Building Plinth Height	CENTRAL LIBRARY – 900 mm
(ix)	Substructure Brickwork	Common Burnt Clay Bricks
(x)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(xi)	Superstructure Brick work (External)	Exposed Bricks
<b>B.</b>	<b>Flooring</b>	
(i)	Chequered Tile	All ramps
(ii)	Vitrified Wall tiles	Toilet 2400 mm High dado & Entrance Lobby 2400mm
(iii)	Matt finished Vitrified Floor tiles	<u>All toilet area.</u>
(iv)	Vitrified Floor tiles	Reading Area, Book Issue Counter, Photocopy Area, Baggage Counter Area, Book Binding Area and other such areas
(v)	Granite	All Common areas (stair case, entrance lobby, corridor, Porch)
(vi)	Granite Cladding	Lift Fasia 2.40 M high, window jamb & platform
<b>C.</b>	<b>Railing</b>	
		SS Railing (Grade 304) In staircases and Courtyard.
<b>D.</b>	<b>Brick Koba Treatment</b>	
		All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
(ii)	Aluminum Clip in Metal Ceiling System	All Common area, Halls & Rooms.
<b>G.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(Vi)	French spirit polishing	Wooden Frames

<b>A.</b>	<b>HEALTH CENTRE</b>	
(i)	Foundation	
(ii)	Foundation Type	Isolated & Combine Footing
(iii)	Anti termite Treatment	Inside and all Around The building

(iv)	Basement	N/A
(v)	Sand Filling	Under Floors 150 mm thickness
(vi)	Structure	RCC Framed earthquake resistant structure
(vii)	Expansion joint	N/A
(viii)	Building Plinth Height	Health Centre – 900 mm
(ix)	Substructure Brickwork	Common Burnt Clay Bricks
(x)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(xi)	Superstructure Brick work (External)	Exposed Bricks
<b>B.</b>	<b>Flooring</b>	
(i)	Anti-skid floor tiles	All toilet area
(ii)	Vitrified Floor tiles	All rooms .
(iii)	Vitrified wall tiles	Toilet 2400 mm High dado.
(iv)	Granite Flooring	All Common areas (stair case, entrance lobby, Corridor, Verandah, etc.)
(v)	Granite Counter	Toilet
(vi)	Chequered tile	Ramp area
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) In staircases and Courtyard.
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
(ii)	G.I. Clip in Metal Ceiling System	All Common area, Halls & Rooms.
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(Vi)	French spirit polishing	Wooden Frames

<b>A.</b>	<b>MULTI-PURPOSE HALL</b>	
(i)	Foundation	
(ii)	Foundation Type	Isolated & Combined Footings
(iii)	Anti termite Treatment	Inside and all Around The building
(iv)	Basement	N/A
(v)	Sand Filling	Under Floors 150 mm thickness
(vi)	Structure	RCC Framed earthquake resistant structure
(Vii)	Expansion joint	N/A
(ix)	Building Plinth Height	MULTI-PURPOSE HALL – 900 mm

(x)	Substructure Brickwork	Common Burnt Clay Bricks
(xi)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(xi)	Superstructure Brick work (External)	Exposed Bricks
(xii)	Horizontal Corridors Width	Corridor width 2000 mm has been provided.
(xiii)	Vertical Corridors Width	Corridor width 3000 mm has been provided.
<b>B.</b>	<b>Flooring</b>	
(i)	Chequered Tiles	All ramps
(ii)	Vitrified Wall tiles	Toilet 2400 mm High dado & Entrance Lobby 2400mm
(iii)	Matt finished Vitrified Floor tiles	All toilet area.
(iv)	Vitrified Floor tiles	Toilet 2400 mm High dado
(v)	Granite	All Common areas (stair case, entrance lobby, corridor, Porch)
(vi)	Granite Cladding	Lift Fasia 2.40 M high, window jamb & platform
(vi)	Wooden Flooring	Multipurpose Hall
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) In staircases , ramp, pitch stairs.
		SS Railing (Grade 304) with glass In first floor corridor
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
(ii)	GI Clip in Metal Ceiling System	All Common area, Halls & Rooms.
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(vi)	French spirit polishing	Wooden Frames

<b>A.</b>	<b>GUEST HOUSE</b>	
(i)	Foundation	
(ii)	Foundation Type	Isolated & Combine Footing
(iii)	Anti termite Treatment	Inside and all Around The building
(iv)	Basement	N/A
(v)	Sand Filling	Under Floors 150 mm thickness
(vi)	Structure	RCC Framed earthquake resistant structure
(vii)	Expansion joint	N/A
(viii)	Building Plinth Height	GUEST HOUSE – 900 mm
(ix)	Substructure Brickwork	Common Burnt Clay Bricks
(x)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density

		551 to 650 kg/cum
(xi)	Superstructure Brick work (External)	Exposed Bricks
<b>B.</b>	<b>Flooring</b>	
(i)	Chequered Tiles	All ramps
(ii)	Vitrified Wall tiles	Toilet 2400 mm High dado
(iii)	Matt finished Vitrified Floor tiles	All toilet area.
(iv)	Vitrified Floor tiles	Rooms ,Living Area, Kitchen and other such areas
(v)	Granite	All Common areas (stair case, entrance lobby, corridor, Porch)
(vi)	Granite Cladding	window jamb & platform
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) In staircases and Courtyard.
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
(ii)	Aluminum Clip in Metal Ceiling System	All Common area, Halls & Rooms.
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(Vi)	French spirit polishing	Wooden Frames

<b>A</b>	<b>FACILITY CENTRE, MAINTAINANCE OFFICE, POLICE CHOWKI &amp; SERVICES BUILDING</b>	
(i)	Foundation	
(ii)	Foundation Type	Isolated & Combine Footing
(iii)	Anti termite Treatment	Inside and all Around The building
(iv)	Basement	N/A
(v)	Sand Filling	Under Floors 150 mm thickness
(vi)	Structure	RCC Framed earthquake resistant structure
(vii)	Expansion joint	N/A
(viii)	Building Plinth Height	All Buildings – 900 mm
(ix)	Substructure Brickwork	Common Burnt Clay Bricks
(x)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(xi)	Superstructure Brick work (External)	Exposed Bricks
<b>B.</b>	<b>Flooring</b>	

(i)	Anti skid floor tiles	All toilet area
(ii)	Vitrified Floor tiles	All rooms.
(iii)	Vitrified wall tiles	Toilet 2400 mm High dado.
(iv)	Kota Stone Flooring	All Common areas (stair case, entrance lobby, Corridor, Verandah, etc.)
(v)	Granite Counter	Toilet
(vi)	Chequered tile	Ramp area
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) In staircases and Courtyard.
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	N/A
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(Vi)	French spirit polishing	Wooden Frames

<b>A.</b>	<b>V.C. RESIDENCE</b>	
(i)	Foundation	
(ii)	Foundation Type	Isolated & Combine Footing
(iii)	Anti termite Treatment	Inside and all Around The building
(iv)	Basement	N/A
(v)	Sand Filling	Under Floors 150 mm thickness
(vi)	Structure	RCC Framed earthquake resistant structure
(vii)	Expansion joint	N/A
(viii)	Building Plinth Height	V.C. RESIDENCE – 900 mm
(ix)	Substructure Brickwork	Common Burnt Clay Bricks
(x)	Superstructure Brick work (Internal)	Common Burnt Clay Bricks
(xi)	Superstructure Brick work (External)	Exposed Bricks
<b>B.</b>	<b>Flooring</b>	
(i)	Kota stone	Store, Utility, Porch
(ii)	Vitrified Floor tiles	Rooms, Offices, and other such areas
(iii)	Vitrified Wall tiles	Toilet 2400 mm High dado
(iv)	Matt finished Vitrified Floor tiles	All toilet area.
(v)	Granite	All Common areas (stair case, entrance lobby, corridor, Verandah etc)
(vi)	Granite Cladding	window jamb & platform
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) 1.2m high In stair and Balcony.
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	

(i)	Calcium Silicate tile & Boards false ceiling	N/A
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(Vi)	French spirit polishing	Wooden Frames

<b>A.</b>	<b>TYPE-5</b>	
(i)	Foundation	
(ii)	Foundation type	Raft Foundation
(iii)	Sand Filling	Under Floors
(iv)	Structure	RCC Framed earthquake resistant structure
(v)	Building Plinth Height	600MM
(vi)	Substructure Brickwork	Common Burnt Clay Bricks
(vii)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(viii)	Superstructure Brick work (External)	Exposed Bricks
(ix)	Building Plinth Height	600MM
(x)	Substructure Brickwork	Common Burnt Clay Bricks
(xi)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
<b>B.</b>	<b>Flooring</b>	
(i)	Anti skid floor tiles	All Toilets and sitout area
(ii)	Kota stone	Stair Steps, Landings, Store Room, Electrical Room
(iii)	Vitrified Floor tiles	All rooms and Kitchen
(v)	Ceramic glazed floor and wall tiles	All toilets area 2400 mm High
(vi)	Granite flooring	Verandah, Lobby & Corridor
(vii)	Granite Cladding	Lift Fasia, Platform Counter & Window Jamb
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) 1.2m high In stair and Balcony.
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.

(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(vi)	French spirit polishing	Wooden Frames

<b>A</b>	<b>TYPE-4</b>	
(i)	Foundation	
(ii)	Foundation type	Raft Foundation
(iii)	Sand Filling	Under Floors
(iv)	Structure	RCC Framed earthquake resistant structure
(v)	Building Plinth Height	600MM
(vi)	Substructure Brickwork	Common Burnt Clay Bricks
(vii)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(viii)	Superstructure Brick work (External)	Exposed Bricks
(ix)	Building Plinth Height	600MM
(x)	Substructure Brickwork	Common Burnt Clay Bricks
(xi)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
<b>B.</b>	<b>Flooring</b>	
(i)	Anti skid floor tiles	All Toilets and sitout area
(ii)	Kota stone	Stair Steps, Landings, Store Room, Electrical Room
(iii)	Vitrified Floor tiles	All rooms and Kitchen
(v)	Ceramic glazed floor and wall tiles	All toilets area 2400 mm High
(vi)	Granite flooring	Verandah, Lobby & Corridor
(vii)	Granite Cladding	Lift Fasia, Platform Counter & Window Jamb
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) 1.2m high In stair and Balcony.
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(iii)	premium acrylic emulsion paint of interior grade,	Internal areas
(iv)	Enamel Paint	Door Frames



<b>A</b>	<b>TYPE 3, TYPE 2 (ALL BLOCKS)</b>	
(i)	Foundation	
(ii)	Foundation type	Raft Foundation
(iii)	Sand Filling	Under Floors
(iv)	Structure	RCC Framed earthquake resistant structure
(v)	Building Plinth Height	600MM
(vi)	Substructure Brickwork	Common Burnt Clay Bricks
(vii)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(viii)	Superstructure Brick work (External)	Exposed Bricks
(ix)	Building Plinth Height	600MM
(x)	Substructure Brickwork	Common Burnt Clay Bricks
(xi)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
<b>B.</b>	<b>Flooring</b>	
(i)	Anti skid floor tiles	All Toilets area
(ii)	Kota stone	Stair Steps, Landings, Store Room, Electrical Room
(ii)	Granite Flooring	Verandah, Lobby & Corridor
(iii)	Vitrified Floor tiles	All rooms and Kitchen
(v)	Ceramic glazed floor and wall tiles	All toilets area 2100 mm High
(vi)	Granite Cladding	Lift Fasia, Platform Counter & Window Jamb
(vii)	CC Flooring with Hardner tapping	Parking Areas
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) 1.2m high In staircases and Balcony.
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(Vi)	Enamel Paint	Door Frames

<b>A</b>	<b>ALL HOSTELS</b>	
(i)	Foundation	
(ii)	Foundation type	Raft Foundation
(iii)	Sand Filling	Under Floors

(iv)	Structure	RCC Framed earthquake resistant structure
(vi)	Building Plinth Height	600 MM
(vii)	Substructure Brickwork	Common Burnt Clay Bricks
(viii)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
(ix)	Superstructure Brick work (External)	Exposed Bricks
(vi)	Building Plinth Height	900MM
(vii)	Substructure Brickwork	Common Burnt Clay Bricks
(viii)	Superstructure Brick work (Internal)	Autoclaved Aerated concrete(AAC) blocks masonry with 150mm to 300 mm thick with Grade-1 AAC blocks of density 551 to 650 kg/cum
<b>B.</b>	<b>Flooring</b>	
(i)	Anti skid floor tiles	All Toilets and sitout area
(ii)	Kota stone	Stair, Corridors, Store Room, Electrical Room and all such areas
(iii)	Vitrified Floor tiles	All rooms and Kitchen
(v)	Ceramic glazed floor and wall tiles	All toilets area 2400 mm High
(vi)	Granite flooring	N/A
(vii)	Granite Cladding	Lift Fasia, Platform Counter & Window Jamb
(vii)	CC Flooring with Hardner tapping	Parking Areas
<b>C.</b>	<b>Railing</b>	SS Railing (Grade 304) 1.2m high In staircases and Balcony.
<b>D.</b>	<b>Brick Koba Treatment</b>	All Terrace Area
<b>E.</b>	<b>False Ceiling</b>	
(i)	Calcium Silicate tile & Boards false ceiling	In Toilets
<b>F.</b>	<b>Finishing/ Painting</b>	
(i)	Silicon based transparent sealer	On Exposed Bricks
(ii)	FRP JALI	External façade as per dwg.
(iii)	Structural Glazing	External façade as per dwg.
(iv)	Cement plaster 15 mm rough surface and 12 mm smooth surface.	External wall and Internal walls
(v)	premium acrylic emulsion paint of interior grade,	Internal areas
(Vi)	Enamel Paint	Door Frames

**Construction of FORESTRY AND  
HORTICULTURE UNIVERSITY AT  
GORAKHPUR, Uttar Pradesh, INDIA on EPC  
mode**

**DBR OF STRUCTURE**

## **CONTENTS**

1. INTRODUCTION
2. MATERIALS FOR CONSTRUCTION
3. BUILDING PROFILES AND CONFIGURATION
4. BUILDING WORKS
5. PROJECT SPECIFIC
6. DESIGN PHILOSOPHY
7. LOADING ON STRUCTURES
8. DESIGN CONDITIONS FOR UNDERGROUND OR PARTLY UNDERGROUND LIQUID RETAILING STRUCTURES
9. REINFORCEMENT CEMENT CONCRETE(RCC)
10. NOMINAL COVER
11. ROAD WORK, SURFACE PARKING, PLINTHP ROTECTION
12. MINIMUM THICKNESS FOR ALUMINIUM SECTION
13. DESIGN CODE & STANDARDS

## 1.0 INTRODUCTION:

This chapter provides brief design basis report related to Civil and Structural work for the **“Construction of Forestry and Horticulture University at Gorakhpur, Uttar Pradesh, INDIA and their Maintenance during Defect Liability Period,”**

This Report describes in brief the Structural aspects and Design Philosophy including selected construction aspects. The report also deals with considerations relating to seismic design of the building in addition to the structural system of the building.

The structural design will be primarily based on the current Indian Codes of practice. While efforts have been made to incorporate all the structural aspects of the project in this report, a revision of the same at the later stages of the project cannot be ruled out which may be necessary due to some aspects not foreseen now.

## 2 MATERIALS FOR CONSTRUCTION

All building constructions materials shall be conforming to requirement of Green building certifications of GRIHA 3 STAR rating.

## 3.0 BUILDINGS PROFILE AND CONFIGURATION

All buildings profile and configuration shall be conforming to the approved architectural drawings.

### **Important Note:**

**The columns, foundations and other relevant structural elements of Forestry and Horticulture University at Gorakhpur shall be designed for future vertical expansion .**

### 3 . 1 General:

The proposed site is spread over 46.84 acres at Gorakhpur (Uttar Pradesh).The Site plans are appended to the tender documents. The Site plans are appended to the tender documents.

The bidders shall be provided with a Master Plan of the complex, Concept Plans of the proposed buildings in the complex, Technical specifications and other details forming the part of bid documents. Based on these drawings and documents, the Bidders shall prepare their detailed designs and in conformity with the local Bye-laws. Any modification in the master plan and concept plan, required to meet the conformance to the local bye laws, shall be done with the approval of UPPWD.

The bidder shall also be required to provide 2 entrance gates with guard room as required including external development of area, internal roads, street lightning, parks, and other amenities etc. required for complete development of the site and also during the construction.

In the Master Plan, there is provision for overall development of the land. However,

present scope of work involves construction of various buildings/blocks as per Master Plan and concept designs with a total tentative built up area of approx. 21128.10 sqm. Besides these, all required MEP and other services, utilities, horticulture, landscaping, roads and pavements, parking, pathways, all gates (internal & external), external development, drainages, signage's and all related utilities and as mentioned in the Design Basis Report and otherwise taking into consideration w.r.t all statutory regulations as required for development and functioning of campus are also included in the scope of work. The tentative area details of the buildings/ blocks are as given below:

#### **4.0 BUILDING WORK**

##### **4.1 Mudmat concrete**

All blinding and leveling concrete shall be of minimum 100 mm thickness of concrete mix M10 (min) over 100mm thick course sand, unless otherwise specified.

##### **4.2 Plinth**

The grade slab at ground floor of all buildings except basement area shall comprise of the following layers:

- 200mm compacted stone/trap metal so ling including filling voids with crushed sand/grit, ramming, watering etc.
- 100mmthick M-10 PCC
- 150mm thick M-25 RCC reinforced with single layer 10mm dia 200 mm C/C reinforcement bars in each direction.
- Floor finish as per specifications.

##### **4.3 Brickwork**

All brickwork shall be Burnt Clay brick below plinth and Façade (Exposed) Bricks in superstructure, unless otherwise specified.

##### **4.4 Glazing/glass**

All single and DGU glass/glazing of doors, DGU in UPVC windows, facade work, structural glazing etc. shall be conforming to requirement of green building certifications.

## 5.0 PROJECT SPECIFIC

### 5.1 Geographic/topographic parameters:

Sr. No.	Description	Parameters
1	Location of site	<b>GORAKHPUR, UTTAR PRADESH</b>
2	Seismic zone	IV
3	Wind Speed	47 m/sec.
4	Environmental Exposure Condition as per Table 3 of IS 456:2000	Structure upto Plinth Level–Severe Structure above Plinth Level –Moderate
5	Water Table	As per geotechnical report
6	NGL/FGL/FRL	As per architectural drawings and master plan

### 5.2 Structural System:

Structural system of the buildings shall be combinations of RCC Shear walls and/or Columns with conventional Beam Slab System. Appropriate foundation system will be considered based on soil investigation report and its recommendation.

The sizes of the RCC structural elements shall be considered as per the design requirements subjected to the minimum thickness as follows:

- Column–300mm
- Roof slabs, Floor slabs, Walk ways, Balconies, Canopies, Wastes lab etc.– 150mm
- Retaining wall –200mm
- Precast roof slab, walls of cable/pipe trenches, Sunshade etc.– 100mm
- Footing– 350 mm
- Pre-cast trench covers– 75mm

## 6.0 DESIGN PHILOSOPHY

**6.1** All RCC structures shall be designed according to IS: 456-2000 and other relevant BIS codes using STAAD, ETABS, SAFE, etc., as appropriate.

**6.2** Serviceability limits considered are as follows: Crack width

---

0.3 mm for beams and slabs

0.2 mm for Footing, Retaining wall and water tanks

0.1 mm for STP structures

Drift Ratio: 0.004(displacement/height)

**6.3** The Vertical deflection under imposed load should be limited as follow:

- L/250 considering all imposed loading including temperature and creep/shrinkage
- L/350 considering all imposed loading including temperature and creep/shrinkage after construction of the finishes of 20mm whichever is less.

**6.4** Steel structure shall be designed as per IS:800-2007 or latest.

**6.5** Fire resistance rating for structural and non-structural elements shall be considered as Type 2 constructions as per Table 1 of NBC 2016 Vol. – 1.

## **7.0 LOADING ON STRUCTURE:**

### **7.1 Dead Loads:**

The self-weight of the various elements is computed based on the unit weight of materials as given below as per IS: 875 (part 1):

Materials	Unit Weight(KN/m <sup>3</sup> )
Reinforced Cement Concrete	25.00
Plain Cement Concrete	24.00
Steel	78.50
Soil	As per the soil report (Min.18.00)
Water	9.81
Cement Plaster	20.40

This load case comprises of self-weight of all the frames and shell elements modeled into the Structure



**7.1.1 Dead Imposed Loads:**

Items	UDL(KN/m <sup>2</sup> )
Floor finishes Approx. 50mm	1.20
Sunken portion	Depends upon the depth of filling(with lightweight density of 10 KN/m <sup>3</sup> )
Screed for waterproofing in Terrace	Actual
Terrace garden	Actual

**7.1.2 Wall Loads:**

It comprises of load from walls (including partitions in floors). Loads are calculated and applied at appropriate locations uniformly distributed load.

**7.2 Live Loads**

The live loads assessed based on the occupancy classification as per IS:875(Part-2).

Type of Structure	Occupancy classification	UDL(KN/m <sup>2</sup> )
	Bed rooms, wards, dressing rooms, dormitories and lounges	2.00
	Kitchens, laundries and laboratories	3.00
	Dining rooms, cafeterias and restaurants	3.00
	Toilets and bathrooms	2.00
<b>Institutional, Educational</b>	Corridors, passages, lobbies and staircases including fire escapes-as per the floor serviced but not less than	4.00
	Boiler rooms and plant rooms-to be calculated but not less than	3.00
	Balconies	Same as the rooms to which they give access but with a minimum of 4.0
	Library (without separate storage)	4.00

	Library(with separate storage)	3.00
	Library(Stack Area)	6.0 KN/m <sup>2</sup> for a minimum height of 2.2m+2.0 KN/m <sup>2</sup> Per meter height beyond 2.2 m
	Assembly areas with fixed seats, Lecture Halls	4.00
	Multipurpose Hall (with fixed seats)	4.00
	Multipurpose Hall(without fixed seats)	5.00
	Live load on accessible terrace	1.50
	Live load on in accessible terrace	0.75
	Service areas, Heavy Equipment's/ Machines	Actual

### 7.3 Wind Loads

The wind pressure shall be calculated based on the data furnished below and other provision laid in IS: 875 (Part 3).

Description	Parameter
<b>Wind Parameters</b>	<b>GORAKHPUR , UTTAR PRADESH</b>
Basic wind speed	47 m/sec.
Risk coefficient	As per table-1 of IS:875(Part3)
Terrain category	1
Topography factor	1

Return period of 100 years for Academic and other important buildings and 50 years for General buildings to be considered to estimate the risk coefficient. However, this requirement is not applicable to replaceable materials.

### 7.4 Earthquake Load

The loading due to earthquake is assessed based on the provision of IS: 1893, Dynamic analysis for earthquake force in all three directions is to be carried out by response spectrum method.

Description	Parameter
<b>Seismic Parameters</b>	<b>GORAKHPUR, UTTAR PRADESH</b>
Seismic zone	IV
Zone factor	0.24
Soil type	As per geotechnical report
Lateral Load resisting System	SMRF
Response reductionFactor(R)	5
Importance Factor	As per IS 1893

\*Fundamental time period

$T_a = 0.075h^{0.75}$  (for RCMRF Buildings without Masonry in fills)  $T_a = 0.09h / \sqrt{d}$  (for all other buildings)

Where h=height of building,  
d= base dimension of the building at plinth level along the considered direction of the earthquake shaking.

\*\*Importance factor–**1.5** for UNIVERSITY

## 7.5 Temperature Load

Temperature load due to diurnal variation for summer and winter shall be considered for designing the structures as per relevant code of practice.

## 7.6 Special Loads

Imposed load of 10 KN/Sqm is considered in LMR base slab or as per manufacture, whichever is more.

## 7.7 Load Combinations

The various loads shall be combined accordance with the stipulations in IS: 456- 2000. Whichever combination produces the most unfavorable effect in the building, foundation or structural member concerned shall be adopted.

Load Combinations	Limit State of Collapse			Limit State of Serviceability		
	DL	LL	WL/EL	DL	LL	WL/EL
DL+LL	1.5	1.5	--	1.0	1.0	--
DL+/-WL	1.5 or 0.9\$	--	1.5	1.0	--	1.0
DL+LL+/-WL	1.2	1.2	1.2	1.0	0.8	0.8
DL+/-EL	1.5 or 0.9\$	--	1.5	1.0	--	1.0
DL+LL+/-EL	1.2	1.2	1.2	1.0	0.8	0.8

\$ This value is to be considered when stability against overturning or stress reversal is critical.

Note: DL-Dead load; LL- Live load; WL- wind load; EL- Earthquake load.

The above load combinations will be considered and effect of worst combinations will be taken for design for various elements. Live load reduction factors as per IS: 1893 and IS: 875 part-2 will be considered.

---

## **8.0 DESIGN CONDITIONS FOR UNDERGROUND OR PARTLY UNDERGROUND LIQUID RETAILING STRUCTURES**

All underground or partly underground liquid containing structures shall be designed as per IS: 3370 for the following conditions:

- i) For Water tanks and Underground sumps, crack width shall be limited to 0.2mm and for STP it shall be limited to 0.1mm as per Clause 35.3.2 of IS 456:2000.
- ii) liquid depth up to full height of wall : no relief due to soil pressure from outside to be considered;
- iii) structure empty (i.e. empty of liquid, any material, etc.) : full earth pressure and surcharge pressure wherever applicable, to be considered;
- iv) partition wall between dry sump and wet sump: to be designed for full liquid depth up to full height of wall;
- v) partition wall between two compartments: to be designed as one compartment empty and other full;
- vi) structures shall be designed for uplift in empty conditions with the water table as indicated in geo technical report/ defined to be taken for design purpose whichever is higher;
- vii) walls shall be designed under operating conditions to resist earthquake forces from earth pressure mobilization and dynamic
- viii) underground or partially underground structures shall also be checked against stresses developed due to any combination of full and empty compartments with appropriate ground/uplift pressures from below to base slab. The design shall be such that the minimum gravity weight exceeds the uplift pressure at least by 20%

## **9.0 REINFORCEMENT CEMENT CONCRETE(RCC)**

### **9.1 Concrete**

Grade of Reinforced Concrete- M30(Min)

Grade of Reinforced Concrete for WTP, STP, UGT, OHT- M35 (Min)

Note:

- Normal weight aggregates are considered for all concrete works.
- Minimum Cement content and maximum water cement ratio is considered as per IS:456-2000 Table-5.

---

## **9.2 Reinforcement**

Steel reinforcement shall be Grade Fe500D confirming to IS: 1786-2008.

As per the tall building code IS:16700 - 2016 there is no lapping of bars shall be allowed in RC Columns and shear walls, when diameter 16 mm (or) higher, mechanical couplers as per IS:16172 shall be used to extend bars.

Structural steel of grade E250/E350 and other requirements confirming to IS800:2007 shall be used.

## **10.0 NOMINAL COVER TO REINFORCEMENT**

For the durability requirement, environmental exposure condition shall be considered as per Sr. No. 5.1 above and two (2)hrs. fire resistance whichever is more as per relevant clause of IS:456 and National Building Code (NBC).

## **11.0 ROADWORK, SURFACE PARKING, PLINTH PROTECTION**

### **11.1 Road Work**

#### **11.1.1 Cement Concrete Road**

The cement concrete road shall be designed as per relevant IRC and/or BIS code subjected to the minimum thickness as follows:

- Surface preparation and compaction
- Granular Sub-base course(GSB)–250mm
- Dry Lean Concrete(DLC)–100mm
- Cement Concrete (M30gradeMin.)– 200mm
- Dowel bar, Tie-bar, Groove & Bituminous Joint

#### **11.1.2 Bituminous Road**

The Bituminous road shall be designed as per relevant IRC and/or BIS code subjected to the minimum thickness as follows:

- Surface preparation and compaction
- Granular Sub-base course(GSB)–250mm
- Wet Mix Macadam(WMM)–200mm
- Dense Bituminous Macadam(DBM)–75mm
- Bituminous Concrete(BC)–40mm
- Prime coat, Tack Coat and Seal coat

---

**11.2 Surface parking**

The Surface parking shall be designed as per relevant IRC and/or BIS code subjected to the minimum thickness as follows:

- Surface preparation and compaction
- Dry Lean Concrete(DLC)–75mm
- Cement Concrete (M30gradeMin.)– 150mm
- Dowel bar, Tie bar, Groove & Bituminous Joint

**11.3 Plinth Protection**

The Plinth protection shall be designed as per relevant code subjected to the minimum thickness as follows:

- Surface preparation and compaction
- Dry Lean Concrete(DLC)–75mm
- Cement Concrete (M25 grade Min.)– 125mm
- Groove and Bituminous Joint

**12.0 MINIMUM THICKNESS FOR ALUMINIUM SECTION**

The thickness of Aluminium sections use for building works shall be as per design subjected to the minimum thickness as follow:

- Doorsection–2.0mm
- Doorframe–2.5mm
- Partitionsection–2.0mm
- Casementwindow–1.5mm
- Slidingwindow–1.0mm

The minimum weight of aluminium windows shall not be less than 7.0 kg per sqm, subject to considering the above thickness.

**12.0 DESIGN CODE & STANDARDS**

Materials and workmanship shall comply with the current relevant Indian Standards (with amendments) on the date of submission of the tender,

Where the relevant standard provides for the furnishing of a certificate to the Employer's Representative, at his request, stating that the materials supplied comply in all respects with the standard, the Contractor shall obtain the certificates and forward it to the Employer's Representative.

The specifications, relevant latest edition of codes, and the latest edition of references mentioned below are considered to be part of this bid specification. All standards, specifications, and codes of practice referred to herein shall be the latest editions, including all applicable official

amendments and revisions.

In case of discrepancy between the Bid Specification and the latest edition of code, the latest edition of code shall govern. Some of Indian Standard Codes, as given below for the reference:

Sr.No.	Code	Description
1.	IS:875(Part1)	Code of Practice for design loads (other than earthquake) for buildings and structures- Unit weights of buildings materials and stored material.
2.	IS:875(Part2)	Code of Practice for Design loads(other than earthquake)for buildings and structures-Imposed
3.	IS:875(Part3)	Code of Practice for Design loads(other than earthquake) for buildings and structures- Wind loads
4.	IS:875(Part5)	Code of Practice for Design loads (other than earthquake) for buildings and structures- special loads and load combinations.
5.	IS:456	Code of Practice for Plain and Reinforced Concrete.
6.	IS:800	Code of Practice for General Construction in steel.
7.	IS:1893	Criteria for Earthquake resistant design of structures.
8.	IS:13920	Ductile detailing of reinforced concrete structures subjected to seismic forces- Code of practice
9.	IS:1786	Specification for High Strength Deformed Steel Bars and Wires for
10.	IS:6313(Part 2)	Code of Practice for Anti-Termite Treatment measures in buildings-
11.	IS:2911	Code of practice for design and construction of pile foundations
12.	IS:4326	Code of Practice for Earthquake Resistant Design and Construction of Buildings

- Any other relevant codes shall be followed as per requirements from Indian, British & Euro standards.



## STRUCTURAL SCHEME:

The design of the “Construction of Forestry and Horticulture University at Gorakhpur, Uttar Pradesh, INDIA and their Maintenance during Defect Liability Period”, will be based on the Architectural drawings provided by the M/S. Skyline Infraworld Pvt Ltd, Uttar Pradesh. The structure will be designed as per latest IS earthquake code IS: 1893:2016 for seismic Zone-IV.

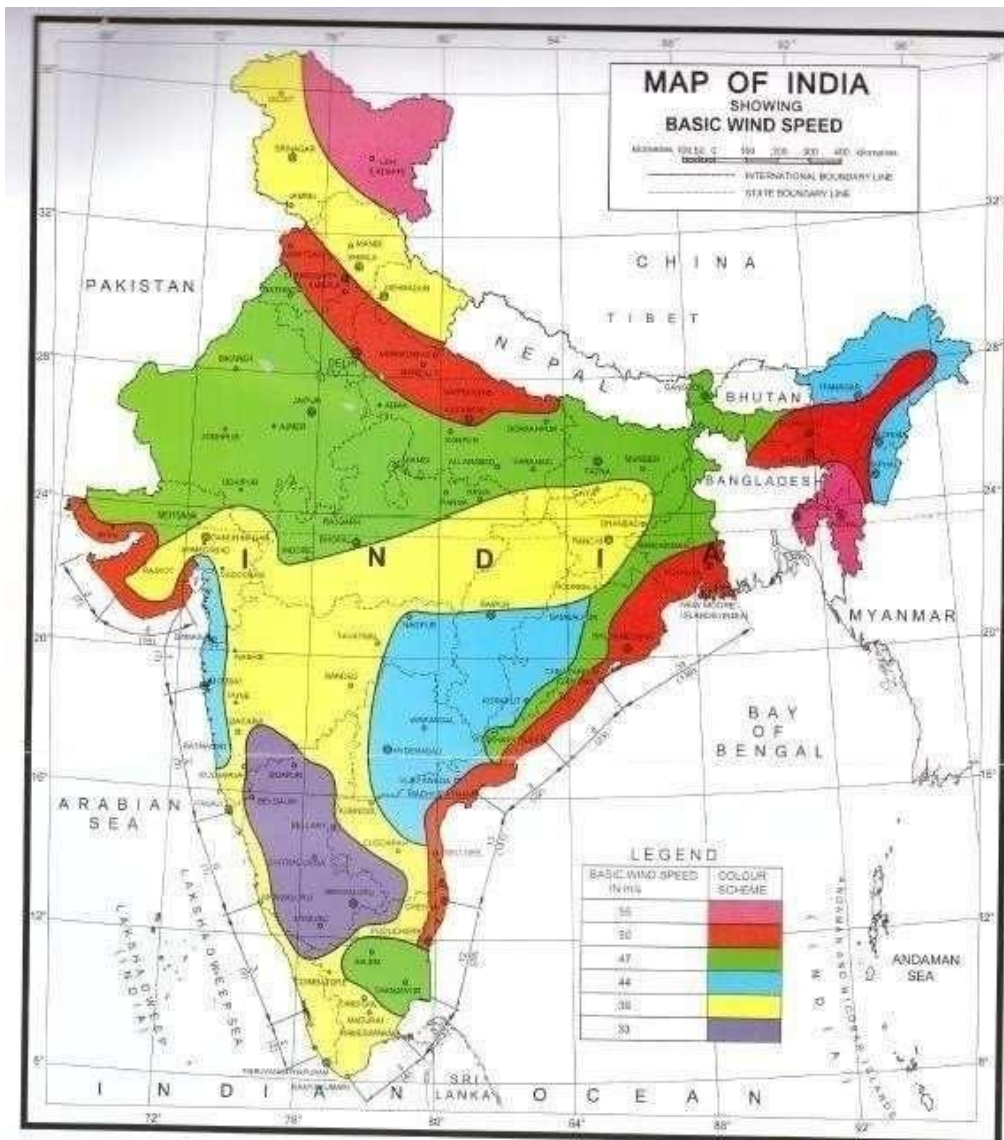
S.NO	BUILDINGS	FLOORS	Importance factor
RESIDENTIALBUILDINGS			
1	Type-6 VC Residence	G	1.0
2	Type-5 Residence	S+7	1.2
3	Type-4 Residence	S+8	1.2
4	Type-3 Residence	S+14	1.2
5	Type-3 Residence	S+13	1.2
6	Type-2 Residence	S+10	1.2
7	UG/PG Boys Hostel	G+7	1.0
8	UG/PG Girls Hostel	G+5	1.0
9	Diploma Hostel Male	G+2	1.0
10	Diploma Hostel Female	G+2	1.0
11	Research Hostel Boys	G+3	1.0
12	Research Hostel Girls	G+2	1.0
NON-RESIDENTIALBUILDINGS			
13	Administrative Building	G+3	1.5
14	Academic Blocks	G+3	1.5
15	Central Library	G+2	1.2
16	Multipurpose Hall	G	1.2
17	Guest House	G	1.0
18	Health Centre	G	1.0
19	Facility Centre	G	1.0
20	Maintenance Office	G	1.0
21	Police Chauki	G	1.5
22	ESS Building	G	

The structure of all the above-mentioned building shall be bifurcated into the following segments:

- Foundation System
- Foundation to Ground Floor Level
- Ground Floor to Top Floor Level
- Top Floor Level to Terrace Level
- Terrace, Mumty, Machine Room

## WIND MAP OF INDIA:

The wind pressure shall be calculated based on basic wind speed, risk coefficient, terrain category, topography factor and other provisions laid in IS: 875 (Part 3)- 2015.



Based upon Survey of India Political map, printed in 2002.

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate baselines. The international boundaries between Andaman and Nicobar Islands and Bangladesh shown on this map are as interpreted from the North Eastern Areas (Memorandum) Act, 1971, but have yet to be verified.

The state boundaries between Uttar Pradesh & Uttar Pradesh, Bihar & Jharkhand, and Chhattisgarh & Madhya Pradesh have not been verified by the Government concerned.

The administrative headquarters of Chandigarh, Raigarh and Purbi are as Chandigarh.

The external boundaries and coasts of India agree with the Hydrographic Charts published by Survey of India.

The responsibility for the correctness of internal details rests with the publisher.

### NOTES:

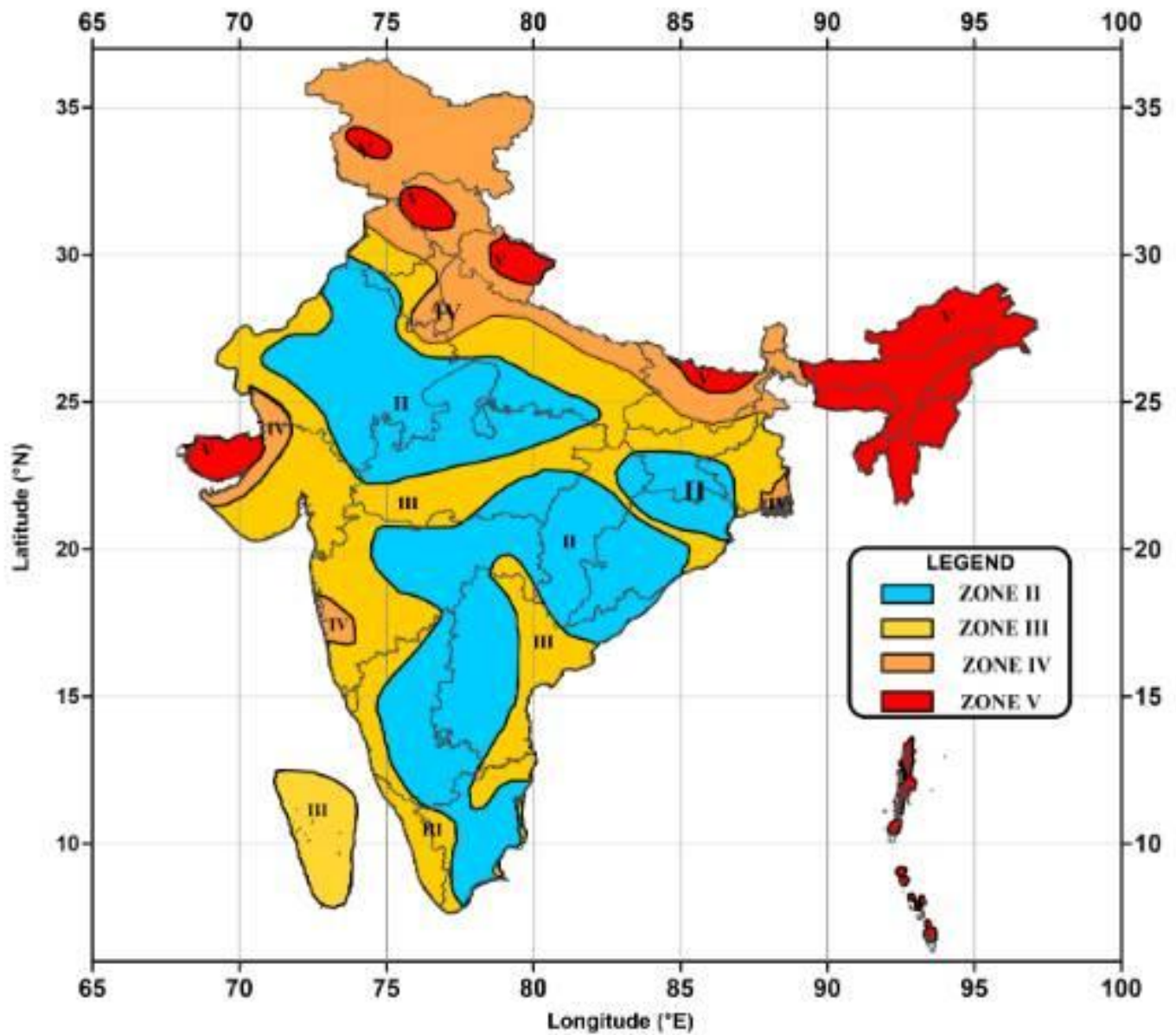
1. The occurrence of a tornado is possible in virtually any part of India. They are particularly more adverse in the northern parts of India. The recorded number of these storms is too small to assign any frequency. The devastation caused by a tornado is due to exceptionally high winds about its periphery, and the sudden reduction in atmospheric pressure at its centre, resulting in an explosive outward pressure on the elements of the structure. The regional basic wind speeds do not include any specific allowance for tornadoes. It is not the local practice to allow for the effect of tornadoes, unless special requirements are laid for as in the case of important structures such as nuclear power reactors and satellite communication towers.

2. The total number of cyclonic storms that have struck different sections of east and west coasts are included in Fig. 1, based on available records for the period from 1877 to 1992. The figures above the lines (between the stations) indicate the total number of severe cyclonic storms with or without a zone of hurricane winds (speeds above 87 km/h) and the figures in the brackets below the lines indicate the total number of cyclonic storms. Their effect on land is already reflected in the basic wind speeds specified in Fig. 1. These have been included only as additional information.

© Government of India Copyright, 2016

#### SEISMIC ZONE MAP OF INDIA:

The seismic forces shall be calculated based on seismic zone factor, importance factor, response reduction factor, soil characteristics and other provisions laid in IS 1893 (Part 1)- 2016.



\*Note:- Soil Test Report for the project has been Attached as "Str.Annx-01"

**END OF STRUCTURAL DBR**

**Construction of FORESTRY AND  
HORTICULTURE UNIVERSITY AT  
GORAKHPUR, Uttar Pradesh, INDIA on  
EPC Mode**

**DBR OF PLUMBING & FIRE FIGHTING WORK**

PROJECT: Construction of FORESTRY UNIVERSITY.

## PLUMBING & FIRE FIGHTING WORK

### INTRODUCTION

The proposed project is an educational complex "Construction of FORESTRY DEPARTMENT at Gorakhpur, U.P consisting of multiple buildings within a common project area, to be developed for the client.

Each building is having with all necessary services and infrastructural facilities being provided as per standards. Additional facilities such as clubhouse etc. has also been proposed.

#### 1.1 PROJECT OBJECTIVES

---

The project objectives include energy efficiency, green eco friendly design and centralized grouped location of services installation to ensure easy maintenance, state of the art technology, fast track installation and compliance to all statutory regulations. The services design shall conform to regulations laid down by various authorities.

#### 1.2 SALIENT FEATURES OF THE PROJECT

---

The entire mix land use project has been divided into five zones depending upon its usages and category.

Zone I	-	Multipurpose Hall (Assembly Building) (D)
Zone II	-	Hostels and Type quarters (Residential building) ((A)
Zone III	-	Administrative Building (Business Class) (E)
Zone IV	-	Facility Center (Mercantile Class) (F)
Zone V	-	Academic Building (B)

#### 1.3 BROAD CONCEPT OF SERVICES

The Services Systems for the project have been conceptualized based on the acceptable design standards to produce a concept which is an integrated whole. Effort shall be made to conceal all services and still provide access to these for accommodating change in requirement in future. Conservation of energy, optimization of resources in the design concept to ensure least downtime and reduce maintenance hassles.

Every effort shall be made to design, layout and install equipment in locations which will tend to encourage routine preventive maintenance by providing easy access for operation personnel. Manual isolation shall be provided to enable servicing, expansion or renovation of any part of the system without interrupting the services in adjacent areas. The changes made by second agency prior to the consultants' approval will be causing a redesign.

#### 1.4 CODE & REGULATION

Plumbing/Sanitary systems will be designed and installed conforming to the following codes and standards:

Regulations of the local authority.

National Building Code (NBC) 2016.

Manual on water supply and treatments published by Central Public Health and Environment Engineering Organization Ministry of Urban Development, Govt. of India.

Manual of sewerage and sewage treatment published by Central Public Health and

Environment Engineering Organization Ministry of Urban Development, Govt. of India.

Relevant BIS Codes.

Good Engineering Practice.

## **2.1 REFERENCE STANDARDS**

### **2.1.1 National Building Code of India 2016**

## **2.2 DESIGN BRIEF**

### **2.2.1 BASE OF DESIGN**

The Plumbing services for the project shall be designed keeping in view the following:

- i) Requirement of adequate and equal pressure of cold water in entire.
- ii) Adequate storage of raw water/domestic water in underground water tanks (for one day requirement). Further static water storage for firefighting requirement shall also be provided based on NBC-2016 requirements and as required by local Chief Fire Officer. Separate underground fire tanks & fire pumps shall be provided as per local fire officer's requirement.
- iii) Recycling of treated waste water (from sewage treatment plant) for flushing and for irrigation water use.
- iv) Levels of roads/pavements and other services in the area.
- v) Landscape layout.
- vi) Soil Investigation report.

### **2.2.2 CONCEPT OF THE SYSTEM**

The following Plumbing Services are envisaged:

- i) Water treatment plant (WTP) to ensure that the chemical and bacteriological parameters of water supply in the complex are in accordance with IS:10500 standards. Water shall be available from Municipal/Tanker/Tubewell water supplier only. WTP system design shall be verified for suitability after obtaining water analysis report from the sources.
- ii) Sewage and sullage collection system based on applicable guidelines by NBC 2016.
- iii) Storm/rain water drainage system from the roof terrace and various levels of the buildings, including balcony drains, planter drains and fountain drains by means of draining rain water and surface run-off water to rain water recharge pits, with overflow connection to existing municipal storm water drains.
- iv) Hot water system comprising of high pressure electrically operated hot water geyser to cater for hot water requirement of Apartments toilets & kitchen.

## **2.3 Source**

- ☐ Water will be sourced from the following source: -
  - ☐ Municipal Supply
  - ☐ Tanker
  - ☐ Tubewell
- ☐ The clients may need to furnish information with regard to the availability of water from all the above sources.

## **2.4 Water Treatment System**

In order to decide the exact treatment to be adopted, it is essential to know the chemical

composition of raw water as per IS 10500. Efforts should be made by the clients to get the water samples tested from all the possible sources.

In general practice following water treatment system will be adopted.

The water from the source will be brought into the underground raw water tank. Water from this tank shall be treated in the water treatment plant, consisting of chlorination, filtration (DMF - Dual Media Filter) and optional softening units, located in the plant room. The water after treatment stored in static fire water tank. From fire water tank, the water will over flow to Domestic water tank. So that the fire suppression system will get treated water supply. The domestic water shall be stored in the domestic water tank. Domestic water shall be supplied after chlorination and filtration. Municipal connection shall be directly brought into the raw water tank. In case of emergency, the municipal connection will be brought into fire water tank which is normally in close mode.

## **2.5 Pumping, Overhead Storage & Distribution System**

### **2.5.1 Domestic Water**

For pumping and distribution of domestic water to tower, the gravity system is being proposed. The domestic water from underground domestic water tank shall be transmitted via variable speed pumping system to all the overhead tanks located at terrace levels of each tower depending upon heights, and from there the water shall be supplied by gravity to all user points. The system shall be designed to take care of peak demand of water and a residual pressure at the ground floor users' point shall be minimum 1.2 kg/cm<sup>2</sup>. The low-rise building club will be feed thru extended by the gravity line from nearby towers with pressure reducing station at ground floor level or separate pumping system as per requirement.

Each tower shall have an OH Tank (Domestic) as per requirement.

Water supply system will be completely automatic through mechanically operated valve with level controller. The ON/OFF operation of the motorized valve will get signal from level controller placed in domestic water tank.

### **2.5.2 Flushing Water**

- ☐ Since the recycled water from STP is to be used for flushing, an independent system of pumps, pipes and overhead tank in each tower shall be provided. This water shall be used only for flushing and ablution taps/health faucets shall be connected to domestic water.
- ☐ Similar pumping system is proposed for flushing water system as described in Domestic water system.

### **2.5.3 Each tower shall have an OH tank (Flushing) as per requirement & mechanically operated valve with level controller. The ON/OFF operation of the motorized valve will get signal from level controller placed in flushing water tank. Water for Irrigation/Horticulture/Road washing**

- ☐ Water to the garden hydrants/Irrigation system shall be supplied through a separate Irrigation pump, which shall be supply water from treated sewage tank near STP.
- ☐ Operation of these pumps shall be manually operated system.

### **2.5.4 Hot water system**

- ☐ Provision of electric operated geyser shall be made in the toilet and kitchen of individual flat.
- ☐ All hot water supply pipe shall be insulated by Nitrile Insulation



## 2.6 Location & Area requirements for Plant Room & Storages

The U.G. water tanks shall be located separately as marked in the drawing by the Architect and the Plumbing & Fire Fighting plant room shall be adjacent to underground tank. The plant room has fire pumps, water supply pumps, water treatment plant and all other related equipment located there. These services shall act as a centralized system for all the towers/buildings.

## 2.7 Materials for Water Supply

- The pipes inside shafts/Terrace shall be G.I. pipes conforming to IS 1239 and internal pipes for cold and Hot water pipes inside the toilet & kitchen will be CPVC (chlorinated poly vinyl chloride) conforming to IS:15778 CTS SDR-11 using solvent cement joints.
- Fittings shall be G.I. & CPVC.
- Valves on branches, main line and pumps shall have ball valve/gate valve/butterfly valve of good approved quality, as per requirement.

### DAILY WATER REQUIREMENT AND WATER BALANCE CHART

S.NO	Building Name	NO OF BLOCK	NO OF FLATS	pop criteria	popula tion	water criteria	Water requirement	Flushi ng	Domes tic	Flushi ng	Domes tic
1	TYPE 6	1	1	10	10	150	1,500	45	105	450	1,050
2	TYPE 5 (S+7)	2	14	10	140	150	21,000	45	105	6,300	14,700
3	TYPE 4 (S+8)	2	32	10	320	150	48,000	45	105	14,400	33,600
4	TYPE 3 (S+14)	1	56	5	280	135	37,800	45	90	12,600	25,200
5	TYPE 3 (S+13)	1	52	5	260	135	35,100	45	90	11,700	23,400
6	TYPE 2 (S+10)	5	40	5	200	135	27,000	45	90	9,000	18,000
7	TYPE 1 (G+7)	1	56	4	224	135	30,240	45	90	10,080	20,160
8	GIRLS HOSTEL UG&PG (G+5)	1			357	135	48,195	45	90	16,065	32,130
9	BOYS HOSTEL - DIPLOMA	1			99	135	13,365	45	90	4,455	8,910
10	GIRLS HOSTEL - DIPLOMA	1			99	135	13,365	45	90	4,455	8,910
11	BOYS HOSTEL-RESEARCH	1			99	135	13,365	45	90	4,455	8,910
12	GIRLS HOSTEL-RESEARCH	1			99	135	13,365	45	90	4,455	8,910
13	ADMINSTRATIVE (G+3)	1			500	45	22,500	20	25	10,000	12,500
14	ACADEMIC	1			1350	45	60,750	20	25	27,000	33,750
15	ACADEMIC	1			1350	45	60,750	20	25	27,000	33,750
16	AUDITORIUM	1			600	15	9,000	10	5	6,000	3,000
17	LIBRARY	1			200	15	3,000	10	5	2,000	1,000
18	GUEST HOUSE	1			35	180	6,300	45	135	1,575	4,725
19	HEALTH CENTER	1			10	150	1,500	45	105	450	1,050
20	MAINTENANCE BLDG	1			10	45	450	20	25	200	250
21	FACILITY CENTER	1			100	45	4,500	20	25	2,000	2,500
22	POLICE CHOWKI	1			10	45	450	20	25	200	250
23	Multipurpose hall				1000	15	15,000	10	5	10,000	5,000
TOTAL WATER REQUIREMENT PER DAY							486,495			184,840	301,655
adding 20% losses + visitors							97,299			36,968	60,331
TOTAL WATER REQUIREMENT							583,794			221,808	361,986
Say		in KLD					600			230	370
90% of water requirment flow to STP							540				
adding 20% rain water infiltration							108				
							648				
Proposing STP capacity		in KLD					650				
85% recovery from STP							550.8				
Say		in KLD					560				
deducting flushing from STP treated water							230				
This balance water will be used in IRRIGATION & HVAC cooling towers							330				

Underground Tank											
FIRE WATER TANK							200 KL				
Untreated Water Tank (borewell / tanker supply)							200 KL				
TREATED Water Tank							200 KL				
STP							650 KL				
							342				
							20				
							17.1				



## SEWERAGE SYSTEM

3.1 As per MOEF requirement it is mandatory to provide STP and same shall be done for this project.

3.2 It is proposed that the sewage generated from the entire towers shall be treated in a sewage treatment

plant, so that the treated effluent can be recycled for horticulture & flushing requirements of the site & balance treated water can be sold to outside agencies.

□ Design Conditions

a. Termination of vent cowl at terrace level.

b. Provision of adequate slope for horizontal header pipes in the ceiling level of the floor for achieving self-cleaning velocity in the pipes.

c. Provision of cleanout plugs.

d. Provision of the system services maintenance.

### 3.3 System Designed

□ The sewerage system will be based on conventional water carriage system, in which soil and domestic waste generated by individual buildings/units will be collected into a collection chamber, through soil and waste piping system.

□ The sanitary, waste & vent system shall be water tight and gas tight designed to prevent escape of foul gas and odor from various fixtures.

□ Provision of ASP vertical vent shall be made for hygiene, safety considerations, and to avoid entry of foul smell into occupied areas.

□ Vent system shall be designed to facilitate escape of gases and odor from all parts of sanitary and waste system to the atmosphere at a point above the building and to allow admittance of air to all part of the system, so that siphonage, aspiration or back pressure conditions do not cause loss of seal at traps.

□ It is proposed to use CI pipes for soil/waste application. The soil & waste piping from toilet shall be connected vertical stack located inside the pipe shaft which shall be coordinated with other services and in consultation with the Architect.

□ The collection chamber from all units shall be connected to the nearest manhole on the external sewer line planned along the periphery of the building and as per site conditions.

□ It is recommended that the domestic sewage shall finally be carried due to gravity to one disposal point for further treatment in the Sewage Treatment Plant.

□ As per calculation total domestic water consumption of is about 625 m<sup>3</sup>/day.

□ Treated effluent shall be filtered through "Dual Media Filter (DMF)" & Activated Carbon filter (ACF) and stored in an UG tank for use in flushing and Horticulture.

### 3.4 Estimated Characteristics of Raw & Treated Sewage:

Parameter	Raw Sewage (Influent)	Treated Sewage (After Secondary Treatment)	Treated Sewage (After Tertiary Treatment)
pH	6.5-8.5	6.5-8.5	6.5-8.5
BOD3 at 27°C (mg/l)	250-300	<15	<5

COD (mg/l)	600-800	<100	<30
TSS (mg/l)	300-400	<20	<10
Nitrogen (mg/l)	20-25	<10	<5
Phosphorus (mg/l)	Up to 10	<5	<5
Oil & grease (mg/l)	Up to 100	<5	<2

Proposed Sewerage treatment plant SBR which has less surface as reactor tank is one whereas it is 2 in MBBR. Also, automation is better in SBR than MBBR. The proposed system will have disinfection like OZONATOR with Ultra Filtration process.

### 3.5 Material Specifications for the Sewerage System

SW Pipes: For dia. 100mm, 150mm and 200mm Grade 'A' as per IS:651 depending on site conditions with laying, jointing and bedding as per IS:4127-1983

RCC Pipes Class NP2: For dia 250mm and above as per IS: 458, for normal slopes and general site conditions.

### 3.6 Manholes

The manholes shall be constructed of brick masonry as per standard specifications of National Building Code and shall be having details as follows: -

Rectangular of size 900x800mm up to 900mm depth.

Circular of size 910mm dia from 900mm up to 1670mm depth.

Circular of size 1220mm dia from 1668mm up to 2290mm depth.

Circular of size 1520mm dia from 2290mm up to 4180mm depth.

#### Manhole Covers

Steel fiber reinforced concrete (SFRC) Manhole cover with frame conforming to IS: 12592 shall be provided.

#### 4.1 Introduction

Due to urbanization of the land and sharp growth in population and thus increase in water demand for various uses, the fresh water is becoming scarce in most regions of the area. In certain areas due to almost total dependency on the underground water, the wells and bore-wells are getting deeper and deeper. Also, due to increase in paved surface/roof areas, the amount of natural/percolation of rainfall is reducing very drastically.

Therefore, it has become very necessary to harvest the rain water as maximum as possible. The drainage system needs to be planned with a view to incorporate rainwater harvesting principles.

Separate and independent rain water drainage system shall be provided for collecting rain water from terrace, paved area, lawns and roads. Independent rain water down takes of appropriate size and number shall be provided in apartment toilet shafts & other dedicated shafts. The final disposal shall be in dispersion trench with overflow connection to the municipal storm water mains for the site. Perforated pipe drainage system shall be provided for open-to-sky courtyards/lawns.

#### 4.2 Systems of Rainwater Harvesting

Out of the various techniques adopted in India, and approved of by the Central Ground Water Authority, the following are the three main classes of rainwater harvesting systems:

System that collect direct roof runoff for storage and then reusing for various purposes.

Systems that use in-field or adjoining surface catchments to collect run-off and then impounded for irrigation, horticultural, recreational & domestic purposes, after treatment.

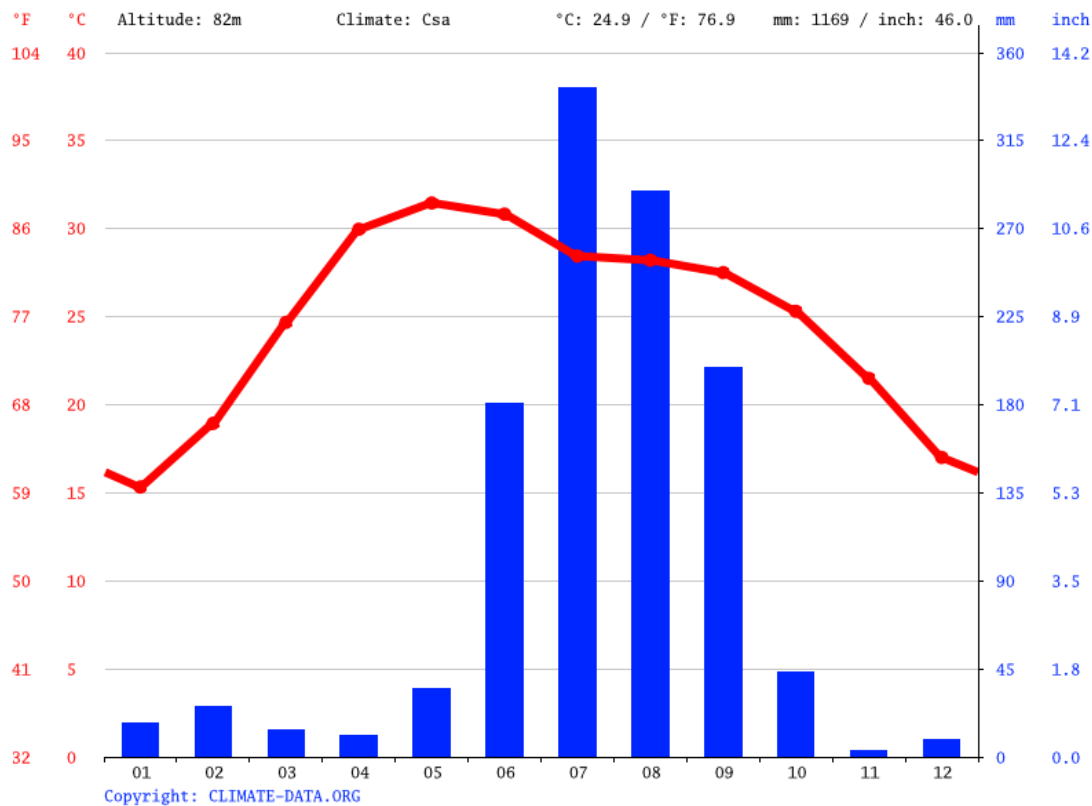
Systems that utilize the rainwater run-off from various surfaces including Terrace and Roads and green areas etc. for re-charging of the underground aquifer, through various measures.

In this system, the catchments from roof/terrace areas are further segregated for direct recharging of aquifer through filter media. (Harvesting pit with bore)

The catchment from surfaces of road/paved/park/lawns etc. is segregated and then taken to underground, through desilting chamber pit without bore will be considered.

**4.3** Therefore, as per prevailing practice and from a practical point of view in India, it is more feasible and recommended to use rainwater to recharge groundwater aquifers than for direct storage. Therefore, it is proposed to implement the system as explained in Point-'C' above, so as to maximize the rain water utilization efficiency for recharging the underground aquifer.

a) Peak Hourly rainfall as <https://en.climate-data.org/asia/india/uttar-pradesh/gorakhpur-4961>



	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	15.3 °C (59.6) °F	18.9 °C (66.1) °F	24.7 °C (76.4) °F	30 °C (85.9) °F	31.5 °C (88.6) °F	30.8 °C (87.5) °F	28.4 °C (83.2) °F	28.2 °C (82.8) °F	27.5 °C (81.5) °F	25.3 °C (77.5) °F	21.5 °C (70.7) °F	17 °C (62.6) °F
Min. Temperature °C (°F)	9.6 °C (49.3) °F	12.8 °C (55) °F	17.5 °C (63.5) °F	22.8 °C (73) °F	25.5 °C (78) °F	26.5 °C (79.8) °F	26 °C (78.8) °F	25.8 °C (78.4) °F	24.7 °C (76.5) °F	20.6 °C (69.1) °F	15.6 °C (60) °F	11.1 °C (52) °F
Max. Temperature °C (°F)	21.4 °C (70.5) °F	25.3 °C (77.5) °F	31.7 °C (89) °F	36.9 °C (98.5) °F	37.3 °C (99.1) °F	35.3 °C (95.6) °F	31.6 °C (88.9) °F	31.5 °C (88.7) °F	30.9 °C (87.7) °F	30.2 °C (86.4) °F	27.6 °C (81.7) °F	23.3 °C (73.9) °F
Precipitation / Rainfall mm (in)	17 (0)	26 (1)	14 (0)	11 (0)	35 (1)	181 (7)	342 (13)	289 (11)	199 (7)	43 (1)	3 (0)	9 (0)
Humidity(%)	71%	62%	43%	34%	47%	64%	83%	84%	83%	74%	63%	68%
Rainy days (d)	2	2	2	2	5	11	20	20	15	3	0	1
avg. Sun hours (hours)	8.2	9.5	10.6	11.3	11.3	9.9	7.8	8.0	8.1	9.1	9.4	8.4

Data: 1991 - 2021 Min. Temperature °C (°F), Max. Temperature °C (°F), Precipitation / Rainfall mm (in), Humidity, Rainy days. Data: 1999 - 2019: avg. Sun hours

Max rainfall month : July  
 Rainfall : 342 mm  
 Rainy days : 20  
 Per day rainfall : 17.1mm  
 Considering : 20mm/hour for design purpose

b) Retention time for capacity of Recharge Tank - 20 Minutes

#### 4.4 References

Manual on "Rain Water Harvesting & Conservation" by Govt. of India, Central Public Works Department (CPWD), New Delhi, June 2002.

Guidelines from Central Water Board - Ministry of Water Resources, Govt. of India.

A Water Harvesting manual for Urban Areas Case Studies from Delhi by Centre for Science & Environment.

Part "a" National Building Code of India" 2016

#### 4.6 Proposed Storm Water Drainage System

In general, the rain water from terraces and other open areas shall be collected through Rain water down take pipes and connected to catch basins. The Rain water from hard courts and landscaped area shall be collected by catch basins through a RCC NP2/RCC NP3/DWC HDPE pipes network with perforated gratings and connected to the desilting chamber which is connected to the dispersion trench and finally over flow from dispersion trench will be led out to main Municipal Drainage. The proposal of dispersion trench will be due to high sub soil water level. In dispersion trench there will not be any bore hole. We will create a collection pit only. The percolation from these pits will base on soil absorption rate. But we will have to design our system to achieve zero discharge site. As per CGWB norms, we are proposing one recharging pit per acre basis.

## INTERNAL PLUMBING SYSTEMS

### 5.1 Details of System

	System Designed	Two pipes system (with fully ventilated vertical stack) system as recommended in code of practice for soil and waste
	Minimum dia adopted	
	All main soil & waste pipes and branches	100mm /75mm
	All Main soil & waste vertical stacks	100 and 150mm as per requirement For kitchens dedicated stack to be provided.
	Vent pipes (if required)	65mm or 75 mm
	Wash Basin waste	32 mm
	Floor Drain	50 mm
	Vertical Pipe (Exposed & approachable)	All soil, waste, and vent pipes shall be running vertically in vertical shafts as per architectural drawing.
	Access door junctions for cleaning purpose	Each connection from the fixtures.
	Clean out Plugs	Where two or three fixtures are connected to a single horizontal pipe leading to a vertical stack (in toilets), provided at starting point. The cleanout plugs shall have access from the ceiling
	Water seal for all traps	Minimum 50mm
	Methodology of conveying horizontal soil & waste pipes/Sinking of Slab (Option 1) - Most preferred	At ceiling level below, by hanging the pipes with MS structural supports/dash fasteners and proper clamping etc. with proper slope (1:60). All structural Beams at ceiling level should be inverted. App. 100mm sunken area required for
	(Option 2)	At floor level below, by laying the pipes on floor with proper slope (1:60). All structural Beams at floor level should be downwards preferably. App. 350 mm sunken area required for connection of W.C., Wash Basin & Floor
	Material	
	All soil, waste and vent pipes and fittings	CI pipe conforming to IS: 3989
	Waste pipe from sinks, wash basins and urinals	uPVC pipe conforming to IS:4985
	Rain water pipe	uPVC pipe conforming to IS: 13592

### 4.2 Fixtures and Fittings

Sanitary fixtures shall be off-white vitreous china and of standard quality and make, as per requirement.

C.P. fittings shall be as per requirement and of good quality (medium range).

Generally Following Type of Fixtures/Accessories shall be provided:

#### ☐ Water Closet

Generally, either wall hung European W.C with cistern or floor mounted with P-trap & cistern shall be provided in main apartment toilets.

Combination of IWC and floor mounted wash down WC for lower end apartments.

Health faucet & ablution tap with two-way bib cock for E.W.C.

□ Wash Basins

Circular/Oval table top and flat back wash basins with mirror, single lever hot & cold-water mixtures as per requirement, liquid soap containers and towel rings.

Flat back wash basin for toilets as per requirements.

□ Geysers

Provision of hot water piping has been ensured from geyser to all points WB/Shower.

□ Sinks

Stainless steel sinks with drain board with mixtures in kitchen/utility and pantry areas, as per requirements.

□ Urinals (If required for clubhouse/ any specific common areas)

Flat back semi-stall urinal of size 610x400x380mm with conventional press type flush system shall be provided as per requirements.

Flush fixtures (Urinal/EWC)	3/4.5	(LPF)
Flow fixtures (Faucet/Basin mixer/Taps) at 3bar	1.89	(LPM)
Flow fixtures (Showers)	5.68	(LPM)

## Fire Fighting System

### 6.1 Introduction

The entire mix land use project has been divided into three zones depending upon its usages and category.

Zone I - Auditorium, Museum, Multipurpose Hall (Assembly Building) (D)

Zone II - Hostels and Type quarters (Residential building) (A)

Zone III - Administrative Building (Business Class) (E)

Zone IV - Facility Center (Mercantile Class) (F)

Zone V - Educational Building (B)

S.NO	Building Name	Class of building as per Part 4		System	Terrace pump	terrace Tank
1	TYPE 6	(Residential building) (A)	Less than 15m	Downcomer	450	5000
2	TYPE 5 (S+7)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
3	TYPE 4 (S+11)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
4	TYPE 4 (S+9)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
5	TYPE 3 (S+11)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
6	TYPE 3 (S+10)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
7	TYPE 2 (S+11)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
8	TYPE 2 (S+7)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
9	TYPE 1 (S+10)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
10	TYPE 1 (S+7)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
11	BOYS HOSTEL UG&PG (G+6)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
12	GIRLS HOSTEL UG&PG (G+5)	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
13	BOYS HOSTEL - DIPLOMA	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
14	GIRLS HOSTEL - DIPLOMA	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
15	BOYS HOSTEL-RESEARCH	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
16	GIRLS HOSTEL-RESEARCH	(Residential building) (A)	15m and above but not exceeding 35m in height	Downcomer	900	25000
17	ADMINISTRATIVE (G+4)	Business Class) (E)	above 15m and upto 24m in height	wet riser	900	25000
18	ACADEMIC	Educational Building (B)	15m and above but not exceeding 35m in height	Downcomer	900	25000
19	ACADEMIC	Educational Building (B)	15m and above but not exceeding 35m in height	Downcomer	900	25000
20	AUDITORIUM	(Assembly Building) (D)	Less than 10m in height but not exceeding 15m in	wet riser	450	5000
21	MUSIUM	(Assembly Building) (D)	Less than 10m in height but more than 300 person	Downcomer	900	25000
22	LIBRARY	(Assembly Building) (D)	Less than 10m in height but more than 300 person	Downcomer	900	25000
23	GUEST HOUSE	(Residential building) (A)	Dormitories and apartment houses	Downcomer	450	5000
24	HEALTH CENTER	Business Class) (E)	Less than 10m in height	Downcomer	900	25000
25	MAINTENANCE BLDG	Business Class) (E)	Less than 10m in height	Downcomer	900	25000
26	FACILITY CENTER	(Mercantile Class) (F)	Less than 15m in height - Ground plus one storey a	Downcomer	900	20000
27	POLICE CHOWKI	Business Class) (E)	Less than 10m in height	Downcomer	450	5000
28	Multipurpose hall	(Assembly Building) (D)	Less than 10m in height but more than 300 person	wet riser	450	5000

The entire fire safety installation shall be compliant with the most stringent codes / standard for the entire Township to ensure the highest safety standard and uniformity of system

### References & Design Guideline Sources

National Building Code of India - (Latest Edition, November 2016 - Part - IV, Fire & Life Safety)

IS: 3844-1989 (Amended to Date) - Code of practice for installation and maintenance of internal fire hydrants and hose reels on premises.

IS: 13039-1991 (Amended to Date) - Code of practice for external hydrant system provision and maintenance.

IS: 2190-1992 (Amended to Date) - Code of practice for selection, and maintenance of first aid fire extinguishers.

IS: 15105:2002 (Amended to Date)- Design & Installation of Fixed Automatic Sprinkler Fire Extinguishing Systems

Consultation with Local Chief Fire Officer



## 6.2 SYSTEM

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

	Piping System		Piping system as per NBC confirming to IS:1239 - MS heavy class.
	Fire water static		Fire water static storage shall be provided in accordance to the NBC/Local bye-laws.
	Fire Pumping system		Pumping system comprising of independent pumps for hydrant, Sprinkler & jockey
	Fire Fighting system		Sprinkler will be provided on the tower which is above 45 m in height, Wet Riser
	Trolley mounted		For Transformer Room/LT Panel Room, all as per local byelaws. Gas flooding system
	Hand held		Strategically placed at designated areas.

## 6.3 SYSTEM DESCRIPTION

Fire Pumping System for Hospital and Auditorium:

The fire pumping system shall comprise of electrical pump, independent electrical pump for wet riser/hose reel. 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 electrical power failure. Jockey pumps are proposed to compensate for pressure drop and line leakage in the hydrant and sprinkler installation.

Individual suction lines shall be drawn from the fire tanks at the terrace level and connected to independent fire suction header.

Delivery lines from various pumps shall also be connected to a common down comer header. The sprinkler pump shall be isolated from the hose reel by a non-return valve so that the hydrant pump can also act as standby for the sprinkler system. Automation required to make the system fully functional shall be provided.

Fire Pumping System for Residential:

The fire pumping system shall comprise of independent electrical pump, independent electrical pump for hose reel/down comer system located at terrace level. Electrical pump shall provide adequate flow for catering requirement of fire hose reel system.

## 6.4 Wet Riser, Downcomer, Hydrants & Sprinkler System

The firefighting system shall be provided mainly as per latest National Building Code of India (2016)(Part IV) and other relevant I.S codes and it shall be consisting of: -

For Hospital, Academic & Auditorium building Static Underground storage fire tank of 150 m<sup>3</sup> capacity and terrace tanks of 20 m<sup>3</sup> capacity as per NBC-2016 requirement.

For Residential buildings terrace tanks of 5 m<sup>3</sup> capacity with fire pump 450 lpm installed at terrace as per NBC-2016 requirement.

Fire main of 150 mm dia. connected to external yard hydrants placed @ 45m c/c distance.

For Hospital, Academic & Auditorium building, Wet - riser system with landing hydrant valves and fire hose cabinet @ 900m<sup>2</sup> area minimum, and as per staircases/landing details of final architectural layouts. (As per recommendations of IS: 3844:1989, Code of practice for installation of Internal Hydrants)

For Residential buildings, Down - comer system with landing hydrant valves and fire hose cabinet @ 900m<sup>2</sup> area minimum, and as per staircases/landing details of final architectural layouts. (As per recommendations of IS: 3844:1989, Code of practice for installation of Internal Hydrants)

Sprinkler system will be provided only in Hospital, Academic & Auditorium building and as per final architectural layouts. (As per recommendations of IS:15105-2002, Code of practice for Design & installation of fixed sprinkler fire extinguishing systems)

Each Fire Hose Cabinet shall be consisting of:

2 Nos., 63mm dia and 15m long rubberized fabric lined hose pipe as per IS: 636 (Amended to Date) type - II.

SS male and female instantaneous type coupling as per I.S:903 (Amended to Date) with I.S. specifications.

SS branch pipe with nozzle as per I.S:903 (Amended to Date)

First-aid fire hose reels with 20mm dia 36.5m long with 5mm bore SS nozzle as per IS:884 - 1969 (Amended to Date).

Fireman's axe.

## 6.5 Fire Pumps

Following Fire Pumps shall be provided for Commercial building only as per NBC requirement:

01 Nos. - Main Electrical fire pump of 2280 LPM capacity (to give a minimum pressure of 3.5 kg/cm<sup>2</sup> at the farthest point)

01 Nos. - Main Electrical Sprinkler pump of 2280 LPM capacity (to give a minimum pressure of 3.5 kg/cm<sup>2</sup> at the farthest point)

02 Nos. - Electrical Jockey pump of 180 LPM capacity

01 Nos. - Diesel operated fire pump of 2280 LPM capacity

For Residential buildings, Main Terrace Electrical fire pump of 450 LPM capacity respectively (to give a minimum pressure of 3.5 kg/cm<sup>2</sup> at the farthest point)

All fire pumps shall be with positive suction arrangements.

All the fire pumps shall cut-in automatically based on the pressure settings, so as to ensure that the entire fire main line, risers etc. are pressurized on a continuous basis.

The jockey pump shall automatically cut-out based on the pressure settings. However, the remaining fire pumps shall off only in the manual mode.

**6.6 Fire Extinguishers** The following type of portable fire extinguishers shall be provided at all levels of the towers, at strategic locations as per requirements, generally to follow IS - 2190: 1992)

Two 9-liter water expelling type for every 600 m <sup>2</sup> area with minimum of 1 extinguisher per floor	-	IS: 15683 – 2012
One no Dry powder type of 6kg capacity in each FHC & other required area	-	IS: 15683 – 2012
One no CO2 type of 4.5kg capacity in required area	-	IS: 15683 – 2012
Two nos. 4.5 kg, CO2 type (Plumbing & Fire Plant Room)	-	IS: 15683 – 2012

## SPACE REQUIREMENTS

	App. space for underground tank (considering the maximum depth of 4.0m)	See details above
	Space for Plant room (for water supply pumps) (Adjacent to UG	See details above
	Space for STP of Capacity 150 m <sup>3</sup> /day	App. 180 m <sup>2</sup> .
	Details/sizes for various shafts	
	Main Plumbing Shaft for water supply pipes/firefighting line risers to terrace level (Originating from plant room and continues	
	Plumbing shafts for Apartment Toilets	Minimum (i) 750 x 750, mm for one toilet (ii) 1150 x 700mm for
	Fire Hose Cabinets	To be placed in consultation with architect and co-

## APPROVALS AND CLEARANCES

E.I.A. / other Statutory Approval: -

As per the latest govt. notifications, it has become mandatory to get the E.I.A. clearances for a project like this from local pollution control board authorities and Ministry of Environment and Forests (MOEF).

It is therefore suggested that from this stage only, an expert agency should be hired to start the necessary formalities for obtaining these clearances.

This report provides all necessary information related to our services, however E.I.A. agency must be informed to coordinate with our office before finalizing the submission of documents.

## ElectricalLoad

Sr.No.	Description	Load(KW)
1	Plumbing	
a	Borewell (4nos)	60.0
b	WTP	15.0
c	TransferPumps	25.0
	<b>TotalPlumbingLoad</b>	<b>100.0</b>
2	Fire	
a	4pumpsaterrace@7.5KW	30
B	24 pumps at terrace @15KW	360
b	Mainelectrical pump (2nos)	150
c	JockeyPump (2nos)	30
d	Batterychargerfordieselpumpst arter	1.0
	<b>Totaloffire</b>	<b>571</b>
3	STP	35.0
	<b>TOTAL</b>	<b>705</b>

# **Proposed Construction of Forestry and Horticulture University at Gorakhpur**

## **DESIGN BASIS REPORT–ELECTRICAL**

## **DESIGN BASIS REPORT–ELECTRICAL SERVICES**

### **1. ELECTRICAL&ELVSYSTEM**

#### **1.1 Intent**

The intent of this report is to define the basis and enlist the salient features of electrical system design for “Proposed Construction of Forestry and Horticulture University at Gorakhpur”. This report will be a guideline to take forward the detailed engineering design and will help in the preparation of:

Design Calculations

Engineering Drawings

This report is a preliminary report which needs to be read in conjunction with other Project Documents and Drawings. Should there be any ambiguity, the same shall be brought into the notice of “The Architect Consultant”.

This report also defines the broad system requirements pertaining to electrical systems, defining the standards to be followed along with a broad scope of work, so that the battery limits gets broadly specified. It is required that the system shall be energy efficient, easy to operate and maintain, robust and reliable.

#### **1.2 Scope of Work**

The electrical services scope of work for design, supply, erection, testing and commissioning for the complete Phase-I include the following:

- Incoming 2nos. 33KV power supply feeder 1 working & one standby or provisional from State Electricity Board Grid station 1nos. bus coupler & 6nos. 11KV outgoing for Transformers.
- HT meter, Panel Board, HT Switch gear, CSS and LV Switch gear, Main Power Distribution.
- Battery, Battery charger with DCDCB etc.
- Power Generating System
- UPS for ELV system & Emergency Lighting System.
- Lighting, LED light fixtures, occupancy & day light sensor etc.
- Lightning Protection System
- Earthing and grounding system
- Solar System as per GRIHA requirement (but the quantity not less than mentioned in DBR).

- External Lighting, landscape lighting system
- Life safety and emergency public announcement system.
- Fire detection & Alarm system.
- Centralize metering & Billing system
- Elevators.
- IP CCTV System.
- Two-Way Audio-Visual System.
- Video Conferencing System.
- IT Data & Voice Networking system including Passive, Active, Wi-Fi and Hybrid EPBAX system
- Telephone & TV system
- External Façade lighting system.
- Clean Agent Suppression System for Electrical Substation H.T & L.T Panels and sub panels.
- Electrical Vehicle Charging
- Physical Security System

Note: -The size and rating of Transformers, DG sets, lifts, Solar PV power, UPS system, H.T & L.T Panels, power distribution system, ELV (i.e. FAS & PAS & Talkback system, CCTV, Data, Voice, Wi-Fi, Audio-Visual system etc.) systems etc. are minimum. This requirement is based on the estimated calculations. If any additional capacity is required in the above based on statutory norms, the same shall be provided without any cost implications.

### **Codes and Regulations**

The electrical design and installation of the electrical systems will comply with the latest edition of the codes, regulations and standards of the following organizations:

- International Electric Code(IEC)
- Energy Conservation Building Code(ECBC)
- Bureau of Indian Standard Code of Practice
- Indian Electricity Rules & Regulations (IE Rules)
- National building Code(NBC)

- Institute of Electrical and Electronic Engineers(IEEE)
- National Electrical Manufacturer's Association(NEMA)
- National Electric Code(NEC)
- Indian Electricity Act(IEA)
- National Fire Protection Association(NFPA)
- Underwriter's Laboratories(UL/EN-54)
- CPWD Specifications
- Local Bye-laws
- NBC 2016.

### **1.3 Electrical Power Demand of Campus.**

The total maximum electrical power demand of campus is 5.35 MVA after considering the demand factor as per appendix-I

The detailed load calculations are given below.

These are minimum requirements and the same shall be worked out at the detailed design state and executed with prior approval of UP PWD / consultant.

#### **Electrical Load Calculation**

#### **Appendix-I**

**Attached as an annexure.**

Note: - The 4 nos. 20000KVA CSS(3W+1S) and 4 Nos. 500KVA DG sets are minimum requirement.

### **1.4 Incoming Supply**

EPC Contractor shall do all necessary documentation required for getting power supply from State Electricity Board at 33KV, Double circuit for complete building to meet power demand of 5.35 MVA, for which nothing extra shall be paid apart from the electricity charges to the state electricity department.

### **1.5 Power Distribution System**

The power supply made available from State Electricity Board Grid station to the Building at 33KV, in double circuit to cater power supply. State Electricity meter board room and 33 KV panel board room located at the main gate of campus. The 33KV power supply feeders from SEB Grid stations shall be



terminated at building meter board rooms.

The 11KV power supply from SEB meter room shall be terminated in H.T. panel room near building. Further the 33 KV power supply feeders shall be taken to dry type transformer located at service floor through 33 KV XLPE power cables.

The ESS shall have 4 no. 2000 KVA CSS with OLTC & AVR, 33KV indoor panel board, with 2nos. Incoming, 1 nos. bus coupler & 6 nos. outgoing, 4X500KVA silent D.G. sets, Main L.T. panel, DG Panel, PLC panel, APFC Panels, Utility Panel etc.

The power supply received at 33 KV H.T panel board is further connected to 33/0.433 KV, 2000 KVA indoor type Oil Type OLTC Transformer CSS and 433V L.T. power supply connected to Main L.T. panel through bus-duct and D.G. power supply & APFC Panel is also fed to main L.T. panel board through bus-duct as shown in schematic drawings.

The Main L.T. panel board shall supply power to various buildings main distribution panel boards, utility service panel boards, etc. as shown in schematic drawings.

The power distribution will be carried out through 1.1 KV grade, Bus Duct and Rising Mains, overhead cable trays inside the buildings.

Separate panels will be provided for light & fans, power and UPS power and equipment supply. Each panel or rising main shall supply power to floor panel boards located at each floor electrical room through tap-off box (if Applicable) and further connected various utility services distribution boards etc. each small distribution incoming feeders shall be provided MCB and ELCB / RCCB & Surge protectors as incomer and outgoing feeder with MCB.

All motor control centers (MCC's), power control centers (PCC's) distribution boards shall be provided with required rating of MCCBs/ ACBs and required no. outgoing feeders with MCCBs/ACBs of suitable rating and twenty (20) percent of spare feeder for maintenance purposes and twenty (20) percent spare space with complete wiring & bus- bars etc. for future use.

## **1.6 Emergency Power Supply**

### **Emergency Power Supply Generating System**

To meet the emergency power supply of Campus, Diesel Generating Sets are proposed and installed at near ESS are given below: -

I. DG Sets- 4x500KVA 415V Silent type, radiator cooled DG Sets.

These generating sets shall be providing power supply in the absence of SEB power supply or when the supply voltage drops below the preset value through

DG panel. The no. of DG sets running at a time will depend on load requirement through PLC in the absence of normal supply automatically (i.e. supply from SEB).

### 1.7 Uninterruptible power supply(UPS)

De-centralized UPS equipment planned for some critical loads which shall be capable of providing uninterrupted power during changeover period of SEB power to DG power.

De-centralized UPS installed for back-up power to following areas:

- UPS power points for common area work stations in Admin/Academic/Library.
- UPS power points for all ELV services viz., Fire Alarm System, Data, Voice, CCTV Security, AV & sound system etc.

UPS shall be of 3 phase input and 3 phase output configurations with 'N+1' configuration. Battery backup upto 30 minutes shall be provided. Storage batteries shall be VRLA sealed maintenance free type.

The UPS systems (True online double conversion VFI type as per IEC 62040-3) are being proposed with battery backup shall be as per requirement. Batteries shall be placed in separate room near to the UPS.

UPS are of modular design of controlled circuitry easy to install having high efficiency, low heat generation and noise. Invertors & rectifiers of UPS shall be with IGBT (Insulated Gate Bipolar Transistor) Isolation Transformer with K-13 copper winding, to achieve high reliability in the system. UPS shall have excellent dynamic control due to high switching frequency. Transient conditions and disturbance are corrected quickly to avoid any stress to the connected loads.

Intelligent Computer Interface in-built to provide software communication with almost all standard operating systems.

Considering the fact that DG back-up is planned, there shall be a UPS system for the building with batteries to provide a backup of 30 minutes to the UPS. The minimum capacity of UPS system are given below.

The UPS / Inverter Capacity will be given below as per Appendix-II

Name Of Work -UPS WORK													
Particulars	Unit	Admin Block	Academic Block	Library Block	Health Center Block	Guest House	Diploma Boys /Girls Hostel	ResearchBoys Hostel	Research Girls Hostel	UG/PG Boys Hostel	UG/PG Girls Hostel	Maintenance Office	VC Residence



phase sequence correction. The UPS systems offered are to be of the latest technology with Digital Control Microprocessor based for reliable operation using Insulated Gate Bipolar Transistor (IGBT)'s both for the rectifier & inverter (3 Level) with PWM (Pulse Width Modulation). The quality of design, manufacturing and inspection process should confirm to the relevant International standards such as IEC/EN/VDE. The operating efficiency of the UPS systems shall be >96% while operating on battery mode and delivering quality power to the 100% non-linear loads. Current total harmonic effect (ITHD) on the input grid shall be < 5% at 50 %load. (The required LC (

inductor (L) and a capacitor (C)) filters shall be included in UPS cost),extreme power factor kit to be included to limit the input power factor (PF) to 0.99 and output power factor shall be unity (i.e. kw rating of the UPS shall be kva rating x 1 ), however UPS shall be suitable to take load at 0.7 lagging to 0.7 leading power factor loads. UPS shall be suitable for incoming supply AC : 3Phase 400V +/-20%, 50 Hz +/-5 Hz, AC Output voltage: 3Phase 415 Volt, 50 Hz +/- 0.2Hz, Overload capacity of 120% for 10 mins, Sine wave output. Non condensing, noise level less than 60db at 1 meter distance, protections: Input Under voltage over voltage, abnormal out voltage, battery over charging, output over current, short circuit protection, battery deep discharge protection, 10KV surge. UPS must comply with low voltage electromagnetic compatibility (EMC) achieved as per EN 6204, EN6204 Part I and Part 2, it shall be a Voltage and Frequency Independent (VFI)-type UPS. Communication RS232/RS485/SNMP





Under Voltage, Output Over, Under Voltage, Battery Over, Under Voltage, Over Load and short circuit, Over Temperature. The UPS should have QR code which should contain drawing, test report OEM manual, Geo-Tag of manufacturing location etc													
5 KVA (Each Power module shall be < 05 KVA)	Each											1.00	1.00
10 KVA (Each Power module shall be < 10 KVA)	Each					1.00							
30 KVA (Each Power module shall be < 10 KVA)	Each						1.00	1.00	1.00				
40KVA (Each Power module shall be < 10 KVA)	Each	3.00	2.00	3.00	1.00						2.00	2.00	

### 1.8 Sub-Board, Distribution Board and Rising Main/Bus duct

- Al Sandwich Type Bus Ducts shall be provided from Transformers to main LT Panels.
- Sub-mains will be provided for mechanical equipment e.g. domestic water pump, water feature equipment, medical equipment, lift equipment etc.
- Fire Survival cable shall be provided for mechanical equipment e.g. mechanical ventilation fan, mechanical pressurization fans, fire equipment etc.
- Distribution boards shall be provided for lighting, power and UPS distribution with per phase isolation facility.
- Cables shall be provided from main LT panel to end feed units for all sub main services, above 16 Sq.mm shall be aluminum and including & upto 16 Sq.mm. shall be copper.
- All life safety equipment's cabling shall be fire survival category viz. Fire Lift, Fire Pumps, UPS, cables for Fire Alarm system, Emergency Voice Evacuation system, Security System, Emergency Lighting distribution system, Pressurization fans,



smoke exhaust system.

## 1.9 Wiring

- PVC insulated copper conductor stranded flexible FRLS wires of 1100V grade of insulation will be used for all sub mains and final circuit wiring in conduit.
- The minimum size of copper conductor shall be 1.5 Sq.mm for light point wiring, 2.5 Sq.mm for light circuiting and 4.0 Sq.mm for power circuiting.
- In all other areas surfaced mounted MS conduit will be used for extra low voltage wiring e.g. Telephone cable, data cable, and security co-axial cable, etc.
- Armored cable will be used for external, landscape, façade and lighting power.

S.No.	Buildings	Type of Conduits	
		In Slab	On Surface
1	All Blocks	2MM FRLS PVC	2MM FRLS PVC

### 1.9.1 Wiring Accessories

- Electrical accessories provided for the development will include:
- All Switch Socket will be of anti-bacterial modular type.
- Socket for electric water heater, surface mounted metal clad sockets in plant rooms.
- Switch socket on table for work station will be considered separately.
- Weather proof switches and switch socket outlets for wet areas
- Isolator for, air-con. compressor, pumps and other mechanical equipment.

RCCBs for life safety with 30mA Trip subject to Local Authority Compliance.

## 1.10 Earthing

Safety in using electrical energy is of paramount importance considering its dangers. The earthing system will be in conformity with the IS: 3043. All non-current carrying metal parts forming part of the electrical system shall be connected to the grounding system. The requirement of Indian Electricity Rules and statutory requirement of local Electricity authority shall also be met fully.

The function of the earthing (grounding) system is to establish and provide:

- T-N-S grounding system for connection of all electronic/electrical equipment to the ground grid system.
- Protection of personnel and equipment from electrical shock hazard.

- Protection of personnel, structures, and equipment from lightning hazard.
- Return ground path for ground fault protective devices.

T-N-S earthing system will comply with IS 3043, NBC and local Authority standards. All main plant rooms, electrical rooms, lift motor rooms and ELV rooms will be provided with dedicated earth bars/stations where appropriate. All equipment within the vicinity will be connected to the earth bars through appropriately sized earth cables, which will be sized in detail design stage. The generator room will also be provided with earth bars/stations.

- T-N-S earthing system will comply with IS 3043, NBC and local Authority standards.

The Earthing System is divided into Two Sections:

i.	Main Receiving Substation earthing (Copper)	A	Transformer neutral earthing solidly earthed
		B	DG sets neutral earthing solidly earthed
ii.	Main Receiving Protective earthing (GI)	A	HT panel body earthing.
		B	Transformer & DG set body earthing
		c.	LT Panels
		d	Power Panel
		e	Equipment's

The earthing system for each block substation shall be provided through mat earthing with overall resistance less than 1ohm. Protective earthing mat shall be provided for each Block/ Hall separately with overall resistance less than 0.5 ohm. The substation and protective earthing mat shall be provided below ground floor.

### 1.11 Lightning Protection System

A complete lightning protection system complying comprising horizontal G.I. tapes around the roof perimeter, and 25 mm x 3 mm G.I. conductor with PVC sheath and down conductor to earth electrode on ground level will be provided.

Heavy duty hinged cover inspection pit will be provided at Ground floor for the earth electrode. Test clamp will be provided at Ground floor.

As per Indian Standard suggested early streamer emission (ese) type lightning to be used for this development and confirming to NBC-2016.

### 1.12 PowerFactor Correction

HPFC filter having microprocessors, capacitors and other associated accessories and Step-less Power Factor Correction (for lagging current) Capacitor Banks to reduce harmonic for power factor correction to near unity shall be provided to optimize

power consumption alongwith IGBT thyristor-based switching. These panels will be connected main LT Panels in sub- station located in Utility building to maintain minimum 0.99 power factor.

#### **1.13 Voltage Drop**

Voltage Drop are not more than 5% from the output of the distribution Transformer to the final distribution board.

#### **1.14 Lighting**

##### **Installation**

#### **1.15 System Description**

The average illumination levels area as per below with Suitable LED lighting will be selected in accordance to IS-3646, NBC.

<b>S. No.</b>	<b>Areas</b>	<b>Lux level(Eav)</b>
1	Office areas/Classrooms	300-500-750Lx
2	Staircase	50-100-150Lx
3	Plantrooms & Substation	100-150-200Lx
4	Electrical rooms	100-150-200Lx
5	Meeting rooms	300-500-750Lx
6	Utility areas	100-150-200Lx
7	Multipurpose hall	300-500-750Lx
8	Admin block	300-400-500Lx
9	Kitchen area	200-300-400Lx
10	Car parking area	5-20Lx
11	Landscape	20-50 Lx
12	Façade	20-50 Lx
13	Elevator lobbies/Corridors	50-100-150Lx
14	Sports Area and Other Areas	As Per NBC

All other place as per norms.

Lighting power densities shall achieve as per the energy analysis report by the GRIHA consultant of the EPC Contractor.

### 1.16 SOLAR PV SYSTEM

It is proposed that power for lights, raw power etc. shall be supplied through solar PV. These loads shall get two supplies. One from normal panel and other from solar PV. The solar panels shall be of mono crystalline type and to be installed in the terrace area of building with minimum capacity of 400KWp as per GRIHA to achieve 3-star rating. It is minimum of 400 KWp and to be complied with ECBC.

### 1.17 Clean Agent Suppression System

Main panels like HT, LT and main power distribution, DG change over and main supply panels for the station shall be protected with the above system. Suitable detection mechanism shall be provided for triggering the system automatically as per NBC-2016 and any other relevant standards and its amendments upto date.

### 1.18 LIFT& ESCALATOR SYSTEM (IN ALL BLOCKS)

#### (ANNEXURE-III)

#### LIFT QUANTITY

Sr.No.	Particulars	Unit	Qty											
			Admin Block	Academic Block	Library Block	Research Boys	Research Girls	UG/PG Boys	UG/PG Girls	Type -II Block	Type -III	Type -III	Type -IV Block	Type -V Block
1	Supply Installation Testingand Commissioning of lift with power operated doors and AC variable voltage and variable frequency controls having speed of minimum 1.5m/sec as per CPWD specifications.													
a	16 Passenger Lift	Each	01	01	00	01	01	01	01	01	01	01	01	01
b	20 Passenger Lift	Each	03	06	02	01	01	03	03	01	01	01	01	01

#### 1.18.1 General

- Anefficientandeffectiveverticaltransportationsystemplaysanimportantrolei nthe successful operation of high-rise structures.
- Theprimaryobjectiveofthetrafficstudyistoidentifythecurrentandpracticalcriteriasu ch as types of traffic, critical period, population, handling capacity and

acceptable interval that would affect the traffic performance and then to evaluate the optimum speed, capacity, stops arrangement etc with the factors of cost and utilization in mind.

### **1.18.2 Codes and Regulations**

The latest edition of the following statutory codes, regulations and specifications will be complied with:

- Local authority requirement/Vertical transportation consultant's recommendation
- BS5655 Part 1 to Part13 safety rules for the construction and installation of electric lifts, and hydraulic lifts published by the British Standards Institution (BSI)
- N81 Part1 to Part13 safety rules for the construction and installation of electric lifts and hydraulic lifts, published by the European Committee for Standardization (CEN)
- As per CPWD latest specification.
- As per specification of state lift rules.
- BS7255 Code of Practice for safe working on lifts, published by the British Standards Institution (BSI)
- IS:3696(PartI) – 1966 Safety code for scaffolds and ladders: Part-I Scaffolds
- IS:3696(PartII)-1966 Safety code for scaffolds and ladders: Part-II Ladders
- Recommendations of CIBSE guidebook.

### **1.18.1 FIREDETECTION & ALARMSYSTEM:**

#### **Annexure-IV** **Building wise provisions**

Admin Block	Automatic Addressable Fire Detection and Alarm System alongwith PA System
Academic Block	Automatic Addressable Fire Detection and Alarm System alongwith PA System
Health Center Block	Manual Fire Alarm System
UG & PG Boys Hostel	Manual Fire Alarm System
UG & PG Girls Hostel	Manual Fire Alarm System
Type-2 Residential Block (G+10)	Manual Fire Alarm System
Type-3 Residential Block (G+14)	Manual Fire Alarm System

Type-3 Residential Block (G+13)	Manual Fire Alarm System
Type-4 Residential Block (G+8)	Manual Fire Alarm System
Type-5 Residential Block	Manual Fire Alarm System

This will comprise of below mentioned components

- Intelligent addressable Fire Detection system with communication, notification & Interface capability. The fire alarm control panel shall be microprocessor based with redundant CPU.
- Addressable Multi sensor detectors, Smoke detectors, heat detectors, Beam detectors with in- built isolators or isolator base/module.
- Manual / Addressable Manual call points for activation of fire alarm system annually within built isolators or isolator module.
- Interlocking with other equipment's likes Elevators, AHUs, Smoke Extraction system, Security system, public address system
- Manual / Addressable notification appliances like hooters, strobes with inbuilt isolator or isolator module.
- Graphic software work station shall be provided.
- Active repeater panel should be considered at security control room & Telecomroom.
- Fire fighting telephone system shall be considered and shall be worked stand alone and also integrate with FAS.
- Fire telephone system shall be provided at all exits, staircase in addition to fire pump room, elevator room, electrical utility room.
- Fire survivable cable to be considered.
- Loop length not more than 1.5Km.
- Each loop support maximum 240 detector/devices.
- 20% components spare to be considered in each loop and panel.
- Cable size 2Cx1.5sq.mmt to be considered
- FAP with TCP/IP port.
- Display of FAP shall be 860 character or Touchscreen.
- Nickel cadmium battery for 24 hours in normal condition and 30 minute in alarm condition shall be considered.

- Location of addressable Fire alarm panel at individual blocks.
- Fire alarm system should be with UL-FM/EN-54, VDS Certified

#### **1.18.2 EMERGENCY VOICE EVACUATION SYSTEM:**

- PA controller shall have digital matrix system.
- PA system shall have PC software.
- Shall support DANTE/CobraNet.
- PA controller shall have TCP/IP.
- Pre-programmed emergency EVAC messages.
- PA controller with minimum 32 zones.
- Integrated supervision and scheduling.
- Dual channel Amplifier with 2X1000W.

#### **1.19 TV system**

- TV cabling system and associated accessories shall be provided for all buildings including wiring.

#### **1.20 CCTV System**

Surveillance systems for facilities that have high/critical security need the high definition video delivered by megapixel cameras to address surveillance and monitoring. An information security risk may have physical security ramifications and vice versa. A comprehensive look at all identified risks can assist in determining mitigation strategies. The solution design envisaged for the project looks at implementing a surveillance and site monitoring system taking into consideration the above. Central Command Centre to be made for surveillance from a single place.

#### **Total Quantity of CCTV as follows but not limited to**

-	-	-	Admin Block	Academic Block	Library Block	Health Centre Block	Guest House Block	Multi purpose Hall
Sr.No.	Particulars	Unit	Qty	Qty	Qty	Qty	Qty	Qty
1	2 MP IP IR Dome Camera							

Supplying Installation Testing and Commissioning of 2 MP IP IR Dome Camera having following specifications, type of lens and features etc :- 1) Signal System: PAL/NTSC, Signal to Noise Ratio: >50 dB, Camera should display Camera title, Date & Time in live & recorded video 2)Image Sensor: 1/2.8" or better progressive Scan CMOS to get color image even at night condition(Minimum Illumination: 0.006 Lux @ F1.4, AGC ON, 0 lux with IR or better) True Day & Night High Performance Mechanical IR cut filter with auto switch, Integrated IR Source (Auto, Manual)- Inbuilt IR LED's with effective distance upto 50 meter or better and 30 meter for colour view in night, Imaging: 1/3s to 1/30000s electronic shutter support, Auto Gain Control , White Balance- Auto, Back Light Compensation, Multi zone Privacy Masking, HLC, Digital Watermarking.							
--	--	--	--	--	--	--	--



3) Compression  
(Minimum):-Video:- H.265 or better, H.264H, H.264, Audio:- G.711U/A, G.711Mu, G.726, AAC, G.723

4) Wide Dynamic Range:- WDR (120db or more)

5) Digital Noise Reduction:- DNR (3D) On/Off

6) Video Streaming & Frame Rates :- Triple streaming , configurable (Main stream: 2MP (1920×1080)@25/30 fps,Sub streams minimum: 720P@25/30 fps).

7) Image Setting: Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser, Edge Analytics: Tripwire, Intrusion, Motion Detection

8) Cyber Security: AES 256-bit Encryption, Configuration encryption, trusted execution, Digest, security logs, account lockout, syslog, video encryption, IP/MAC filtering, HTTPS, trusted upgrade, trusted boot.

9) Onboard Storage:  
Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card.

10) Recording Management: Format SD, overwrite, storage management, video to NAS device

11) Alarm Trigger : Motion/tampering detection; audio detection; network disconnection detection; IP

	<p>conflict detection; memory card state detection; memory space detection</p> <p>12) Network Protocol: SFTP, IPv6, IPv4, DNS, RTCP, NTP, RTP, HTTP, HTTPS, SNMP TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS, unicast</p>							
	<p>13) System Capability: ONVIF, Camera shall support open source VMS</p> <p>14) Ethernet: 1 RJ 45 10/100 Ethernet port</p> <p>15) Audio : It should support 1 x Built-In Mic and 1/1 Alarm In/ Out for External Mic. and Speakers as per site requirement.</p> <p>16) Power Input: The camera should support simultaneous dual power input—12 VDC (via power adapter) and PoE (802.3af)—to ensure continuous operation in the event of a failure in one power source.</p> <p>17) Power Requirement: 12VDC/24 VAC/PoE(802.3af)/ePoE</p> <p>18) Housing/ Enclosure:- IP67 weather proof, IK10, Metallic body</p> <p>19) Operating Condition:- Ambient Temperature:- (-) 05°C to 50°C, humidity 95% (max) (non-condensing)</p> <p>20) IR life: 40000 hours or higher</p> <p>21) Video Bit rate: 32 KBPS - 8 MBPS or better</p> <p>22) Standards: BIS with ER, STQC Certified, CE, FCC and RoHS</p>							
	2MP (@ 25/30fps @ 1080P (1920×1080)) IP IR Dome	Each	34.00	49.00	21.00	1.00	7.00	2.00

	Camera with 2.8/ 3.6mm fixed lens							
2	<b>2 MP IP IR Outdoor Bullet Camera</b>							
	<p>Supplying Installation Testing and Commissioning of 2MP Fixed Lens IP IR Outdoor Bullet Camera having following specifications and features etc :-</p> <p>1) Signal System: PAL/NTSC, Signal to Noise Ratio: &gt; 50 dB, Camera should display Camera title, Date &amp; Time in live &amp; recorded video</p> <p>2) Image Sensor: 1/2.8" or better progressive Scan CMOS to get color image even at night condition (Minimum Illumination: 0.006 Lux @ F1.4, AGC ON, 0 lux with IR or better) True Day &amp; Night High Performance Mechanical IR cut filter with auto switch, Integrated IR Source (Auto, Manual)- Inbuilt Smart IR LED's with effective distance upto 50 meter or better and 30 meter for colour view in night, Imaging: 1/3s to 1/30000s electronic shutter support, Auto Gain Control , White Balance- Auto, Back Light Compensation, Multi zone Privacy Masking, HLC, Digital Watermarking.</p>							

<p>3) Compression (Minimum):-Video:- H.265 or better, H.264H, H.264, Audio:- G.711U/A, G.711Mu, G.726, AAC, G.723</p> <p>4) Wide Dynamic Range:- WDR (120db or more)</p> <p>5) Digital Noise Reduction:- DNR (3D) On/Off</p> <p>6) Video Streaming &amp; Frame Rates :- Triple streaming , configurable(Main stream: 2MP (1920 × 1080)@25/30 fps Sub streams minimum: 720P@25/30 fps).</p> <p>7) Image Setting: Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser, Edge Analytics: Tripwire, Intrusion, Motion Detection</p> <p>8) Cyber Security: AES 256-bit Encryption, Configuration encryption, trusted execution, Digest, security logs, account lockout, syslog, video encryption, IP/MAC filtering, HTTPS, trusted upgrade, trusted boot.</p> <p>9) Onboard Storage: Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card.</p>							
--	--	--	--	--	--	--	--

10) Recording Management: Format SD, overwrite, storage management, video to NAS device, 11) Alarm Trigger : Motion/tampering detection; audiodetection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection 12) Network Protocol: SFTP, IPv6, IPv4, DNS, RTCP, NTP, RTP, HTTP, HTTPS, SNMP TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS, unicast, 13) System Capability: ONVIF, Camera shall support open source VMS

14) Ethernet: 1 RJ 45 10/100 Ethernet port  
 15) Audio : It should support 1 x Built-In Mic and 1/1 Alarm In/ Out for External Mic. and Speakers as per site requirement.  
 16) Power Input: The camera should support simultaneous dual power input—12 VDC (via power adapter) and PoE (802.3af)—to ensure continuous operation in the event of a failure in one power source.  
 17) Power Requirement: 12VDC/24 VAC/PoE (802.3af)/ePoE  
 18) Housing/ Enclosure:- IP67 weather proof, IK10, Metallic body  
 19) Operating Condition:- Ambient Temperature:- (-) 05°C to 50°C, humidity 95% (max) (non-condensing)  
 20) IR life: 40000 hours or higher  
 21) Video Bit rate: 32

	KBPS - 8 MBPS or better 22) Standards: BIS with ER, STQC Certified, CE, FCC and RoHS							
	2MP @ 25/30fps@1080P (1920×1080) Outdoor Bullet Camera with 2.8/ 3.6mm fixed lens	Each	10.00	4.00	3.00	4.00	-	2.00
<b>3</b>	<b>Network Video Recorder (NVR)</b>							
	Supplying Installation Testing and Commissioning of following Channel Network Video Recorder (NVR) with camera licenses to record for all channels having specifications and features etc as mentioned below : 1) Network Video Recorder Embedded/ Installed OS (Linux) along with Camera Licenses for number of channels of NVR to record per NVR and to provide a live view, storage and simultaneously Multi- channel playback of all IP, IR camera or more and must be ONVIF with minimum support of 256Mbps incoming Bandwidth.							

2) NVR should support H.265 or better, H.264, MJPEG, MPEG4 support  
3) Must support 1 channel Input, 1 channel Output, RCA for Two-way Talk  
4) Intelligent auto power on when power resumes after power outage.  
5) Storage: It should support minimum 2 SATA Slots with 20TB capacity/ Slot.  
6) Connectivity Interface : 1 Nos. x 10/100/1000 Mbps Ethernet Ports, 1x RS485, 1x RS232  
7) Backup Interface : Its should have 2 Nosx USB port (1x USB3.0, 1xUSB2.0)  
8) Video Output Ports: 1x HDMI and 1 VGA

9) Alarm Ports: It should have 4/1 Ch In/ Out ports toconnect various type of external sensors and outputdevices like hooter/ Siren etc.10) Email & SMS Alert options: Option for SMS/ EmailAlerts to minimum 5 designated mobile number forpower failure, HDD failure, vandalism, tempring,network disconnection and panic11) Web & Mobile Application: Web, Mobile app ( ForiPhone, iPad, Android Phone) for alerts and viewing.12) Protocols: HTTP, HTTPS, TCP/IP, IPv4, UDP,NTP, DHCP, DNS, SMTP, UPnP, DDNS, AlarmServer, IP Search, Multicast, Auto Registration, ONVIF(Profile T, Profile S, Profile G), CGI, SDK and OEMCloud for remote monitoring without any public IPneed.

13) Standards: CE, FCC, RoHS and BIS Certified

14) Power Supply : Should support 12VDC, 4Amp or AC100-240V, 50/60Hz Power supply.

15) Operating Condition : Ambient Temperature (-5°C to 50°C), humidity 90% (max) (non-condensing)

16) The VMS, NVR application shall support all the features & functionalities of the offered cameras.

17) VMS should consist of Base license and Channel Licenses. VMS should be provided with camera Licenses , with no dependency of VMS licenses by binding with the MAC address of the cameras to achieve the functionality.

18) The NVR OEM shall be responsible for providing a mobile application compatible with both Android and iOS devices, enabling remote monitoring and playback of cameras/NVR footage.

19) The OEM must provide its own DDNS server hosted in India, eliminating the need for a public IP address for remote monitoring over the Internet.

20) Must support Resolution: 7680x4320 (8K), 3840\*2160, 1920×1080, 1280×1024,1280×720, 1024×768

21) Must support recording resolution upto 32MP

22) Must support Continuous, Alarm, Motion, Instant,



	<p>Panic Recording Mode</p> <p>23) When alarm recording is enabled and an event occurs, you can click the alarm icon on monitoring page to view the alert details. The snapshot function is supported on monitoring and playback page</p>							
	<p>24) The Network Video Recorder (NVR) shall be configured to send email whenever a system message is created or an alarm event occurs. The email server shall be a valid SMTP server. Each recipient email address shall be configured to receive any combination of critical, warning, or informational messages or alarm notifications. When an alarm occurs, the email message includes the NVR name, time of alarm and a list of camera that is configured to record upon alarm</p> <p>25) It should support Network Support: HTTP, TCP/IP, SMTP, DHCP, DNS, DDNS, FTP, NTP, UPnP, Multi IP Setting. Convert multiple recording files to one avi/MP4 file.</p>							

26) General AI Based Search: Search Pictures bychannel, time, event type, target classification (FallDetection, People Approach Detection, People No.Exception Detection, People Staying Detection, Violence Detection.27) Alarm Notifications based on: Motion detection, video tampering, video loss, scene changing, PIRalarm, Camera external alarm, Face detection, facerecognition, perimeter protection (intrusion andtripwire), ANPR, people counting, stereo analysis, crowd distribution, heat map, Disk Full, Storage Error, IP Conflict and abnormal behavior of fan28) Alarm Notification should be linked with Recording, snapshots, Camera external alarm output, buzzer, logs, presets and email.

29) Built-In Artificial Intelligence: NVR should have built-in AI :-  
 - 2 Channel face detection and recognition, - Minimum 4 Channel perimeter protection, - Minimum 8 Channel Smart Motion Detection  
 30) Face Recognition Database Capacity: It should support total Blacklist and Whitelist capacity of Minimum 20,000 Faces or more with Face Detection speed of 12 face images/sec.  
 31) Face & Human Attributes Search: Search Pictures/  
 Video by Gender, age

	group, glasses, expressions, face mask, beard, Top color, top type, hat, bag, age, gender and umbrella.							
	<p>32) ANPR Capability: It should support ANPR Camera with License plate, plate color, vehicle body, vehicle model, vehicle logo, calling, seatbelt, vehicle registration location etc vehicle attributes.</p> <p>33) Alarm Notifications based on: Motion detection, video tampering, video loss, scene changing, PIR alarm, Camera external alarm, Face detection, face recognition, perimeter protection (intrusion and tripwire), ANPR, people counting, stereo analysis, crowd distribution, heat map, Disk Full, Storage Error, IP Conflict and abnormal behavior of fan, cybersecurity exception</p>							
	<p>34) Alarm Notification should be linked with Recording, snapshots, Camera external alarm output, buzzer, logs, presets and email.</p> <p>35) General AI Based Search: Search Pictures by channel, time, event type, target classification (Fall Detection, People Approach Detection, People No. Exception Detection, People Staying Detection, Violence Detection.</p> <p>36) Smart playback function: Should support smart search for the selected area in the video and smart playback to improve the playback efficiency</p>							

	37) VCA (Video Content Analytic): Should support multiple video contented analytics based on camera analytics							
	08 Channel Network Video Recorder (NVR) having display split :- Main screen: 1/4/8/9, 2nd screen: 1/4/8/9	Each						1.00
	16 Channel Network Video Recorder (NVR) having display split :- Main screen: 1/4/8/9/16, 2nd screen: 1/4/8/9/16	Each					1.00	
3	Supplying Installation Testing and Commissioning of following Channel Network Video Recorder (NVR) with camera licenses to record for all channels having specifications and features etc as mentioned below : 1) Network Video Recorder Embedded/ Installed OS(Linux) along with Camera Licenses to record per NVR and to provide a live view, storage and simultaneously Multi-channel playback of all IP camera or more and must be ONVIF with minimum support of 384 Mbps incoming Bandwidth.							

2) NVR should support video compressions : H.265 or better, H.264, MJPEG.

3) Must support 1 channel RCA Input, 2 channel RCA Output for Two-way Talk with G.711U/A, G.711u, PCM, G726 audio compressions.

4) Intelligent auto power on when power resumes after power outage.

5) Storage: It should support minimum 8 SATA Slots with 20TB capacity/ Slot and RAID support of RAID 0/1/5/6/10.

6) Connectivity Interface : 2 Nos. x 10/100/1000 Mbps Ethernet Ports, 1x RS485, 1x RS232, 1x eSATA Port

7) Backup Interface : Its should have 4 Nosx USB port (2x USB3.0, 2xUSB2.0)

8) Video Output Ports: 2x HDMI and 2 VGA

9) Alarm Ports: It should have 16/8 Ch In/ Out ports to connect various type of external sensors and output devices like hooter/ Siren etc.

10) Email & SMS Alert options: Option for SMS/ Email Alerts to minimum 5 designated mobile number for power failure, HDD failure, vandalism, tempring, network disconnection and panic

11) Web & Mobile Application: Web, Mobile app ( For iPhone, iPad, Android Phone) for alerts and viewing.

12) Protocols: HTTP, HTTPS, TCP/IP, IPv4/IPv6,

	UDP, DHCP, DNS, SMTP, UPnP, IP Filter, PPPoE, FTP, DDNS, Alarm Server, IP Search, Multicast, Auto Registration, ONVIF (Profile T, Profile S, Profile G), CGI, SDK and OEM Cloud for remote monitoring without any public IP need.							
	<p>13) Standards: CE, FCC, RoHS, BIS Certified</p> <p>14) Power Supply : Should support AC100-240V, 50/60Hz Power supply.</p> <p>15) Operating Condition : - 5°C to 50°C, humidity 90% (max) (non-condensing)</p> <p>16) The VMS application shall support all the features &amp; functionalities of the offered cameras.</p> <p>17) VMS should consist Licenses for all channels to record Cameras with General, motion detection, intelligent, alarm and POS recording modes. VMS should be provided with Camera Licenses , with no dependency of VMS licenses by binding with the MAC address of the cameras to achieve the functionality.</p>							
	<p>18) The NVR OEM shall be responsible for providing a mobile application compatible with both Android and iOS devices, enabling remote monitoring and playback of cameras/NVR footage.</p> <p>19) The OEM must provide its own DDNS server hosted in India, eliminating the need for a public IP address for remote monitoring over the Internet.</p>							

20) Must support Continuous, Alarm, Motion, Instant, Panic Recording Mode							
21) It should support Resolution: 32MP; 24MP; 16MP; 12MP; 8MP; 5MP; 4MP; 1080p; 720p; D1; CIF; QCIF							
22) When alarm recording is enabled and an event occurs, you can click the alarm icon on monitoring page to view the alert details. The snapshot function is supported on monitoring and playback page							
23) The Network Video Recorder (NVR) shall be configured to send email whenever a system message is created or an alarm event occurs. The email server shall be a valid SMTP server. Each recipient email address shall be configured to receive any combination of critical, warning, or informational messages or alarm notifications. When an alarm occurs, the email message includes the NVR name, time of alarm and a list of camera that is configured to record upon alarm							

24) It should have Web and GUI interface.

25) Built-In Artificial Intelligence: NVR should have built-in AI :-

- 2 Channel face detection and recognition, - Minimum 4 Channel perimeter protection, - Minimum 8 Channel Smart Motion Detection

26) Face Recognition Database Capacity: It should support total Blacklist and Whitelist capacity of Minimum 20,000 Faces or more with Face Detection speed of 12 face images/sec and facility to add Name, gender, birthday, address, credential type, credential No., countries & regions and state to each face image.

27) Face & Human Attributes Search: Search Pictures/ Video by Gender, age group, glasses, expressions, face mask, beard, Top color, top type, hat, bag, age, gender and umbrella.

28) ANPR Capability: It should support ANPR Camera with License plate, plate color, vehicle body, vehicle model, vehicle logo, calling, seatbelt, vehicle registration location etc vehicle attributes.

29) Alarm Notifications based on: Motion detection, video tampering, video loss, scene changing, PIR alarm, Camera external alarm, Face detection, face recognition, perimeter protection (intrusion and tripwire), ANPR, people counting, stereo analysis,



	crowd distribution, heat map, Disk Full, Storage Error, IP Conflict and abnormal behavior of fan, cybersecurity exception							
	30) Alarm Notification should be linked with Recording, snapshots, Camera external alarm output, buzzer, logs, presets and email. 31) General AI Based Search: Search Pictures by channel, time, event type, target classification (Fall Detection, People Approach Detection, People No. Exception Detection, People Staying Detection, Violence Detection. 32) Smart playback function: Should support smart search for the selected area in the video and smart playback to improve the playback efficiency 33) VCA (Video Content Analytic): Should support multiple video contented analytics based on camera analytics							
	34) Analytics by NVR: Perimeter protection and face recognition							
	32 Channel Network Video Recorder (NVR) having display split :- Main screen: 1/4/8/9/16/25/32(36), 2nd screen: 1/4/8/9/16	Each			1.00			
	64 Channel Network Video Recorder (NVR) having display split :- Main screen: 1/4/8/9/16/25/36/64, 2nd screen: 1/4/8/9/16	Each	1.00	1.00				

CCTV system will be IP based centrally controlled through Control Room/ Security room with reqd. displays & recording devices as per reqt. – Main Control will be provided in Admin Bldg. with suitable Monitors/Display's at center& for individual bldg. with reqd. NVR, recording & display.

**Access System,**

Main Gates (IN & Out) will be equipped with automatic boom barrier system with Surveillance & driver face identification system

Server Rooms, EPABX Room will be equipped with Biometric door access system.

Server Room, EPABX room & all Hub rooms will be equipped with Rodent repellent system.

Machine should be with GUI Interface, display screen, with COMMUNICATION TCP/IP

**1.21 Audio Visual System**

The Audio-Visual system will ensure the institute stands up to the rigorous standards of the Global lecture delivery standards. Enabling students and faculties to use world-class technology infrastructure to accelerate learning process and creating a truly global standard institution.

A truly State of the Art Facility can be achieved with:

- High Quality classrooms equipped with technology, increased flexibility and interaction.
- A stimulated Learning environment
- Technology Customization to meet Comfort level of user.
- Meeting Acoustic requirements to create a fatigue free listening environment.
- State of art Audio Visual infrastructure with all modern equipment's.
- Specialist requirements for Video on demand, Archival and Live Streaming.

Here are the list of locations featuring state-of-the-art Audio-Visual Systems.

S.No.	Places
1	Conference Room
2	Boardroom
3	Meeting Room
4	Executive Rooms
5	Video conferencing Room
6	Faculty Common room
7	Seminar Hall

**1. General**

Supply, Installation, testing and Commissioning of Audio-Visual system complete in all respect as per drawings, BOQ and Specification.

The system shall be designed in accordance with the appropriate IS, BS or IEC recommendation.

**2. Scope of Work**

**1. General Scope of Work:**

The scope of work shall include the supply, installation, testing and commissioning of all Audio-Visual system services, equipment, components, accessories and fittings required for the operation of the facility to the extent specified and detailed on the Drawings and Specifications.

Supply and installation of Audio/Visual and control equipment in the Ceiling, Walls and Floors with all cables as required for the proper functioning of the system.

Supply and installation of all cables, outlets, etc. associated with audio-visual systems. Anything that has been omitted in any item of works and materials usually furnished with is necessary for the completion of A/V works as outlined herein before, then such items shall be and are hereby included in the section of work. The scope of work covers an Audio-Visual system in accordance with the specifications, drawings and relevant tender documents regardless of whether they are explicitly mentioned or not for the proper functioning of the AV System. The Bidder shall have to submit a detailed design after evaluating the requirement of an audio-visual system as per the details given below to AV Consultant for approval.

**Projection and Display:**

To ensure optimum visual impact, the classroom shall be equipped with a high-brightness 5000 lumens DLP projector to ensure crisp and vivid visuals, enhancing the clarity of educational materials presented on the screen. For optimal viewing, a motorized projection screen shall be thoughtfully selected and sized to a minimum of 115 inches diagonal, ensuring excellent visibility for all students based on the room size and seating arrangement.

**Audio System:**

To ensure crystal-clear audio delivery, 6 units of 6.5-inch ceiling-mount speakers shall be meticulously distributed across the classroom, ensuring uniform sound coverage. To power the loudspeakers and optimize audio performance, a high-quality Class D power amplifier shall be provided.

An effective communication setup is paramount for successful lectures. To facilitate dynamic and articulate discussions, the classroom shall feature a wireless lapel microphone, providing instructors with the flexibility to move freely around the room while maintaining clear audio transmission. Additionally, a gooseneck microphone will be installed at the podium to capture and amplify the instructor's voice with exceptional clarity. To ensure seamless integration and smooth signal management, a 12-input analogue mixer shall be utilized, allowing for effortless control and routing of audio inputs from microphones and other audio sources.

As per the tender specifications, the entire AV system must be comprehensively equipped with all essential components, including necessary wiring, connectors, and equipment racks. The Cat 6 cables should be shielded to ensure optimal signal integrity and minimal interference. For seamless high-quality video transmission, HDMI cables employed in the system should adhere to the standards of 4K Premium High-Speed HDMI Ultra-Flexible Cable. This ensures the delivery of crystal-clear and high-resolution visuals, meeting the demands of modern audio-visual presentations. To enable smooth and efficient functionality, the proposal must encompass all mandatory video switchers, network switches, routers, and access points. These components play a critical role in establishing a robust and reliable AV infrastructure, facilitating seamless data transfer and signal distribution throughout the system. Moreover, it is of

utmost importance that the bidder strictly adheres to the specified tender requirements when proposing the above-mentioned products. Conformity to the tender specifications ensures that the proposed AV system will align precisely with the intended project objectives and meet the specific needs of the classroom.

### **15 pax Board Room/Meeting Room/Conference Room**

The audio-visual system for the Board Room shall be carefully designed to cater to meetings, presentations, and video conferencing needs. A 65" 4K UHD professional display will be installed on the front wall, complemented by an all-in-one Video Conferencing Bar featuring an integrated Camera, Microphone, and Speakers. The Video Bar should support popular platforms such as Microsoft Team, Zoom, Google Meet, and others. In addition, a flush mount cable manager will be incorporated into the board room, equipped with 1x HDMI, 1x USB, 2x USB Charger, 1x LAN, and 2x power outlets for seamless connectivity. The bidder is responsible for providing all the necessary cables, connectors, mounting brackets, and other essential components required to ensure the system's optimal functionality.

### **Large Conference Room /Meeting Room/Board Room**

The Audio-Visual System in Conference Room shall be designed for Meetings and Video Conferencing. The Room should have 1 unit of 85" 4K UHD Interactive Flat panel Display with built-in white board, should support wireless content sharing up to 4 or more source simultaneously on single screen. The Room Should have 4 units of 55" 4K UHD Professional display. This display shall be used as extended display to make proper visibility for each delegate.

The Room should have 6 units of Table Mount enclosure with 1xHDMI and 1xUSB with F-pigtail connectors and 2 x Universal Power sockets. Manually open and close lid with Black and Clear anodize color options.

The Room should have a 4K Network PTZ Conference camera with 20x optical zoom & 60-degree horizontal coverage and 1 units of Network 4K PTZ Conference camera with 12x optical zoom & 80-degree horizontal coverage.

The room should also have a recorder and streaming device with built-in 1 TB HDD storage, can record up to any 3 sources simultaneously.

The Room should have 3 units of 1G HDMI Video Encoder having Inputs- 3 HDMI capable of

streaming of 3-HDMI sources simultaneously. Resolution-up to 4K60 4:4:4 and 7 unit of 1G HDMI Video Decoder having Inputs- 1 HDMI and 1 HDBT, 1 USB C and 1 HDMI Output. Resolution-up to 4K60 4:4:4.

The Room should have a 10" Wireless Touch panel to control All AV Devices.

The Room should also have a Digital Signal Processor with minimum 12 Mic/Line Inputs and 12 Line Outputs. AEC Channels - minimum 12 assignable & routable with minimum tail length of 200ms. The room should have

The Room should also be designed for audio conferencing as well, and shall have 1 unit of Central Audio Conference controller with Recording & Web Server, Conference Controller with built-in Digital Signal Processing, Control up to minimum 50 Discussion Unit and expandable up to 150 Discussion Unit. The room should have a flush mount Chairman microphone unit with Gooseneck Microphone of minimum Length 400mm with Bi-color led ring indication, Priority and Next-in-Line Configuration Priority button silences all delegate microphones and allows only the chairperson to speak. Next-in-line button gives the floor to the next speaker in a waiting list of speakers who requested to speak. The room should also have Delegate microphone unit with Gooseneck Microphone in two to one sharing basis, minimum Length 400mm with Bi-color led ring indication and built-in Digital Signal Processing, Unit with Microphone On / Off Button. Shall have 2 units of wireless Handheld Microphones.

The Room shall have 10 units of 4.5-inch, 2-way, Full Range, Ceiling-mount loudspeaker. To power these loudspeakers there should be an adequate class D power Amplifier with min. 1.25 times headroom.

The whole AVC system has to be complete in terms of necessary wiring, connectors and equipment rack. Cat 6 cables should be shielded, and HDMI cables should be 4K Premium High-Speed HDMI Ultra-Flexible Cable. All necessary video Switcher, Network Switch and router/ Access point to make above system functional should be provided.

### **Multipurpose hall cum examination hall**

The audio-visual system in Divisible Multipurpose Hall cum examination hall shall be designed for presentations and teachings. The control rack shall be located at one place in the corner. The comprehensive design intends to elevate the educational experience for both instructors and students, facilitating seamless communication, engagement, and knowledge sharing within the Multipurpose Hall.

### **Projection and Display:**

To ensure optimum visual impact, the MPH shall be equipped with 2 units of high-brightness 5000 lumens DLP projector to ensure crisp and vivid visuals, enhancing the clarity of educational materials presented on the screen. For optimal viewing, 2 units of motorized projection screen shall be thoughtfully selected and sized to a minimum of 115 inches diagonal, ensuring excellent visibility for all students based on the room size and seating arrangement.

### **Signal Distribution and:**

A cutting-edge 4x4 HDMI matrix switcher with audio output shall be provided to manage seamless signal distribution to various endpoints. Transmitters and receiver's unit shall be provided as per the requirement to extend HDMI signals over long distances, ensuring consistent and high-quality audio and video delivery.

### **Control and Accessories**

The AV system shall be controlled by a sophisticated Hardware/Software-based control system. The centralized control, combined with a wireless touch display, shall offer a user-friendly interface for seamless management of audio, and video.

As per the tender specifications, the entire AV system must be comprehensively equipped with all essential components, including necessary wiring, connectors, and equipment racks. The Cat 6 cables should be shielded to ensure optimal signal integrity and minimal interference. For seamless high-quality video transmission, HDMI cables employed in the system should adhere to the standards of 4K Premium High-Speed HDMI Ultra-Flexible Cable. This ensures the delivery of crystal-clear and high-resolution visuals, meeting the demands of modern audio-visual presentations. To enable smooth and efficient functionality, the proposal must encompass all mandatory video switchers, network switches, routers, and access points. These components play a critical role in establishing a robust and reliable AV infrastructure, facilitating seamless data transfer and signal distribution throughout the system. Moreover, it is of utmost importance that the bidder strictly adheres to the specified tender requirements when proposing the above-mentioned products. Conformity to the tender specifications

ensures that the proposed AV system will align precisely with the intended project objectives and meet the specific needs of the MPH.

## **1.22 IT Data Networking System Including Passive, Active, Wi-Fi and Hybrid EPABX System**

### **Overview:**

An IT Data network is a digital telecommunications network, which allows nodes to share resources. In computer networks, computing devices exchange data with each other using connections (data links) between nodes. These data links are established over cable media such as wires or optic cables, or wireless media such as WiFi.

Network computer devices that originate, route and terminate the data are called network nodes. Nodes can include hosts such as personal computers, phones, servers as well as networking hardware. Two such devices can be said to be networked together when one device is able to exchange information with the other device, whether or not they have a direct connection to each other.

Computer networks support an enormous number of applications and services such as access to the World Wide Web, digital video, digital audio, shared use of application and storage servers, printers, and fax machines, and use of email and instant messaging applications as well as many others.

### **IT LAN Networking System:**

#### **General**

To effectively manage and utilize available services such as Data, Voice, CCTV Surveillance & Video and other mission critical services requires a well-designed LAN infrastructure. It is in this context the Local Area Networking was envisaged as a robust and highly secured communication network. The following are the objectives that have been addressed: -

- (a) Provide a common Infrastructure to all End Users.
- (b) Ability to provide a common platform for all strategic and operation applications which require robust infrastructure.
- (c) The Passive network shall serve as the transport infrastructure for data, VOIP, CCTV camera and Wi-Fi Access Points and voice telephony signals throughout the network
- (d) The Network should be scalable to cater for expansion by addition of more communication nodes.
- (e) The Passive infrastructure should support Quality of Service (QoS) from end to end.

### **3. SCOPE OF WORK:**

Its plans to create a secured, ultra-high Speed Wi-Fi and Wired campus area network.



This will be implemented on turnkey basis along with Path Redundancy, High Availability and Centralized Network Admission Control. The scope includes supply, installation, integration, commissioning and management. We request all interested OEMs/System Integrators/Vendors to visit Campus for further clarifications.

### **3.1 Requirements**

1. The implementation should be able to provide network and internet services (both wired and Wi-Fi) to all the users of the campus without performance degradation. A performance metric must be defined; the design should be scalable and must ensure that the performance metric is honored for a predefined/proposed scalability/load matrix.
2. The network topology must be multi-tiered with physical and logical redundancy at each tier for High Availability, Fail over and band width maximization (and many more). All tier must be intelligent and fully manageable.
3. The entire Surgery Block campus of KGMU must be Wi-Fi enabled.
4. Wireless system to be deployed should be fully integrable with the centrally controlled wireless system at campus so as to make use of the investment made by the institute on acquiring a state-of-the-art wireless network.
5. The solution must be capable of guest user management and Single Sign On across the intranet for both wired and Wi-Fi network.
6. Network security must be implemented and upgraded (for the existing) to avoid any normal or advanced threats such as zero-day attacks, bots etc. The proposed solution must be capable of identifying and quantifying network resources/entities (e.g. be it user, devices, applications, software, hardware etc.) and their behavior, context, pattern in the network.
7. Cabling must be structured. Best effort must be made to maximize the use of existing cabling.
8. All the components related to passive cabling (Fiber & Copper) must be from a single OEM only.

All the active devices must be from the single OEM only. This applies to both wired and wireless Network.

### **AS PER NETWORK DESIGN:**

- a) Complete Building including Gates etc would be on Structured cabling network. Having Consolidation points at block Low Voltage (LV) room.
- b) Main NOC (Network operating center) / Data Center is located in Server Room.
- c) A Single Mode, Bend Insensitive Fiber Optic (SMFO) cable shall be laid in rings for each Loop/zone. Maximum facilities/ units connected to each Loop/zone are limited to 12 as one loose tube of SMFO cable caters to one facility/unit. laid through the HDPE/HUME pipes.

d) Different Hume pipes should be used if the same cable is returning from any tap off point. One Hume pipe is used for laying the cable till the destination and other Hume pipe is used for return path.

e) All passive components including Cat 6A I/O Copper patch panels, Fiber Patch Panels, Fiber pigtails, patch cords etc. as required for structured cabling shall be provided.

f) All pipe and cable laying including termination accessories like conduits/Channels/Cable trays/supporting structure, clamps, identification tags as required for laying of cables.

g) Storage of all equipment in proper environmental condition by the tenderer.

h) Supply of all special tools and tackles as required for erection, testing, commissioning and warranty, maintenance of system at tenderer's own cost.

### **Expectation from New Network**

#### **2.2 Fiber Backbone**

- 1) 3 Tier Network Architecture—Core, Distribution & Access.
- 2) Distribution network with 10G/40G and access with 10G/40G Reliable, Future proof & Scalable.

#### **2.3 Horizontal Copper Network**

- 1) 1G Ethernet & Upgradable upto 10G Ethernet.
- 2) Copper Media CAT6AU/UTP solution or Better.

### **Application Support:**

#### **2.4 The SCS shall be capable of supporting, at minimum, the following applications:**

- (a) Fiber Backbone Upgradable at Distribution Level 10G, 40G & 100G and more.
- (b) 10 Gigabit Ethernet (10G Base-T)
- (c) Gigabit Ethernet (1000BASE-Tx),
- (d) Analog and digital video and analog and digital voice (VoIP)

### **Network Architecture**

LAN infrastructure should be capable of supporting a multiproduct, multi-vendor environment for services such as voice, data, video and multimedia services to all users. The Network architecture should be in a STAR configuration as per ANSI/TIA 568 C.0 standards. The Structure should be designed in such a way that

the connectivity caters all the applications and provides redundancy at each point to avoid disruption of services at each level.

**1. Active Part**

- a. Core Switch
- b. Distribution Switch(Layer2and3)
- c. Access Switches
- d. Firewall-Network Security
- e. Wireless Access Points
- f. WLAN Controller etc.
- g. NMS

**2. Passive part**

- a. Cat6A Structured Cable
- b. Fiber Back Bone – Single Mode, Multimode
- c. Accessories such as Jack Panel, LIU, Racks, I/O Ports etc.

**Main IP-PBX Telephone Exchange**

1.1 The offered system shall be modular in design. The Architecture of the EPABX shall be capable of seamless migration to its maximum capacity by simply adding peripheral cards / Expansion Cabinets and without compromising on any function / features of this system or any degradation of service. The system should be capable to expand up to at least 2000 extensions, including Analog, Digital and IP. System should cover the billing system along with software & associated system

1.2 The EPABX shall support IP distributed architecture for future scope. IP access points shall be centrally administrable from the host system. Peer to Peer connectivity shall be possible on IP end points. The system shall have universal ports for line/trunk cards, where in any peripheral card can be inserted in any slot of the peripheral shelf, thereby enhancing the flexibility of the configuration

1.3 The system should be having a total equipped capacity of 4 PRI / 16 CO Lines/ IP Phones/ Digital/ Analog extensions spread over Building, namely Admin Block, Academic Block, Boys Hostel, Library, and Gates etc.

The Break up is follows;

**3. General Terms**

3.1 Any application software as required for completion of the project shall be within the scope of the bidder.

3.2 The supplier shall be responsible for all upgrades and updates of the firmware and application software during the warranty period and no separate amount should be claimed for this.

3.3 Supply, Installation and Commissioning of MDF/IDF with their all accessories required will be in supplier's scope.

3.4 Cabling & Termination from EPABX upto MDF/IDF with their accessories required will be in supplier's scope. Internal Cable, LAN Network, OFC, and UPS will be in the scope of the department.

#### **4. SYSTEM FEATURE AND FACILITIES:-**

##### **1. Central Processing Unit:**

The Central Processing Unit of the EPABX shall be Next Generation Converged, Linux based Unified Communication Server, with in-built, Ethernet LAN Port Connectivity, and Maintenance Port, MOH Connectivity, External Paging Connectivity, and USB Port for Up-gradation Purpose. No additional hardware or ports shall be utilized for these functions.

2. **Trunks ISDN (Integrated Services Digital Network)-** The offered exchange shall support ISDN & only the necessary ISDN BRI & PRI Cards (Basic Rate Interface & Primary Rate Interface) need to be added for functionality.

3. **Operating System:** The system should be ready to connect Analog Phones and Digital Phones. In addition, the system should support IP extensions, (Proprietary IP and SIP Phones of the same make as the EPABX/IP-PBX) using MGCP/SIP Protocol resp. The operating system of EPABX should be reliable or proprietary make and should be protected against loss / alteration of memory due to power failure / unauthorized command or due to any other faulty condition. The system should support Auto Restore of data in case of Power Failure; No Manual intervention should be required and all Features and facilities should be working on Power Restore.

4. **Network:** The EPABX system should support DHCP server, built-in Router / functionality with capability to its own Network.

5. **Voice Response System:** The system shall be equipped with integrated (in-built) Voice Response System (VRS) with a minimum of 4 channels for voice processing applications allowing the incoming call to be directly connected to the desired extension number after the voice response from the VRS. OGM messages could be uploaded as wave file using PC, to be used to Voice Response from within the system, without using any 3<sup>rd</sup> Party Hardware. The system should support DISA restriction to designated subscriber through Programming. At least 16 Multi Levels of DISA / Voice prompts should be supported by the system. The Multi-Level should be Upgraded to 64 Level as required, within the same embedded Server, with no

additional Hardware.

The offered system shall have the following standard features i.e. Direct Inward Dialing (DID),

Direct Inward Station Access (DISA), Direct Outward Dialing (DOSA), password protected. The system should support subscriber feature access by remote using Password.

- 6. Voice Mail:** The system shall be equipped with an integrated (in-built) 4 Port Voice Mail System to be accessible to all ports of the EPABX. The recording time for voice Mail should be 200 Hours, Expandable to 1000 hours without using and 3<sup>rd</sup> party device. The User shall be able to access the system internally or remotely from any phone and shall be able to record standard / personal greetings within the mailbox. The system shall be able to inform the outside caller about the exact status of the desired extension (no answer / busy). The system should support Name dialing to reach the designated user. The system shall also support recording of name & personalized greeting within each mailbox. In the event of a Voice message, the system should support the following Notifications, an email should be sent to the designated user to inform the user of the message, If configured the entire message should be sent on the email in a wave file format. Message Indication on Digital Phones/ Voice Call to be made by the Voice Mail to advice of the pending Message. The Voice mail should be equipped for 2-way Manual Call Conversation recording by Attendant Console in case of an Emergency, by giving a command on the Attendant Console / Digital Phone or PC.
- 7. Conversation Recording:** System should be equipped for 2-way call recording and should have option to select different extensions for recording based on number of Licenses available for simultaneous recordings. Supervisor should be able to select and record Analog / Digital / Proprietary IP phones without using any 3<sup>rd</sup> party Hardware or Application
- 9 Caller Line Identification CLI on Analog Extension and Trunks:** The offered system shall have the capability to offer CLI on Analog Extensions for all internal calls. The system shall also offer CLI on Analog Trunks. The CLI shall provide Name/Number on the display of the Analog Extension. ( If the Analog Phone support this feature) It should also support CLI based Routing.
- 10** The legacy TDM circuits should not utilize any IP bandwidth when any TDM- TDM switching is being done in the system.
- 11 Conference:** It shall be possible for Digital extension user to initiate a conference of maximum 8 parties each and for Analog Phones a 3 Party Conference with any combination of internal stations & outside circuits to talk to each other at the same time on the conference circuit, (Conference without using Conference Bridge )It

should support 30 Party Conference capacity for a meet-me conference facility, both by Analog and Digital Phone users.(SIP based Meet -Me Conference to be integrated with EPABX/IP-PBX). Recoding of Conference Calls should be possible if so required by the department.

The system should support Group Dial for Outbound Calls where participants can be dialed using ISDN PRI Lines. Upto 8 such groups should be supported by the system.

**12 VOIP-Voiceover IP: The system shall support Voiceover IP (VOIP) applications; the system should support SIP trunks, SIP and H.323 Protocol for Gateway functioning, SIP Extensions for remote extensions, the remote Extensions should be able to work without any VPN and use Built-in functioning of the EPABX System.**

**13. Music-On-Hold: The system shall support in-built music-on-hold. It shall also be able to upload wave file for customized Music on Hold.**

**14. Message Waiting Indication for Voice Mail: The system shall have facility for lighting a Message Waiting Lamp provided on Digital Phones. The Analog Extensions Telephone Instruments should get a Voice prompt Notification of the Waiting Message on the voicemail unit.**

**15. Networking: The offered system shall be capable of networking with other exchanges using normal LAN cable, signaling interfaces E1, ISDN, BRI/PR lan IP Trucking. The system support in built Logical Portioning, without any external hardware or Software on an external device or PC. Log for Logical Portioning should be available for audit and control purposes.**

**16. DECT/IP DECT: The system should support DECT Handsets for Future Wireless communication. The DECT Base unit and the DECT Phones should be of the same make as that of the EPABX Main Unit. The Base station should also support connectivity on LAN, i.e. IP DECT Base Station. Each DECT Base Station shall be capable of handling minimum of 2/4/8 DECT Phones calls simultaneously. The DECT communication should support call handover without call disconnect.**

**17. Networking with Multiple Exchanges/Remote Sites The system should support IP networking with other remote sites on VOIP connectivity. The remote sites should be of the same make as the make of the Central EPABX /IP-PBX (No 3<sup>rd</sup>-Party Gateway is to be used) . The Command and Control of the entire Network should be with the Central unit and the slave/ remote site should work seamlessly without any feature loss. The system solution should support minimum 12 such remote site connectivity in Master Slave/site Concept.**

18. **Unified Messaging:** The system should be capable of In Skin; Card based Unified Messaging facility to provide Fax and E-mail on the same desktop. The same will be required for Future use and should be possible with additional Hardware or equipment from the same OEM.
19. **UCD/ACD:** The system should support ACD routing for Contact Center/Helpdesk functionality, with Queue Message announcing Caller, waiting number and time, without using any 3<sup>rd</sup>Party Hardware. The same will be required for Future use and should be possible with additional Hardware or equipment from the same OEM.
20. **Diagnostic & Enhanced Maintenance Facility:** The system shall have in-built diagnostic features. The system should be programmable using Browser, without using /installing any Application in the PC. The offered system shall have remote maintenance facility over IP. The system should have in - built Web Server for Remote Web-based Maintenance and support, SNMP, FTP, HTTPS, IMAP4, NTP, NAS connectivity ON NFS, In case of an error an email should be sent to the Administrator, conveying the error message. The system should be capable of firmware update.

The system shall be capable of working in a suitably ventilated non-air-conditioned environment. System design shall be immune to noise from various sources like power supplies, lighting system etc. The Power Supply of the equipment should be Fan cooled to provide maximum uptime.

All components should be rated for continuous operation of the system. It should be designed in such a way that any damage in any circuit /subassembly/assembly should be self-containing and should not be propagate to other parts of the system. The system should support Hot Swappable facility for Trunk, Extension & Interface Cards. EPABXs operating on AC shall have in-built battery charging arrangement within the Power Unit for providing battery Backup for 1hr minimum. Batteries for this purpose shall be ordered Separately.

21. **ATTENDANT CONSOLE:** The offered exchange should include 1 No. of Attendant Console. Exchange shall be capable of supporting up to a minimum of 2 nos. of Attendant Consoles. The administrator should be able to monitor the status of trunks & should be capable of attending/holding multi calls at one time. The Attendant Console should have dual color LED Indication for differentiating between the used & self used lines. It should also have a Large Graphic Display, to distinguish between Trunk calls and Extension calls.

Following minimum facilities in console shall be

- 6 lines Graphic Display with LCD backlit
- Visual Display of Calling & Called Station

- Missed Call List, minimum 10 calls
- Volume Control
- Handset and Headset MIC Mute
- Keypad Dialing
- Computer Software based Call Control with Caller ID Display, Call Hold, Call transfer, Conference, Speed Dialing, Presence for Specified Extensions, Missed Call, Contact List of 100 Users.
- Interface for Headset Operations-Wired
- Electronic Hook Switch Control Port(EHS)
- Busy Override
- Subscriber Identity for incoming Call
- Call Splitting
- Trunk to Trunk access/Transfer
- Transfer of trunk call to another Console
- Breaking into busy extension with an interruption tone
- External Line Hold
- Call Parking
- Selective pickup of calls on Hold
- Call Pickup
- Camp on Busy
- Night Service Control
- DSS(Direct station selection) with at least 40 keys indication.
- OHCA, Off Hook Call Announcement(in case of Busy Operator)
- Call Waiting

## **22. Subscriber Facility**



- (i) The offered system shall have the capability of assigning to use extension a variety of specified services. Further class of service restriction shall be available to the subscribers. Call forwarding shall be available in the offered system.
- (ii) The system shall support abbreviated dialing system for numbers.
- (iii) The system shall be capable of allowing the users to access all the facilities from any extension of the EPABX. The system shall allow user to assign passwords to their phones to prevent misuse of subscriber's facilities provided.
- (iv) Least cost routing through alternate public networks on different time of day basis shall be available
- (v) Night Service: When night service is activated, the operator calls shall be routed to predefine answering position.

**23. The offered system shall have the following minimum features for the subscriber:**

Hotline Attendant

Recall

Call forwarding preset/busy/No answer

Smart Desk for Walking Extension/Free seating across Campus

Call Hunting

Automatic Call Back

Call Waiting

Station Camp on Call back on busy

Hunting method change for each type of calls

DND(Do Not Disturb)

DNDO(Do Not Disturb Override)

Consultation hold

Call Pick up

Call Parking and Retrieve

Extension to extension intercom barring

Storage of last number dialed

Discriminative Ringing—between Internal and external Calls

Class of Service Control Busy Override

Auto Answer on Digital Phones Boss- Secretary Functioning

One Extension for Sr. Executives (2 Digital Phones should work in parallel as a single extension, Table /Sofa Concept)

24. The system should support UCD/ACD based routing and MIS reporting. The group members should be able to LOGIN and LOGOUT for Receiving Calls on the Analog and Digital Phone. The Data should be available on the MIS Reporting Software. Queue Message should be available by default in case the members are All Busy, Routing to Operator / Supervisor should be available
25. The system should support ACD based Reporting for Future use by Activating Feature Key

### **Objective**

- Resource sharing is the main objective of the computer network. The goal is to provide all the program, data and hardware is available to everyone on the network without regard to the physical location of the resource and the users
- Provide the high Reliability. It is achieved by replicating the files on two or more machines, so in case of unavailability (due to fail of hardware) the other copies can be used
- Computer network have provided means to increase system performance as the workload increases (load balancing).In the days of main frame when the system was full it was to replace with the other large mainframe computer, usually at an expensive rate not convenient for user
- Computer network help people who live or work apart to report together. So, when one user prepared some documentation, he can make the document online enabling others to read and convey their opinions. Thus computer network is a powerful communication medium

### **General Terms and Conditions:**

- All copper & Fiber component should be from single OEM as per the makes given in the tender documents.
- All passive components should be RoHS (Restriction of Certain Hazardous Substances) compliant. Declaration-RoHS should be clearly mentioned on datasheet of each Passive Component
- There should be a minimum of 25 years warranty assurance for all supplied

cabling components.

### **Guidelines for Copper and Fiber Installation**

#### **6.1 Copper Cabling Installation Specifications**

##### Telecommunications Outlet & Horizontal cross connect Installation

(a) Cables shall be coiled in the surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. No more than 12" of slack shall be stored.

(b) In addition, each cable type shall be terminated as indicated below:

- Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B document, manufacturer's recommendations and/or best industry practices.
- Pair untwist shall not exceed 0.5 inches and sheath removal within 1 inch at the termination for Category 6 connecting hardware. SL Series Termination Tool helps us to achieve the better results.
- Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
- The cable jacket shall be maintained as close as possible to the termination point.
- Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

##### Horizontal Distribution Cable & Installation

(a) Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

(b) Cable raceways shall not be filled greater than the manufacturer recommended guidelines.

(c) Cables shall be installed in continuous lengths from origin to destination (no splices).

(d) The cable's minimum bend radius and maximum pulling tension shall not be exceeded.

(e) Horizontal distribution cables shall be bundled into groups of not greater than 40 cables. Cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle.

(f) Cables shall not be attached to ceiling grid or lighting support wires.

(g) A self-adhesive label or PVC marker ferrules shall identify the Cables. A cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate. Similar label or marker ferrules shall also be placed on a section of the cable near to the patch panel termination.

(h) Unshielded twisted pair cable shall be installed so that there are no bends less than four times the cables outside diameter (4 X cable outside diameter) at any point in the run.

(i) Pulling tension on 4-pair UTP cables shall not exceed 25-pounds for a single cable or cable bundle. The pathway shall be adequately sized so as not to exceed the 80% cross-section fill of cables. The pathway shall be securely installed in the facility.

(j) Horizontal Cable distance shall be within 90 Meter.

## **6.2 Installation Guide Line for Fiber Optic Cable: Internal**

### **(a) General**

This section describes general precautions to be taken when installing fiber optic cable in a building and the safe handling and disposal of optical cable. The methods and instructions provided are intended only as guidelines, as each installation will be influenced by local conditions and user preferences.

The reader should be experienced in fiber optic cable installation

Methods used for installing fiber optic cables are very similar to those used for installing standard copper cable. However the qualities and characteristics fiber optic cable can be degraded when it is subjected to:

- Excessive pulling.
- Excessive tension.

- Crushing forces.

#### (b) Safety Precautions

It is important to observe the following safety precautions when installing cable in a building and between buildings. These practices may change, or may not be suitable for a specific situation, so are therefore only suggested guidelines. Cairn Energy safety precautions and practices take precedence over any conflicting recommendations given in this section.

Caution: Before starting any cable installation, all personnel must be thoroughly familiar with all applicable Occupational Safety and Health regulations, local regulations, and company practices and policies. To minimize hazards to yourself and others in or near the work area, follow all company rules for setting up barricades, ladders, scaffolding, and warning signs. Any material used above the floor should be arranged so that it cannot fall and hit individuals underneath. Observe standard safety precautions. Wear safety headgear, eye protection, gloves, etc., as specified in your company's practices.

##### Pulling Precautions:

- Personnel normally should not remain in an area where a cable is being pulled under tension around a piece of hardware. Personnel can remain in such an area (e.g., to observe the alignment of a cable around a corner block), if he or she stays clear of the hardware under tension and has a clear path to safety.
- If you use a cable lubricant during a pull operation, make provisions to clean up any spilled lubricant to prevent slipping and possible injury. (Care must be taken if using lubricants as they may react with certain cable sheath types.)

##### Laser Precautions:

Laser light can damage your eyes. Laser light is invisible. Viewing it directly does not cause pain. The iris of the eye will not close involuntarily as when viewing a bright light. Consequently, serious damage to the retina of the eye is possible. Never look into the end of a fiber, which may have a laser, coupled to it. Should accidental eye exposure to laser light be suspected, arrange for an eye examination immediately.

#### **Cable Handling Precautions and Specifications**

The following section provides general guidelines for internal installation of fiber optic cable. (This information is based upon

standard cable designs). Mechanical specifications, minimum bend radii and cable temperature ranges can be obtained by contacting the OEM.

Caution: Fiber optic cable is sensitive to excessive pulling, bending, and crushing. Any such damage may alter the cable's characteristics to the extent that the cable may have to be replaced. To ensure all specifications are met, consult the specific cable specification sheet for the cable being installed.

Note: Zip twin and Single Fiber Cables are designed for use as "jumpers," "patch cords" or "pigtails". These cables are not intended for use in installations requiring long or difficult "pulls" or routing between buildings.

- Leave the protective covering on the reel intact until it arrives at the installation site. If the covering has been previously removed, secure the cable end(s) during transit to prevent damage.
- Cable reels should be stored vertically on their flanges, end-to-end in rows and chocked to prevent rolling. Make sure that reels rest edge-to-edge with reels in adjacent rows to prevent damage to cables.
- Before the installation begins, carefully inspect the cable reel for protrusions such as nails and broken flanges which might cause damage to the cable as it is unreeled.
- Take precautions to protect reeled cable from mishaps or other sources of possible damage. Any damage to a section of cable may require replacement of the entire section.
- If the cable must be unreeled during installation, use the "figure-eight" configuration to prevent kinking or twisting. Do not coil fiber optic cable in a continuous direction except for lengths of 30 m (100 ft.) or less.

#### Installation Considerations

Fiber optic cable can be installed inside buildings using the same methods as coax or twisted pair; however, the following guidelines should be observed:

- Do not deform the cable sheath, specifically when using cable fasteners or ties to secure the cable to a support or hardware
- Do not exceed the cable's maximum pulling tension.

- Do not pull fiber optic cables with copper cables
- Do not pull fiber optic cables over existing cables. The friction could be excessive and cause cable damage. The cables may also become entangled, resulting in damage to the fiber optic cable.
- Do not exceed minimum (installed and long-term) bend radius. (The minimum bend radius varies with the cable diameter. Consult the appropriate Cable specification.)
- Do not pull the cable around sharp corners, such as support brackets.
- Provide additional crush / mechanical protection in high-risk environments.
- Secure the cable to larger permanent cables or available supports when possible. Do not attach the cable to cables that may be removed later or to steam or water lines

Caution: Installation tension exerted on fiber cables may cause the buffered fibers to a sinusoidal “wave” appearance. This effect is caused by installing the cable incorrectly. OEMs generally recommend that all tight-buffered cable pulls employ a grip on the pull end of the cable coupled to the aramid strength member, not the cable jacket.

Pulling grips should be used regardless of the length or duration of the pull. If the pulling end of the cable has not been connectorized, then a knot can be tied in the pull-end of the cable before attempting the pull. If cables are pulled without coupling to the strength member, the cable jacket will stretch. When the jacket relaxes, it may bunch up the fibers underneath the jacket, which may result in degraded fiber performance.

Conduit/Inner duct Use the following guide lines when installing cable in a rigid conduit:

- Ensure the conduit system does not exceed minimum bend radius.
- Do not pull the cable through pull boxes or junction boxes unless the cable's bend radius can be maintained through the use of conduit or inner duct
- Avoid the use of elbows if possible and use an elbow only if the cable's long-term bend radius can be maintained. Never pull cable "through" an elbow. Pull the cable out of the elbow and “back-feed” it

into the conduit exiting the elbow for a second pull.

- Inner duct is semi-rigid plastic tubing commonly used in fiber optic installations to subdivide the duct and to provide for future cable pulls. Proper size and installation of the inner duct is critical for ease of cable installation.
- If additional cables, specifically larger, bulkier cables, are to be installed in the same conduit, install the fiber optic cable inside an inner duct for mechanical protection
- Eliminate sharp edges.

#### Tension Monitoring

- Fiber optic cable is subject to damage if the cable's specified maximum tensile force is exceeded. Except for short runs or hand pulls, tension must be monitored. Maximum pulling tension varies with the cable fiber count. Refer to cable specification sheets for maximum tension.
- All pulling equipment and hardware which will contact the cable during installation must maintain the cable's minimum bend radius.

#### Vertical Runs

- Each fiber optic cable in the vertical run needs to be supported by its own support grip at the top of the run.
- Never use fiber optic cables as support for other cables.
- Cables that are individually supported may be taped or cable-tied together every 3 meters (10 ft.) for cable management – not support.

#### Fiber Optic Cable Disposal

At the end of the products service life there is the potential to recover and recycle component parts of the cable.

When handling and disposing of waste fiber optic cable, observe the following guidelines:

- Comply with Local legislation.
- Consider recycling opportunities.
- Fiber waste should be disposed of safely, the use of sharps containers is recommended for waste fiber shards



## **7. Important Specifications of Networking Passive Components**

### Reference Standards

Design, manufacture, test, and install data distribution systems per manufacturer's requirements and in accordance with NFPA 70 (National Electric Code), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following ANSI/TIA/EIA Standards.

- 1) This Technical Specification and Associated Drawings
- 2) ANSI/TIA/EIA-568-C.1, Commercial Building Telecommunications Cabling Standard – 2009
- 3) ANSI/TIA/EIA-568-C.2, Copper Cabling Components Standard
- 4) ANSI/TIA/EIA-568-C.3, Optical Fiber Cabling Components Standard
- 5) ANSI/TIA/EIA-569-B, Commercial Building Standard for Telecommunications Pathways and Spaces
- 6) ANSI/TIA/EIA-606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- 7) ANSI/J-STD-607-A, Commercial Building Grounding(Earthing)and Bonding Requirements for Telecommunications
- 8) Building Industries Consulting Services International(BICSI) Telecommunications Distribution Methods Manual (TDDMM)
- 9) ANSI/TIA-942, Telecommunications Infrastructure Standard for Data Centers

One of the following types of cables shall be used for backbone wiring as defined in schedule of quantities.

1. 100-ohmUTP/STP multi pair back bone cable.
2. 50/125 umOM3/OM4 optical fiber cable.
- 3 9/125umoptical fiber cables

The EPC Contractor has to assure that cross talk coupling between individual, unshielded twisted-pairs shall not affect the transmission performance of multi-pair cables.

### Grounding Considerations

Grounding system shall be an integral part of the telecommunications wiring system. In addition to helping protect personnel and equipment from hazardous voltages, the grounding system shall reduce the effect of electromagnetic interference ((EMI) to and from the telecommunications wiring system.

Grounding shall meet the NEC requirements and practices or local authorities or codes whichever impose a more stringent requirement.

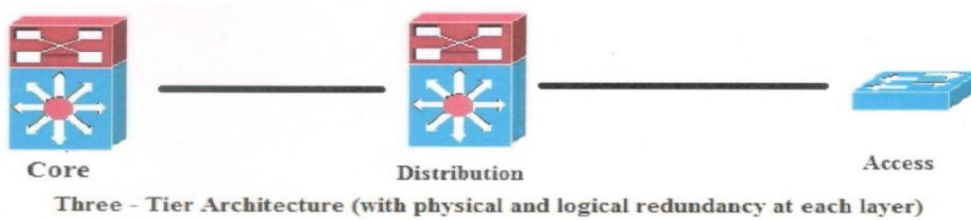
**Essential Eligibility Criteria OEM for Passive Components:**

- a) OEM should be ISO 9001 ISO14000 Certified.
- b) The vendor /OEM should provide test reports generated from any testing software / device for minimum 15000 nodes in support of experience to executing such requirement of margin (3 dB or higher) for Cat 6A of NEXT (worst case) for entire frequency range specified in ISO/IEC 11801. (Details must be provided).
- c) The OEM of Passive components is required to provide the Product warranty and Performance warranty of minimum 20 – 25 years from the date of commissioning. (Details must be provided).
- d) The OEM of Passive Components should have minimum 3 RCDD (Registered Communication Distribution Designer) certified people on the OEMs payroll sitting in India whose services can be utilized for this project. Valid Certificates of the OEM employees along with a letter from the OEM HR Department verifying that the employees are in fact sitting in India should be submitted. (Details must be provided).
- e) The OEM of passive components should provide UL/ETL certification for the full Cat 6A U/UTP copper channel link (UL/ETL 4 connector test report) with at least 3 dB NEXT head room and CAT6 at least 6dB NEXT head room for entire frequency range specified in ISO/IEC 11801 also the individual copper components and fiber cable should be UL/ETL listed.
- f) All passive network components quoted by the bidder should be from a single OEM only (Copper & Fiber).
- g) All the Single mode and Multi-mode fiber cables & fiber patch cords should be **Bend insensitive**. Single Mode fiber cable should be as per ITU-TG.657 with zero/low water peak construction, OS2. (Details must be provided).
- h) The Cat6A U/UTP Cable should be complied with **IEC60332-3-22** features for environment safety.
- i) Cat 6A performance even when termination is within 15meters thus ensuring eliminating short resonance for 4-connector channel (UL/ETL Report for 4 Connector need to be submitted).
- j) The supplied passive product must have capability to upgrade to Intelligent Cabling System without any downtime and they must have their own solution of Intelligence including software Reference with product data sheet must be provided.
- k) The Cat 6A U/UTP Cable Should be **ETL Verified** and all passive components should be RoHS complied. Declaration of RoHS compliant should clearly be mentioned on datasheets of each Passive Components.

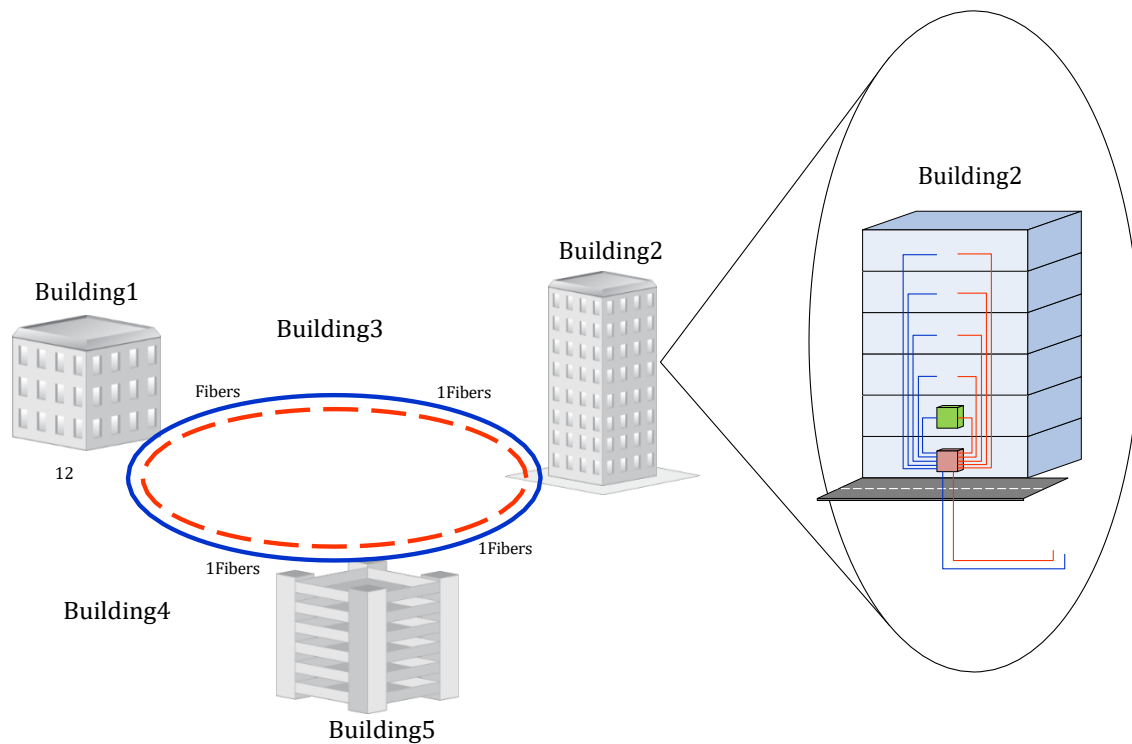
- l) All Cables (Copper or Fiber) should have a unique number printed on the cable jacket. This unique identifier shall be used for on-line reference to a full set of factory tests that were performed on a sample from the same mater reel. The on-line reference must be available on the SCS vendor public website, such that it can be accessed at any time.
- m) Data Sheets of all proposed products should be available on the OEM public website. The data sheets provided on the OEM public website and submitted data sheets should be the same.
- n) All passive components should be RoHS complied. Declaration of – ROHS compliant should clearly be mentioned on data sheets of each Passive Components.
- o) The OEM of passive components to be quoted by the bidder should be present in India from at least past 10 years. (Details must be provided).
- p) OEM should have technology development program partnership with minimum of 1Active networking (Switches and Routers) OEM's globally. (Reference required).

Note: Failing to comply with any of these terms and condition will lead to rejection of the offer.

### Hierarchical



### Ring Redundancy Architecture for Campus Distribution Connectivity:



**IMPORTANT NOTE:** All the works will be done as per relevant standards amended upto date with prior approval from the EIC/Consultants considering all requirement mentioned in the DBR is the bare minimum. Also all the calculations to be done by EPC contractor shall have prior approval of EIC/Consultant before execution.

## DG Set Exhaust Piping System

**DG Set Exhaust Piping** is a system of pipes and components that directs **engine exhaust gases** from the **diesel engine** to the atmosphere, while minimizing **noise, heat, and backpressure**. It also ensures safe dispersal of **harmful gases** like CO<sub>2</sub>, CO, NO<sub>x</sub>, etc.

### 1. Design Objectives

- Remove exhaust gases efficiently
- Minimize back pressure on the engine
- Reduce noise via silencers
- Prevent heat damage and fire risk
- Eliminate vibration transmission
- Ensure water drainage and prevent rain ingress

### 2. System Components

Component	Function
<b>Exhaust Manifold</b>	Collects exhaust gases from the engine cylinders
<b>Flexible Bellow</b>	Absorbs vibration and thermal expansion
<b>Silencer / Muffler</b>	Reduces noise from exhaust gases
<b>Exhaust Piping</b>	Transports gases from silencer to outside
<b>Rain Cap / Flap</b>	Prevents rainwater entry at exhaust termination
<b>Support Hangers</b>	Holds and aligns piping, reduces stress on engine flange
<b>Drain Plug / Condensate Trap</b>	Removes accumulated moisture to avoid corrosion or backflow

### 3. Materials

- **Pipe Material:**
  - **Mild Steel (MS)** – Common, cost-effective
  - **Stainless Steel (SS304/SS316)** – For corrosion-prone or marine areas
- **Insulation:**
  - Rockwool / Ceramic wool with aluminium or stainless steel cladding
  - Temperature rating  $\geq 600^{\circ}\text{C}$

### 4. Design Parameters

Parameter	Typical Range / Notes
<b>Pipe Diameter</b>	Based on engine exhaust gas flow (typically 3" to 10"+)
<b>Exhaust Gas Velocity</b>	30–60 m/s recommended
<b>Back Pressure</b>	$\leq 10\text{--}20$ kPa (check OEM spec; excessive = engine derating)
<b>Pipe Slope</b>	1–2% downward (away from engine) for condensate drainage
<b>Length Limit</b>	Keep short; use larger diameter if long distance needed

Parameter	Typical Range / Notes
<b>Bend Radius</b>	Smooth long-radius bends preferred over sharp elbows

## 5. Back Pressure Calculation (Simplified)

Total back pressure =

Friction loss (due to pipe length & bends) + Silencer resistance + Vertical lift (if any)

Use:

- **Darcy–Weisbach equation** for pressure loss
- Consult engine manufacturer for allowable limit

## 6. Noise Reduction

### Types of Silencers:

Type	Use Case	Noise Attenuation
<b>Reactive</b>	Low-frequency noise	Medium
<b>Absorptive</b>	High-frequency noise	Medium
<b>Combination</b>	Balanced solution for all types	High

Ensure silencers match engine size and application (hospital, residential, etc.).

## 7. Installation Guidelines

- Avoid placing load of pipe on engine flange – use independent supports
- Use **flexible connectors** near the engine to absorb movement
- Support piping every **2–3 meters** using clamps or hangers
- Allow thermal **expansion gap** or expansion joints (bellows)
- Paint external pipe with **heat-resistant paint**
- Use **fire sleeves** where pipe passes through walls

## 8. Safety & Compliance

- Ensure **gas discharge height** is above nearby buildings and openings
- Comply with **local emission & noise control regulations**
- Provide **exhaust gas detectors** in enclosed generator rooms
- Use **insulation** on all exposed hot surfaces to prevent burns or fire
- Keep clearances from combustible materials

An **HSD tank system** is the complete **fuel storage and delivery system** used to store diesel and supply it to a **diesel generator set (DG Set)**. It includes the **main diesel storage tank, day tank, transfer pumps, piping, and monitoring systems**.

### 1. Main Components of HSD Tank System

Component	Function
<b>Main Storage Tank</b>	Stores bulk diesel fuel (underground or above ground)
<b>Day Tank</b>	Smaller tank near DG set supplying fuel directly to the engine
<b>Fuel Transfer Pump</b>	Transfers fuel from main tank to day tank automatically or manually
<b>Fuel Return Line</b>	Returns unused diesel from engine to the day tank
<b>Level Sensors</b>	Monitor fuel levels and control pumps or alarms
<b>Vent Pipe</b>	Prevents vacuum/pressure buildup in tanks
<b>Breather Filter</b>	Allows air in/out while filtering dust/moisture
<b>Fuel Piping &amp; Valves</b>	Transfers fuel between components safely
<b>Drain Valve</b>	Removes water/sludge from tank bottom
<b>Bund Wall / Dyke</b>	Containment wall to prevent leakage spread (for safety compliance)

### 2. Working Principle of DG Set HSD Tank System

#### Normal Operation Flow:

1. **Diesel is delivered** and stored in the **main HSD tank** (could be U/G or A/G).
2. A **diesel transfer pump** (manual or automatic) transfers fuel to the **day tank**.
3. The **DG set draws fuel** from the **day tank** via a suction line.
4. **Unused fuel** from the DG engine is returned back to the day tank through a **return line**.
5. Level sensors in the day tank **monitor low/high levels** and trigger alarms or start/stop transfer pumps accordingly.
6. **Breather vents** maintain air pressure inside tanks and avoid vacuum formation.
7. **Drain valves** allow cleaning water or sediment that collects at tank bottom.
8. The **bund wall or containment area** around the tank ensures safe spillage control.

### 3. Design Guidelines

#### Main Tank Sizing

- Based on required **autonomy (24 hrs)** of DG Set
- $\text{Volume} = \text{Fuel consumption per hour} \times \text{hours of autonomy} \times \text{No. of DGs}$

#### Day Tank Sizing

- Sized for **24 hours of operation**
- Mounted on a **stand/frame** near DG for gravity feeding or inline feeding

#### Transfer Pump

- Rated for appropriate flow rate (e.g., 30–100 LPM)

- Can be **submersible** or **external gear pump**
- Controlled by **automatic level switch** in day tank

#### Fuel Supply & Return Lines

- Usually **MS/GI/SS or copper** pipe
- Supply and return should not be mixed
- Slope fuel lines for gravity return where applicable

#### 4. Safety Features

Feature	Description
<b>Flame Arrestor</b>	On vent pipes to prevent fire ingress
<b>Bund Wall / Dyke</b>	Should hold 110–120% of tank capacity (mandatory for above-ground tanks)
<b>Low-Level Alarm</b>	To prevent dry running of DG and trigger refilling
<b>High-Level Alarm</b>	Prevent overflow during transfer from main tank
<b>Emergency Shutoff Valve</b>	For isolating fuel in case of fire/emergency
<b>Leak Detection System</b>	Especially for underground tanks
<b>Double-Walled Tank</b>	For environmental protection

## Physical Security System

Supply, Installation, Testing & Commissioning of Motorised Boom Barrier: Electromechanical Boom Barrier of 6 Mtr Boom Length, Opening Closing Time 2.0 Sec ( adjustable) I.P. 54, MTBF 2 Million etc. all complete, CE Certified.etc. all complete WITH RFID /Token Intigration alongwith printer. Make- Somfy / IRAM/ Neptune/ IICONS

Supply, Installation, Testing & Commissioning of Motorised Boom Barrier: Electromechanical Boom Barrier of 2 Mtr Boom Length, Opening Closing Time 2.0 Sec ( adjustable) I.P. 54, MTBF 2 Million etc. all complete, CE Certified.etc. all complete WITH RFID /Token Intigration alongwith printer. Make- Somfy / IRAM/ Neptune/ IICONS



X- ray Screening Baggage/ Inspection System Multi Energy Imaging (4 color) Tunnel Size 500 x 300 mm can view Previous / next bag, Manual Image Archive, should have configurable image processing keys with Date & time display facility Search Indicator including Flat monitor panel with UPS should have Fixed zoom 64 x or more, equipment should have standard like TIP Approved EU CE EWSTP STAC Certification etc. all complete.

Make- Rapiscan/ Astrophysics / Detec

Walk Through Metal Detector with Auto Tune with side panel One Horizontal Zones to Indicate Detection 100 Sensitivity Step in each program Outer dimension 2240 x 900 x 700 Inner dimension 2050 x 760 should comply the standard of international standards for Human Safety CE & EU certified with Sanitizer Spray Facility etc. all complete.

Make- Rapiscan/ Astrophysics / Detec

Handheld Metal Detector 3 ways Push button Operation can detect all metals, both ferrous & non-ferrous standard 9v battery light weight 260g Dimension: 410 x 140 mm with safety Standard EU directives CE Certification etc. all complete.

Make- Rapiscan/ Astrophysics / Detec

Supply, Installation, Testing & Commissioning of Electromechanical driven stainless steel Turnstile, voltage AC 220-240, IP-55 with facility of drop arm feature sensor compatible to BCCI guideline complete in all respect alongwith control cabling & required operation devices

## **Façade/Landscape Lighting**

- **LED RGB/RGBW floodlighting luminaires**

Luminaires shall be made of die-cast aluminium with powder-coated finish suitable for outdoor use. Fixtures shall provide dynamic colour-changing lighting (minimum 16 million colours) through DMX/Ethernet control.

Luminaires shall have suitable beam angles (narrow/medium/wide/asymmetric) as per design requirements. The fitting shall be complete with in-built driver and operate on 100–270 V AC, 50 Hz with power factor  $\geq 0.9$ , without external power supply.

The luminaire shall be suitable for ambient temperature range of  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  and shall have minimum IP65 and IK06 ratings. LED life shall be minimum  $L70 \geq 50,000$  hours at  $50^{\circ}\text{C}$ . The product shall conform to BIS (IS 10322) standards.

The item shall include all required accessories such as weatherproof cables, waterproof connectors, mounting hardware, etc., and shall include integration, testing, commissioning, and handing over complete system.

Luminaires shall be of 90W, 75W, 55W and 40/45W as required and as approved by the Engineer-in-Charge.

- **LED RGB/RGBW Linear Wall Washer Luminaires**

The facade lighting system shall include LED RGB/RGBW linear wall washer luminaires designed for uniform and dynamic architectural illumination. The luminaires shall be constructed with high-quality aluminium extruded housing, suitable for outdoor applications.

Each luminaire shall be capable of producing dynamic colour-changing effects with up to 16 million colours through DMX and/or Ethernet-based control systems. The optical system shall provide flexibility in beam angles (narrow, medium, wide, or asymmetric) as per facade lighting design requirements.

The luminaires shall be provided with integral drivers and shall operate directly on a line voltage supply of 100–270 V AC, 50 Hz, with a minimum power factor greater than 0.9, without requiring any external power supply.

Fixtures shall be designed to operate under ambient temperature conditions ranging from -10°C to +50°C and shall have a minimum ingress protection rating of IP65 and impact resistance rating of IK06.

The LED system shall have a minimum rated life of  $L70 \geq 50,000$  burning hours at an ambient temperature of 50°C. Luminaires shall conform to applicable BIS standards.

The system shall be complete with all necessary accessories for proper installation and operation, including weatherproof cables, waterproof connectors, mounting arrangements, and associated hardware.

Luminaires shall be provided in wattage configurations of 70W, 60W, 40W, and 25W, as per design requirements.

---

# REPORT ON HVAC DESIGN OF A BUILDING

**DESIGN BASIS REPORT**

**HVAC SYSTEM**

# CONSTRUCTION OF FORESTRY AND HORTICULTURE UNIVERSITY AT GORAKHPUR, UTTAR PRADESH INDIA

## SYSTEM DESIGN DATA

### **A.** General:

The system design, basis of design, requirements and other relevant data are outlined in this section. The detailed specifications and specific requirements are outlined in the subsequent sections.

### B. Location:

The proposed Construction of FORESTRY AND HORTICULTURE UNIVERSITY AT is located at GORAKHPUR in the state of Uttar Pradesh.

### C. Scope of works:

Design, Supply, installation, testing and commissioning of VRV/VRF system including indoor/outdoor units, piping, electrical power distribution/wiring, electrical panel, treated fresh air system etc. **(Minimum outdoor capacity 2450 HP (Hot & Cold) for overall Project for Required Buildings with their separate indoor units) (Before Execution on Site First Approved Drawing from Consultant)**

The work proposed under this tender includes Designing, providing and fixing air-conditioning, heating and ventilation systems for the above work.

Providing and fixing at site all main equipment associated with air-conditioning and ventilation for the above.

To execute all incidental work at site including material supply at site associated with the system asked in the specifications.

Nature of such works will be sheet metal ductwork, air distribution devices viz. grilles and diffusers, copper refrigerant piping and its insulation, drain piping etc., incidental civil works, incidental electrical works, cable, control panel etc. at site for all manufactured items at works and also items fabricated at site.

Routine Testing, pressure testing of fabricated components, commissioning of complete plant at site.

Performance testing at site of complete air-conditioning, air-cooling and ventilation system / installations at site.

# **VRFAIRCONDITONINGSYSTEM**

## **1. Outdoor Units**

The system shall be VRF (Variable Refrigerant Flow) system. The system shall 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. The system shall be able to operate at cooling as well as heating mode. 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.

Condenser Fins should be coated with Anti-Corrosive Layer (Epoxy Acrylic coating) in addition to Hydrophilic Coating.

The heat pump system should consist of 100% inverter driven advanced flash injection scroll compressor, optimized DSH (Discharge Superheat Control), AI enabled technology, factory fitted microprocessor based self-diagnostic & on device inverter check.

All outdoor units shall be able to perform in duty cycle mode to optimize wear and tear of system when more than one outdoor unit is connected to a circuit. Outdoor units must also be equipped with four way valve for necessary provision of heating during winters.

Outdoor unit (individual modules) shall have a sound rating no higher than 67 dB (A) at 1m distance from the front of the unit.

The heat pump outdoor unit shall have a high pressure safety switch, high voltage fuses, over-current protection, phase detection protection, thermal fan protection, low pressure protection, compressor overcurrent protection, fan motor voltage protection and intelligent logic to ensure proper operation within unit design limitations and operational parameters.

The frequency of the inverter compressor shall be variable from 10 to 160Hz to modulate capacity.

Outdoor unit shall have a Peak Demand Control feature to reduce power consumption during Peak Hours.

The inverter compressor PCB(s) shall be cooled with liquid refrigerant circuit(s) and air-cooling fins to operate at optimal temperatures and to prevent failure due to overheating.

All outdoor units above 16 HP shall have minimum two Scroll Inverter Compressors and be able to operate even in case one of compressor is out of order.

The heat pump outdoor unit shall have the ability to operate with a maximum height difference of 110 meter between the outdoor unit and the lowest indoor unit. Maximum allowable refrigerant piping length in a system shall be 1,000 meter. The greatest length should not exceed 200 (220 equivalent) meter between outdoor unit and the farthest indoor unit.

Indoor units on Heat Pump system shall have a maximum vertical separation of 50 meter between the highest and lowest indoor units.

Selected modules should have minimum COP 3.7 at 100% load and 7.5 at 50% load in cooling mode at AHRI Condition and each module should have all inverter compressor/unit.

The outdoor units must deliver a minimum of 100% of nominal capacity at 39 Deg C outdoor temp. The fan static pressure of the outdoor unit shall be minimum 75 Pa to avoid hot air recirculation

The heat pump outdoor unit shall be capable of operating in cooling mode between (-5°C to 53°C) outside ambient temperatures.

The heat pump outdoor unit shall be capable of operating in heating mode between (-20°C to 18°C) ambient temperatures.

The heat pump outdoor unit shall have a high efficiency, individual oil separators for each compressor plus additional logic controls to ensure adequate oil volume in the compressor is maintained.

The heat pump outdoor unit shall have a flat-plate type sub-cooler to sub-cool liquid refrigerant further to increase capacity and performance with long pipe lengths and to decrease refrigerant sounds at indoor equipment.

The heat pump system shall have optional night quiet modes to reduce unit sound level.

The heat pump outdoor unit shall allow temporary disabling of individual compressors to allow system operation at reduced capacity after a compressor or compressor component related issue (when more than one compressor is present in system). Disabling of a compressor shall temporarily remove error codes and allow system operation.

The heat pump outdoor unit compressors shall have a soft-start function to reduce electricity demand during system start and to increase compressor reliability.

In the event of system error due to outdoor unit failure, the heat pump outdoor unit shall display codes that specify a precise error and which outdoor unit PCB is the cause.

The heat pump system shall support system auto-addressing allowing system commissioning without manually configuring indoor unit addresses.

Outdoor unit PCB must have conformal coating for protection complying with IEC 50721-3-3 3C3 Class) and have NABL accredited lab certificate not older than 3 years

Outdoor Unit manufacturer should be of OEM of its compressor

Inverter PCB cooling: Cooling of the inverter PCB shall be conducted by way of high pressure, sub-cooled liquid refrigerant via heat exchanger attached to rear side of inverter PCB. The full capacity flow of refrigerant shall pass through the heat exchangers to maximize the cooling effect of the PCBs and to aid in the evaporation process and capacity of the outdoor coil during the heating mode. The recovered heat of the PCBs must be used to enhance the overall heating process, other uses or dissipation of heat to ambient shall not be permitted.

All electronic PCBs shall comply to IEC 60571/EN 50155 for dry heat test, dust & sand test etc, compliance documents shall be submitted for approval. Also all electronic PCBs shall have protection against direct spikes & surges in the power supply inbuilt as defined in IEC 60571. Type test report not older than 3 years shall be submitted

The Bidder should comply with BIS certification

#### **Unit Cabinet:**

The chassis shall be fabricated of galvanized steel and finished with a powder coated baked enamel.

VRF ODU are powder coated from factory with 80 GSM - 100 GSM Pure Polyester

#### **Fan:**

All fan motors shall be variable speed BLDC type.

All fan motors shall have inherent protection, thermal protection, and have permanently lubricated bearings, and be completely variable speed.

The outdoor unit shall have vertical discharge airflow.

#### **Refrigerant:**

R410A refrigerant shall be required for the heat pump system.

Additional refrigerant amount shall be based on installed refrigerant pipe diameters and lengths and indoor equipment model number and quantity.

Modular systems shall require outdoor refrigerant kits for module connection provided by the manufacturer

#### **Coil:**

Condenser Fins should be coated with factory made Anti-Corrosive Layer (Epoxy Acrylic coating) in addition to Hydrophilic Coating. Anti-Corrosion coating material should have 3000 Hr Salt spray test.



The heat exchanger shall consist of two separate circuits to enhance the heat pump defrost cycle. The unit shall use the entire coil initially for the defrost cycle. To resume heating faster in extreme conditions, the upper section shall return to heating operation while the lower section continues to defrost.

### **Compressor:**

The compressors shall have flash injection capability to increase performance in heating mode. This will be automatically enabled by the outdoor unit(s) by forcing saturated refrigerant as a liquid flash mix directly into the scroll compression cycle increasing mass flow and overall system capacity. Compressors without flash injection shall not be present in the VRF heat pump system.

All compressors shall be modulation capable, flash injected, DC inverter, scroll type.

Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping lengths. Oil sensor to monitor the level of oil in compressor.

The compressor(s) will be equipped with an internal thermal overload.

The compressor(s) shall be mounted to avoid the transmission of vibration.

### **Electrical:**

The outdoor unit electrical power shall be 415 Volts, 3 phase, 50 hertz.

The outdoor unit shall be controlled by integral microprocessors.

The control circuit between the indoor units and the outdoor unit shall be 0.5VDC - 7VDC completed using stranded, annealed copper conductor, 1.5 sq.mm, shielded, two-core cable to provide total integration of the system.

## **INDOOR UNITS**

### **1.0 INDOOR UNITS**

This section deals with supply, erection, testing and commissioning of Various Type Of Indoor Units conforming to general specification and suitable for the duty selected. The type, capacity and size of indoor units shall be as specified in Detailed Bill of Quantities.

### **2.0 GENERAL**

Indoor units shall be either ceiling mounted cassette type, or ceiling mounted ductable type or floor standing type or wall mounted type or other as specified in BOQ. Each unit shall have electronic control valve to control refrigerant flow rate respond to load variations of the room and fan/blower motor should be BLDC type for Low noise performance

- a) The address of the indoor unit shall be set automatically in case of individual and group control
- b) In case of centralized control, it shall be set by liquid crystal remote controller

The fan shall be dual suction, aerodynamically designed turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct driven type, mounted directly on motor shaft having supported from housing.

The cooling coil shall be made out of seamless copper tubes and have continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coils shall be factory tested at 21kg/sqm air pressure under water.

Unit shall have cleanable type filter fixed to an integrally moulded plastic frame. The filter shall be slide away type and neatly inserted.

Each indoor unit shall have computerized PID control for maintaining design room temperature. Each unit shall be provided with microprocessor thermostat for cooling or cooling and heating.

Each unit shall be with wired LCD type remote controller. The remote controller shall memorize the latest malfunction code for easy maintenance. The controller shall have self-diagnostic features for easy and quick maintenance and service. The controller shall be able to change fan speed and angle of swing flap individually as per requirement.

## **2.2 CEILING MOUNTED CASSETTE TYPE UNIT (ROUND FLOW TYPE)**

The unit shall be ceiling mounted type. The unit shall include pre-filter, fan section and DX-coil section. The housing of the unit shall be powder coated galvanized steel. The body shall be light in weight and shall be able to suspend from four corners. The fan shall be aerodynamically designed diffuser turbo fan type. Also Units shall have an external attractive panel for supply and return air. Unit shall have four way supply air grilles on sides and return air grille in center. Each unit shall have high lift drain pump, fresh air intake provision (if specified) and very low operating sound. All the indoor units regardless of their difference in capacity should have same decorative panel size for harmonious aesthetic point of view. It should have provision of connecting branch ducts.

## **3.3 CEILING MOUNTED DUCTABLE TYPE UNIT**

Unit shall be suitable for ceiling mounted type. The unit shall include pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel. The unit shall have high static fan for Ductable arrangement.

Indoor unit must have feature of ESP adjustment to meet CFM requirement.

#### **3.4 CEILING SUSPENDED TYPE**

Unit shall be suitable for ceiling suspended arrangement below false ceiling. The unit include pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel.

#### **3.5 HIGH WALL MOUNTED UNITS**

The units shall be wall-mounted type. The unit includes pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel. Unit shall have an attractive external casing for supply and return air.

#### **3.6 FLOOR STANDING TYPE**

Unit shall be suitable for floor standing arrangement. The unit include pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel.

### **CENTRALIZED TYPE REMOTE CONTROLLER**

A multifunctional compact centralized controller shall be provided with the system.

The controller should be Touch Screen LCD remote controller to act as an advanced air-conditioning management system to give complete control of VRV / VRF air-conditioning Equipment, It should have ease of use for the user and must have a user friendly panel and LCD display.

It shall be able to control up to minimum 128 indoor units with the following functions:-

- a) Starting/stopping of Air-conditioners as a zone or group or individual unit.
- b) Temperature settling for each indoor unit or zone.
- c) Switching between temperature control modes, switching of fan speed and direction of airflow, enabling/disabling of individual remote controller operation.
- d) Monitoring of operation status such as operation mode & temperature setting of individual indoor units, maintenance information, troubleshooting information.
- e) OPTIONAL-Display of air conditioner operation history.
- f) OPERATIONAL-Daily management automation through yearly schedule function with possibility of various schedules.
- g) BMS compatibility

The controller shall have wide screen user friendly LCD display and can be wired by a non-polar 2 wire transmission cable to a distance of 1 km. away from indoor unit.

### **REFRIGERANT CIRCUIT**

- The refrigerant circuit shall include liquid and gas shut-off valves and a solenoid valves at

condenser end.

- The Equipment must have inbuilt refrigerant stabilization control for proper refrigerant distribution.
- All necessary safety devices shall be provided to ensure the safe operation of the system.
- Wherever False ceiling is not being Installed, Use of Cable Tray Along With Proper Accessories For Copper Piping to be installed.

#### **Y-JOINT REFNET SEPARATION**

- Supply & installation of the Y -Joint/ Ref-net separation refrigeration pipe joints and headers in the appropriate orientation to enable correct distribution of refrigerant. The Distribution Joints should be factory insulated with pre-formed sections of Expanded Polystyrene/Equivalent.

#### **1. MATRIX OF AC SYSTEM**

Sr.No	DESCRIPTION	FLOOR	Total HP	TYPE OF AC SYSTEM	PROPOSED LOCATION (Outdoor units)
1	Academic Block	(G+3)	640 HP	VRF System	Terrace Floor /As per Site Condition.
2	Academic Block	(G+3)	640 HP		
3	Admin Block	(G+3)	480 HP		
4	Library Block	(G+2)	350 HP		
5	Multipurpose Block	(GF)	256 HP		
6	Health Centre	(GF)	56 HP		
7	Guest House	(GF)	28 HP		

#### **2. AHU UNIT SELECTION**

Sr. No	DESCRIPTION	FLOOR	No. of Ahu Unit
1	Academic Block	(G+3)	As per Consultant
2	Academic Block	(G+3)	
3	Admin Block	(G+3)	
4	Library Block	(G+2)	
5	Multipurpose Block	(GF)	
6	Health Centre	(GF)	
7	Guest House	(GF)	

## 1. DESIGN -CRITERIA

### GENERAL

HVAC System shall be designed to provide thermal environment control for the project proposed Forestry and Horticulture University is located Gorakhpur, Uttar Pradesh India. Two set of Combined VRF outdoor shall be located in Terrace floor which shall cater to the Air-conditioning requirement of respective block (to be catered by VRF System) as per above AC matrix

### LOCATION

**Site Location: Gorakhpur- U.P**

**Latitude (N) :** 26.75° N

**Altitude (M) :** 77 m

### OUTDOOR DESIGN CONDITIONS

The outdoor design conditions shall be considered as follows:

Summer	:	Dry Bulb Temperature Wet Bulb Temperature	40.0°C(104°F) 26.7°C(80°F)
Monsoon	:	Dry Bulb Temperature Wet Bulb Temperature	33°C(91°F) 28°C(82°F)
Winter	:	Dry Bulb Temperature Wet Bulb Temperature	7.0°C(45°F) 6.0°C(43°F)

### INSIDE DESIGN CONDITIONS

**All Areas except Corridor and Lobby:**

Summer and Monsoon		
Dry Bulb Temperature		21.7+1.1°C(71+2°F)
Relative Humidity		Not exceeding 60%

Winter		
Dry Bulb Temperature		21+1.1°C(69.8+2°F)
Relative Humidity		Not to fall below 40%

Winter		
Dry Bulb Temperature		20+1.1°C(68 +2°F)
Relative Humidity		Not to fall below 40%

**BUILDING ENVELOPE CONDITIONS:**

Description		U-Value	Units
All Exposed Wall	Brickwork(230MM)	0.38	BTU/HrSq.ft0F
Floor/Ceiling	Without insulation	0.48	BTU/HrSq.ft0F
Roof	40mm thick PUF insulation	0.10	BTU/HrSq.ft0F
Partition Wall	Brick Work(100MM)	0.40	BTU/HrSq.ft0F
Glazing	Single Glazing As per Griha	0.90	BTU/HrSq.ft0F
	Effective Glass Shading Coefficient	0.45	-----

**Temperature & RH Profile**

S. No	Area Description	Inside Temperature (°C)	Relative Humidity (%)
1	Classrooms / Lecture Halls	22 – 24°C	50 – 60%
2	Faculty Rooms / Cabins / HOD	22 – 24°C	50 – 60%
3	Offices / Administrative Areas	22 – 24°C	50 – 60%
4	Conference / Meeting Rooms	22 – 23°C	50 – 60%
5	Library / Reading Hall	22 – 24°C	50 – 60%
6	Computer Labs / IT Rooms	21 – 23°C	45 – 55%
7	Laboratories (Non-critical)	22 – 24°C	50 – 60%
8	Corridors / Common Areas	24 – 26°C	50 – 65%
9	Toilets / Service Areas	24 – 28°C	50 – 70%
10	Auditorium / Seminar Hall	22 – 24°C	50 – 60%

**OCCUPANCY, FRESHAIR, LIGHTING, EQUIPMENT LOAD CRITERIA:**

Description	Occupancy (ft <sup>2</sup> /person)	Outdoor Air (CFM)	Lighting (W/ft <sup>2</sup> ) (W/m <sup>2</sup> )	Equipment (W/ft <sup>2</sup> ) (W/m <sup>2</sup> )
Office Space	100	5 cfm/person + 0.06 cfm/ft <sup>2</sup>	0.9 (9.7)	0.75 (8.1)
Entry Lobby	150	5 cfm/person + 0.06 cfm/ft <sup>2</sup>	0.8 (8.6)	0.3 (3.2)
Meeting / Conference Room	50	5 cfm/person + 0.06 cfm/ft <sup>2</sup>	1.0 (10.8)	0.75 (8.1)
Waiting Area	30	7.5 cfm/person +	0.9 (9.7)	0.3 (3.2)

Description	Occupancy (ft <sup>2</sup> /person)	Outdoor Air (CFM)	Lighting (W/ft <sup>2</sup> ) (W/m <sup>2</sup> )	Equipment (W/ft <sup>2</sup> ) (W/m <sup>2</sup> )
		0.06 cfm/ft <sup>2</sup>		
Faculty Room / Cabins	120	5 cfm/person + 0.06 cfm/ft <sup>2</sup>	1.0 (10.8)	0.75 (8.1)
Library / Reading Hall	50	5 cfm/person + 0.06 cfm/ft <sup>2</sup>	1.1 (11.8)	0.75 (8.1)
Lecture / Demo Hall	As per seating (~15–20)	7.5 cfm/person + 0.06 cfm/ft <sup>2</sup>	1.0 (10.8)	0.75 (8.1)
Computer Lab	40	10 cfm/person + 0.12 cfm/ft <sup>2</sup>	1.2 (12.9)	1.5 (16.1)
Laboratories	50	10 cfm/person + 0.06 cfm/ft <sup>2</sup>	1.2 (12.9)	1.0 (10.8)
Corridors	—	0.06 cfm/ft <sup>2</sup>	0.5 (5.4)	—
Reception	60	5 cfm/person + 0.06 cfm/ft <sup>2</sup>	0.9 (9.7)	0.5 (5.4)
Server Room	100	As per equipment	0.5 (5.4)	~4–6 kW (fixed load)
Printing Room	100	Exhaust based	0.7 (7.5)	~2–3 kW (fixed load)

### MECHANICAL VENTILATION:

Mechanical air changes shall be as below table

Space	Ventilation Rate
Pantry	12 ACPH
Public Toilet	10 ACPH
LT & HT Room	15ACPH (As per NBC)
STP	30 ACPH(As per NBC)
Plant Rooms	15-20 ACPH(As per NBC)
Basement Ventilation	6 ACPH in Normal Mode & 6 ACPH additional Fire Mode as per NBC & total 12 ACPH in Fire Mode.
Smoke Extraction System	<b>12 ACPH (As per NBC)</b>
All other Ventilation are as shall be ventilated as per NBC Requirements.	

## 1-Staircase Pressurization

- **Purpose:** Prevent smoke infiltration into stairwells during fire; ensures safe evacuation.
- **System Type:** Central pressurization
- **Fan Location:** Terrace floor / rooftop
- **Key Features:**
  - Continuous fan operation during alarm
  - Pressure sensors at each stair landing to maintain **required differential pressure** (typically 50–75 Pa)
  - Ducted supply from terrace to all staircases & Complies with **ASHRAE 170, NFPA 92, and NBC India fire safety codes**

## 2. Lift Well Pressurization

- **Purpose:** Prevent smoke from entering lift shafts during fire; protects lifts and adjacent floors.
- **System Type:** Dedicated pressurization for each lift shaft
- **Fan Location:** Terrace floor / rooftop
- **Key Features:**
  - Each lift shaft pressurized independently
  - Differential pressure maintained to prevent smoke entry into lift lobby
  - Coordination with fire alarm / lift recall system & Complies with **ASHRAE 170, NFPA 92, and NBC India fire safety codes**

## DUCTDESIGN

Design parameter for duct design shall be:

Maximum velocity of flow		2000FPM(7.5M/S)
Maximum friction		0.83WG/100mrun(0.1inchper100 ft.)
Maximum velocity at supply air outlet		500FPM(2.54mps)

## AIR HANDLING UNIT & ITS COMPONENTS

Maximum velocity across pre-filter		152M/min
Maximum face velocity at cooling coil		152M/min
Maximumfanoutletvelocityforfansupto300 mm dia		550M/min
Maximum fan speed for fans above 300mm dia		1450RPM
Maximum fan speed for fans above 300mm dia		1000RPM
Maximum motor speed (Non O.R. Units)		1450RPM



Maximum motor Speed (O.R. Units)		2900RPM
----------------------------------	--	---------

#### CENTRIFUGAL FAN

Maximum outlet velocity for fans upto 450mm dia		550M/Min.
Maximum outlet velocity for fans above 450mm dia		700M/Min.
Maximum speed for fans upto 450mm dia		1450RPM
Maximum speed for fans above 450mm dia		1000RPM

#### AIR HANDLING UNITS (AHRI CERTIFIED)

The double skin Ceiling suspended Air Handling Units shall be provided with Centrifugal / plug fans & dx cooling coil section, filter sections, motor drive package etc. The Air Handling Units shall be of double skin construction with 23 mm thick PUF injected insulation. The detailing of the same shall be in tender specifications.

The AHU's sub-panels shall be located in AHU Room and in case of Ceiling Suspended AHU, the same shall be located in its vicinity preferably above the false ceiling. The four wall and the ceiling of the AHU/TFA Rooms shall be acoustically lined.

The TFA units shall be of double skin construction with 48 mm thick PUF injected insulation and having thermal break profile. The TFA unit shall be provided with energy recovery wheel to reduce fresh air load on ac system.

### 3. HEAT RECLAIM VENTILLATION

In order to achieve the purpose of better indoor air quality, the Heat Reclaim Ventilation (HRV) unit must exchange the heat between supplied fresh air and exhausted air in order to bring the outside air closer to indoor temperature and humidity conditions thus it must recover the thermal energy of exhaust air and reuse it for supplied fresh air .this must lead to ventilation without increasing the load and thus saving in running cost.

It shall be possible to interlock this HRV system with operation of HRV system to simplify installation and improving the efficiency of air-conditioning. It shall be possible to set automatic ventilation mode so that heat exchange mode and ventilation mode can be automatically selected to enhance energy conservation.

The casing of HRV units shall be made of galvanized steel plate insulation with self extinguishable polyurethane the must have air filters of multi directional fibrous filter.

The heat exchanger element must be design without any moving parts for higher durability and reliability, it should have high permeability high efficiency specially processed paper which is flame retardant and fungi proof to keep air clean.

The unit must be provided with built in multidirectional fibrous filter.

The unit must have optimized design of fan and air flow passage to make it compact and supply air & exhaust air passage must be arranged in such pattern so that to prevent mixing of supply (fresh) and exhaust air.

The unit must be suitable for single phase power supply and have their control panel.

#### **4. AIR DISTRIBUTION SYSTEM**

The conditioned air and the exhaust air shall be travelling through GSS ducting. The ducting shall be of galvanized steel sheet Class VIII (120 gr./m<sup>2</sup> Zinc coating) The ducts shall be insulated.

The conditioned supply air for Air Handling Units shall be distributed in the building through square chutes and Suitable Aluminium Grills & Diffusers. The return air shall be taken through plenum/space above false ceiling via. suitable aluminum grilles & Diffusers. The location and type of diffusers grills shall be as suitable and coordinated with the reflected ceiling plan.

#### **5. ACOUSTIC**

The Acoustic lining of Ducting shall be done with Open Cell Nitrile Rubber acoustic material of suitable thick and wrapping method.

#### **6. DUCT INSULATION**

Closed Cell Elastomeric Nitrile / Crosslinked polyethylene foam Class 0 with aluminium foil facing shall be used. The thickness for the duct insulation in A/C space and R.A. Duct shall be 9 mm and same in Non A.C. Space shall be 13 mm thick.

The duct exposed to atmosphere shall be insulated with 19mm thick above insulation material with two layers of 500G virgin white polythene and then covered with 26G aluminium sheet.

The duct exposed to atmosphere shall have 50mm thick Expanded Polystyrene.

**Note:-The Mechanical Ventilation shall be as per National Building Code**

# **Design Basis Report (DBR) for Furniture**

**Model: Arena Multipurpose Hall Chair**

**FUNCTIONAL SPECIFICATION**

A Tip –up seat which is noise free with spring loaded auto tip up seat movement.

**TECHNICAL SPECIFICATION Structure:**

- Stand – to be 200 x 75 x 6mm M.S Flat welded to 38 x38 x 2mm with CRCA – Tube – 22” long further supported to 38 x 38 x 2mm – Tube – 11” long. Tip – Up movement supported by 200 x 75 x 6mm M.S Flat with M.S Twin support 12mm in Dia. Seat Bracket to be 12 x 25 x 100mm M.S Flat welded to a plate of 80 x 100 x 3mm. Back Bracket to be 200 x 70 x 70mm by 1.6mm CRCA sheet with 2 longitudinal holes for bolting.➤ Seat Shell - 540 x 580 x 2.65mm ABS virgin plastic in sheet form duly embossed & manufactured by vacuum forming process.➤ Seat – 19mm plywood 440 x 490 x 19 mm, with polyurethane foam of size 440 x 490 mm having density of  $50 \pm 5 \text{ kg/m}^3$ . All bolts to be received by Dash nuts CNC milled threaded and nailed of size – 20 x 10mm.➤ Back Shell: 540 x 780 x 2.65mm shell duly embossed bent and formed by ABS.➤ Back: 15 mm bent plywood with PU foam – 470 x 730, top of back to be 90 mm, tapering to 110 and then to 120 mm.➤ Side Panels – All side panels to be of 12mm plywood covered with fabric and fused with foam, side panel to cover all metal parts.➤ Arm rest - Wooden Handles / Black PU To be of size 425 x 25 x 55 / 70 mm depending on the ctc of the chair.➤ Spring for tip-up movement: Spring for seat auto tip-up torsion (Confirming to grade 2) tested for 5,000 cycles, to be used for tip-up movement. • In-house Capabilities – PU Injection/CNC cutting/Laser Cutting/Vacuum forming of plastic/ 7 Tank powder coating/Conveyor assembly/Robotic welding /Circular grinding saw with wide belt grinding/Sanding/Polishing.
  - Testing – Having equipment for measuring thickness/Densities.
  - Powder coating: to be by hoist and crane system followed by degreasing / de rusting / Activation followed by 7 Tank powder coating process.
  - Option of FR coated fabric passing test BS-EN-1021:1&2 / BS 5852 Part 1.
  - Polyurethane foam: Seat Density :  $50 \pm 5 \text{ kg/m}^3$  Backrest density :  $48 \pm 5 \text{ kg/m}^3$  No Property Unit Specification Test Method Seat Back 1 Apparent  $\text{Kg/m}^3$   $50 \pm 5$   $48 \pm 5$  ISO 845- 1988 Density (Core Density) 2 IFD @25%  $\text{Kg/314 15-18 11 - 14}$  ISO 2349 -  $\text{cm}^2$  1997 IFD @40%  $\text{Kg/315 21 - 24}$
- The Seller / Company should be ISO 9001:2015, ISO-14001:2015, ISO-37001:2016, OHSAS 18001:2007, ISO-45001:2018, ISO-50001:2018, GRIHA, GREENPRO, GREEN GUARD, INDIAN DESIGN MARK, AIOTA, FSC, BIFMA Level- 1 certified. The Bidder should also be a member of BIFMA and One or more products of the OEM should be certified as BIFMA COMPLAINT as well as BIFMA LEVEL-1 certified and an official product link/screenshot of the product listing's must be provided from [www.bifma.org](http://www.bifma.org)
- all complete as per specifications and direction of Engineer-in-Charge.

S. No.	Description	Quantity	Reference Picture
1	Arena Multipurpose Hall Chair Tip –up seat which is noise free with spring loaded auto tip up seat movement	500	 [Without Tablet]

**END OF VOLUME-IV**

## Annexure-1

### Schedule of point

**Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

#### Name of Building- Admin Block

S.No	Location	5A Plug Point On Board	5A Plug Point Separate 2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	Occupancy Sensor	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b><u>GROUND FLOOR</u></b>																			
1	Entrance														2					
2	Double Height Entrance lobby		4		4									8		1		4		
3	Corridor		6		6				75											
4	Staircase-1								2											
5	Staircase-2								2											
6	Staircase-3								2											
7	Lift Lobby-1				1							1								
8	Lift Lobby-2				1							1								
9	Liftwell-1				1					1										
10	Liftwell-2				1					1										
11	Lift lobby				2				10											
12	Lift Well-1				1					1										
13	Lift Well-2				1					1										
14	Toilet Male & DWF		4		4		6	3								1				
15	Toilet Female & Handicap Toi.		3		3		7	6								1				
16	Waiting Lounge		4	1	2								6			1	4			
17	Registrar+Waiting+Secretry			1	3	6							10			3	6			2

18	Ante Room + Confidential Room		4	1	1	3		1	1	0				4			2	4			1
19	Conference Room		4		34	10		1	1			3	0	12			2	10			
20	Reception+Jr Assistant+Steno		3		3	3				1		4	2	0			3	2	1		3
21	Security office		3		1	2		1	1	1			4				1	2			1
22	Ass. Registrar		3		1	2		1	1	1			4				1	2			1
23	Deputy Registrar		3		1	2		1	1	1			4				1	2			1
24	Student Greivence		34		34	8								18			2	12			
25	Canteen + Kitchen		8			8								15			2	9			
26	Staff Office		24		24	6								15			1	12			2
27	Staff office + Steno + Jr Ass.		18		18	4								13			1	8			2
28	Office Area		11		11	7						2		11				6			3
	<b>Total-A</b>	<b>0</b>	<b>136</b>	<b>3</b>	<b>131</b>	<b>88</b>	<b>0</b>	<b>18</b>	<b>14</b>	<b>95</b>	<b>4</b>	<b>9</b>	<b>16</b>	<b>104</b>	<b>8</b>	<b>2</b>	<b>23</b>	<b>79</b>	<b>5</b>	<b>0</b>	<b>16</b>
	<b><u>FIRST FLOOR</u></b>																				
1	Corridor		6			7				75				2				1			
2	Staircase-1									2											
3	Staircase-2									2											
4	Staircase-3									2											
5	Lift Lobby-1					1							1								
6	Lift Lobby-2					1							1								
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Lift lobby					2				10											
10	Lift Well-1					1					1										
11	Lift Well-2					1					1										
12	Toilet Male & DWF		4			4		6	3								1				
13	Toilet Female & Handicap Toi.		3			3		7	6								1				
14	Staff Office		24		24	6								15			1	12			2
15	Staff office		16		16	2								9			1	7			2
16	Staff office		16		16	2								9			1	7			2
17	VC + Meeting Room		5	1	14	7				2		3	15	2			3	11			3
18	Ante Room + Confidential Room		4	1	1	3				1				4			2	2			1
19	Waiting Area		4	1		4								6			1	4			
20	Dean Office		4	1	2	4		1	1			2	0	7			1	5			1

21	Dean Office		4	1	2	4		1	1				1	8			1	5			1
22	Dean Office		4	1	2	4		1	1				1	8			1	5			1
23	Account office		3		1	2		1	1	1			4				1	2			1
24	Acc Account office + Cashier Waiting		6		2	4		1	1	1			6	2			2	4			2
25	Record Room					1						2					0				
26	Directors Office Area		22		16	11						4	2	19				14			3
	<b>Total-B</b>	<b>0</b>	<b>125</b>	<b>6</b>	<b>96</b>	<b>76</b>	<b>0</b>	<b>18</b>	<b>14</b>	<b>96</b>	<b>4</b>	<b>11</b>	<b>31</b>	<b>91</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>79</b>	<b>0</b>	<b>0</b>	<b>19</b>
	<b><u>SECOND FLOOR</u></b>																				
1	Corridor		6			7				75				2				1			
2	Staircase-1									2											
3	Staircase-2									2											
4	Staircase-3									2											
5	Lift Lobby-1					1							1								
6	Lift Lobby-2					1							1								
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Lift lobby					2							9								
10	Lift Well-1					1					1										
11	Lift Well-2					1					1										
12	Toilet Male & DWF		4			4		6	3								1				
13	Toilet Female & Handicap Toi.		3			3		7	6								1				
14	Copy Rechecking Section		6		6	4								12			1	8			2
15	Fresh Copy Storage					2						12						4			
16	Office Area		10		8	10						4	3	8				5			3
17	Record Room					4						9						6			
19	Deputy Registrar		2		1	2		1	1					4			1	2			1
20	Ass. Registrar		2		1	2		1	1					4			1	2			1
21	Security Officer		2		1	2		1	1					4			1	2			1
22	Deputy Registrar		2		1	2		1	1					4			1	2			1
23	Ass. Registrar		2		1	2		1	1					4			1	2			1
24	Security Officer		2		1	2		1	1					4			1	2			1



25	VIP Lounge					4								16			1	10	2		1
26	Jr Assistant		1		1	1								2			1	1			1
27	Steno		1		1	1								2			1	1			1
28	Jr Assistant		1		1	1								2			1	1			1
29	Steno		1		1	1								2			1	1			1
30	Exam Controller Officer		8		6	6						2	4	9				7			3
31	Exam Controller Officer		8		6	6						2	4	9				7			3
	Total-C	0	61	0	36	74	0	19	15	81	4	29	22	88	0	0	14	64	2	0	22
	THIRD FLOOR																				
1	Corridor		6			7				75				2				1			
2	Staircase-1									2											
3	Staircase-2									2											
4	Staircase-3									2											
5	Lift Lobby-1					1							1								
6	Lift Lobby-2					1							1								
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Lift lobby					2				10											
10	Lift Well-1					1					1										
11	Lift Well-2					1					1										
12	Toilet Male & DWF		4			4		6	3								1				
13	Toilet Female & Handicap Toi.		3			3		7	6								1				
14	Waiting					4								9			1	6			1
15	Officers Room		2		1	2		1	1					4			1	2			1
16	Officers Room		2		1	2		1	1					4			1	2			1
17	Officers Room		2		1	2		1	1					4			1	2			1
18	Officers Room		2		1	2		1	1					3			1	2			1
19	Officers Room		2		1	2		1	1					3			1	2			1
20	Student Welfare Dept. Office		4	1	3	4		1	1					10			2	4			4
21	Office		24		24	8						2		18			2	11			3
22	Medical Officer		3	1	3	3		1	1			0		7			2	4			3
23	Office		11		11	6						2		12			2	11			3
24	Medical Officer		3	1	3	3		1	1			0		7			2	4			3
25	Office		11		11	6						2		12			2	11			3

26	Conference Room		6		15	6		1	1			2		12				8			
	<b>Total-D</b>	<b>0</b>	<b>85</b>	<b>3</b>	<b>75</b>	<b>72</b>	<b>0</b>	<b>22</b>	<b>18</b>	<b>91</b>	<b>4</b>	<b>8</b>	<b>2</b>	<b>107</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>70</b>	<b>0</b>	<b>0</b>	<b>25</b>
	<b><u>TERRACE FLOOR</u></b>																				
1	Staircase-1									2											
2	Staircase-2									2											
3	Staircase-3									2											
4	Lift Lobby-1					1							1								
5	Lift Lobby-2					1							1								
6	Liftwell-1					1					1										
7	Liftwell-2					1					1										
8	Lift lobby					2							9								
9	Lift Well-1					1					1										
10	Lift Well-2					1					1										
14	Terrace										8					8					
	<b>Total-F</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>12</b>	<b>0</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b>Grand Total</b>	<b>0</b>	<b>407</b>	<b>12</b>	<b>338</b>	<b>318</b>	<b>0</b>	<b>77</b>	<b>61</b>	<b>369</b>	<b>28</b>	<b>57</b>	<b>82</b>	<b>390</b>	<b>8</b>	<b>10</b>	<b>74</b>	<b>292</b>	<b>7</b>	<b>0</b>	<b>82</b>
	<b>Load Per Unit</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>200</b>	<b>1000</b>	<b>1280</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>22</b>	<b>36</b>	<b>36</b>	<b>50</b>	<b>50</b>	<b>10</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>50</b>
	<b>Total Load</b>	<b>0</b>	<b>40700</b>	<b>2400</b>	<b>67600</b>	<b>318000</b>	<b>0</b>	<b>616</b>	<b>732</b>	<b>5535</b>	<b>280</b>	<b>1254</b>	<b>2952</b>	<b>14040</b>	<b>400</b>	<b>500</b>	<b>740</b>	<b>####</b>	<b>245</b>	<b>0</b>	<b>4100</b>

IN W 470,314.00

IN KW 470.31

A. Light + Fan Load : 109.21 KW

Consider Diversity Factor @ 80% 87.37 KW

Load (in Amps) :  $P = \frac{\sqrt{3} \times V \times I \times \cos\Phi}{1000}$  145.63 Amp.

B.	<u>Plug &amp; Power Plug Load:</u>		361.10 KW
	<u>Consider Diversity Factor @ 50%</u>		180.55 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	300.93 Amp.
C.	<u>HVAC Load (As Per Annexure):</u>		474.00 KW
	<u>Consider Diversity Factor @ 100%</u>		474.00 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	790.05 Amp.
D.	<u>Elevator Load :</u>		30.00 KW
	<u>Consider Diversity Factor @ 80%</u>		24.00 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	40.00 Amp.
	<u>Total Load (In kW) :</u>		765.92 KW
	<u>Total Load (In kVA) :</u>		957.40 KVA

<u>UPS Selection Sheet Admin Blocks</u>				
SL. NO.	DESCRIPTIONS	CONNECTED LOAD (kW)	DEMAND FACTOR	DEMAND LOAD (kW)
1	TOTAL DEMAND LOAD FOR 400 LIGHT POINT @ 36W EACH	14.40	0.80	11.52
2	UPS POINT LOAD FOR 338 COMPUTER POINTS @ 200W EACH	67.60	0.80	54.08
3	SERVER ROOM LOAD	30.00	0.80	24.00
	<b>TOTAL</b>			<b>89.60</b>

MAX. DEMAND LOAD	-	89.60 kW
Consider overall diversity as 100%		89.60
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	89.60 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>112.00 kVA</b>
<b>SAY</b>	-	<b>112.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>3 x 40 KVA</b>

# L+P+HVAC Load Sheet

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

Name of Building- Academic Block

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	22W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	Occupancy Sensor	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b>GROUND FLOOR</b>																				
1	Entrance									3											
2	Double Height Entrance lobby		6	1	3	8							0	0	14		2	0	7		
3	Corridor					6				72											
4	Lobby					1				4											
5	Center Staircase									4											
6	Lift Lobby					1							2				1				
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Liftwell-3					1					1										
10	Side Staircase-1									4											
11	Side Lift Lobby-1												2				1				
12	Liftwell-1					1					1										
13	Liftwell-2					1					1										
14	Side Staircase-2									4											
15	Side Lift Lobby-2												2				1				
16	Liftwell-1					1					1										
17	Liftwell-2					1					1										
18	Toilet Male					2		10	7								1				
19	Toilet Female					2		10	7								1				
20	Handicap Toilet					1		1	1								1				
21	Single Toilet					1		1	1								1				

22	Toilet Male				2		10	3								1					
23	Toilet Female				2		10	7								1					
24	Handicap Toilet				1		1	1								1					
25	DWH		3		3				1							1					
26	Ass. Prof Room		4		4	5		1	1				5			1	3		1	4	
27	Staff Office		9		9	5							6			1	4		1		
28	Professor		2	1	1	2		1	1				4			1	2		1	1	
29	Associate Professor		2	1	1	2		1	1				4			1	2		1	1	
30	Associate Professor		2	1	1	2		1	1				4			1	2		1	1	
31	Research Scholar Room		10		10	4							10			1	8				
32	Class Room 10.5x7m		5		1	5						1		8		1	6				
33	Class Room 10.5x7m		5		1	5						1		8		1	6				
34	Class Room 6x6m		3		1	3						1		6		1	4				
35	Class Room 6x6m		3		1	3						1		6		1	4				
36	Lab-1		24		2	5						1	16	8		1	12				
37	Lab-2		24		2	5						1	16	8		1	12				
38	Lab-3		24		2	5						1	16	8		1	12				
39	Lecture Theatre		5		2	5						2			16		1	12			
40	Examination Hall		5		2	5						2		27			2	24			
41	Seminar Hall		5		2	5						2		27			2	24			
	Total-A	0	141	4	45	103	0	47	31	92	7	13	87	106	30	0	31	137	7	5	7
	<u>FIRST FLOOR</u>																				
1	Corridor				6					55											
2	Lobby				1					4											
3	Center Staircase									4											
4	Lift Lobby				1								2			1					
5	Liftwell-1				1						1										
6	Liftwell-2				1						1										
7	Liftwell-3				1						1										
8	Side Staircase-1									4											
9	Side Lift Lobby-1												2			1					
10	Liftwell-1				1						1										
11	Liftwell-2				1						1										
12	Side Staircase-2									4											
13	Side Lift Lobby-2												2			1					

14	Liftwell-1					1					1										
15	Liftwell-2					1					1										
16	Toilet Male					2		10	3								1				
17	Toilet Female					2		10	7								1				
18	Handicap Toilet					1		1	1								1				
19	Single Toilet					1		1	1								1				
20	Toilet Male					2		10	3								1				
21	Toilet Female					2		10	7								1				
22	Handicap Toilet					1		1	1								1				
23	DWH		3			3				1							1				
24	Ass. Prof Room		4		4	5		1	1				5				1	3		1	4
25	Staff Office		9		9	5							6				1	4		1	
26	Professor		2	1	1	2		1	1				4				1	2		1	1
27	Associate Professor		2	1	1	2		1	1				4				1	2		1	1
28	Associate Professor		2	1	1	2		1	1				4				1	2		1	1
29	Research Scholar Room		10		10	4							10				1	8			
30	Class Room 10.5x7m		5		1	5						1		8			1	6			
31	Class Room 10.5x7m		5		1	5						1		8			1	6			
32	Class Room 6x6m		3		1	3						1		6			1	4			
33	Class Room 6x6m		3		1	3						1		6			1	4			
34	Lab-1		24		2	5						1	16	8			1	12			
35	Lab-2		24		2	5						1	16	8			1	12			
36	Lab-3		24		2	5						1	16	8			1	12			
	Total-B	0	120	3	36	80	0	47	27	72	7	7	87	52	0	0	24	77	0	5	7
	<u>SECOND FLOOR</u>																				
1	Corridor					6					55										
2	Lobby					1					4										
3	Center Staircase										4										
4	Lift Lobby					1							2				1				
5	Liftwell-1					1						1									
6	Liftwell-2					1						1									
7	Liftwell-3					1						1									
8	Side Staircase-1										4										
9	Side Lift Lobby-1												2				1				

[illegible]





5	Liftwell-3					1					1										
6	Side Staircase-1									4											
7	Side Lift Lobby-1												2				1				
8	Liftwell-1					1					1										
9	Liftwell-2					1					1										
10	Side Staircase-2									4											
11	Side Lift Lobby-2												2				1				
12	Liftwell-1					1					1										
13	Liftwell-2					1					1										
14	Terrace										8					8					
	Total-E	0	0	0	0	8	0	0	0	12	15	0	6	0	0	8	3	0	0	0	0
	Grand Total	0	506	13	155	356	0	188	112	320	43	36	354	262	46	8	107	380	7	20	28
	Load Per Unit	100	100	200	200	1000	1280	8	12	15	10	22	36	36	50	50	10	35	35	35	50
	Total Load	0	50600	2600	31000	356000	0	1504	1344	4800	430	792	12744	9432	2300	400	1070	13300	245	700	1400

IN W 490,661.00

IN KW 490.66

A. Light + Fan Load : 81.46 KW

Consider Diversity Factor @ 80% 65.17 KW

Load (in Amps) : 
$$\frac{P = \sqrt{3VICO_s}}{\Phi}$$
 108.62 Amp.

B. Plug & Power Plug Load: 409.20 KW

Consider Diversity Factor @ 50% 204.60 KW 81.84

Load (in Amps) : 
$$\frac{P = \sqrt{3VICO_s}}{\Phi}$$
 341.02 Amp.

C.	<u>HVAC Load (As Per Annexure):</u>	634.00 KW
	<u>Consider Diversity Factor @ 100%</u>	634.00 KW
	<div> <div> <u>Load (in Amps) :</u> </div> <div> <math display="block">\frac{P = \sqrt{3V\sqrt{I^2 \cos^2 \phi}}}{\phi}</math> </div> </div>	1,056.73 Amp.
D.	<u>Elevator Load :</u>	52.50 KW
	<u>Consider Diversity Factor @ 80%</u>	42.00 KW
	<div> <div> <u>Load (in Amps) :</u> </div> <div> <math display="block">\frac{P = \sqrt{3V\sqrt{I^2 \cos^2 \phi}}}{\phi}</math> </div> </div>	70.00 Amp.
	<u>Total Load (In kW) :</u>	945.77 KW
	<u>Total Load (In kVA) :</u>	1,182.21 KVA

<u>UPS Selection Sheet Academic Blocks</u>				
SL. NO.	DESCRIPTIONS	CONNECTED LOAD (kW)	DEMAND FACTOR	DEMAND LOAD (kW)
1	TOTAL DEMAND LOAD FOR 500 LIGHT POINT @ 36W EACH	18.00	0.80	14.40
2	UPS POINT LOAD FOR 155 COMPUTER POINTS @ 200W EACH	31.00	0.80	24.80
3	SERVER ROOM LOAD	20.00	0.80	16.00
	<b>TOTAL</b>			<b>55.20</b>

MAX. DEMAND LOAD	-	55.20 kW
Consider overall diversity as 100%		55.20
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	55.20 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>69.00 kVA</b>
<b>SAY</b>	-	<b>69.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>2 x 40 KVA</b>

### Schedule of point

## Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

## Name of Building- Library Block

[illegible]

[illegible]

	Total-E	0	0	0	0	2	0	0	0	2	6	0	0	0	0	8	0	0	0	0	0
	Grand Total	0	15	1	235	138	0	31	22	73	12	11	17	237	0	16	24	195	4	0	2
	Load Per Unit	100	100	200	200	1000	1280	8	12	15	10	22	36	36	50	50	10	35	35	35	50
	Total Load	0	1500	200	47000	138000	0	248	264	1095	120	242	612	8532	0	800	240	6825	140	0	100

IN W 205,918.00

IN KW 205.92

A. Light + Fan Load : 66.22 KW

Consider Diversity Factor @ 80% 52.97 KW

Load (in Amps) :  $\frac{P = \sqrt{3}VIC}{\cos\Phi}$  88.30 Amp.

B. Plug & Power Plug Load: 139.70 KW

Consider Diversity Factor @ 50% 69.85 KW

Load (in Amps) :  $\frac{P = \sqrt{3}VIC}{\cos\Phi}$  116.42 Amp.

C. HVAC Load (As Per Annexure): 342.00 KW

Consider Diversity Factor @ 100% 342.00 KW

Load (in Amps) :  $\frac{P = \sqrt{3}VIC}{\cos\Phi}$  570.03 Amp.

D. Elevator Load : 15.00 KW

**Consider Diversity Factor @ 80%**

**12.00 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**20.00 Amp.**

**Total Load (In kW) :**

**476.82 KW**

**Total Load (In kVA) :**

**596.03 KVA**



<u>UPS Selection Sheet Library</u>				
SL. NO.	DESCRIPTIONS	CONNECTED LOAD (kW)	DEMAND FACTOR	DEMAND LOAD (kW)
1	TOTAL DEMAND LOAD FOR 150 LIGHT POINT @ 36W EACH	5.40	0.80	4.32
2	UPS POINT LOAD FOR 235 COMPUTER POINTS @ 200W EACH	47.00	0.80	37.60
3	SERVER ROOM LOAD	15.00	0.80	12.00
	<b>TOTAL</b>			<b>53.92</b>

MAX. DEMAND LOAD	-	53.92 kW
Consider overall diversity as 100%		53.92
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	53.92 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>67.40 kVA</b>
<b>SAY</b>	-	<b>67.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>2 x 40 KVA</b>

# L+P+HVAC Load Sheet

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

Name of Building- Auditorium Block

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	Auditorium Light With DALI Driver	Step Light	Occupancy Sensor	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
A	Ground Floor		39		20	50		32	20	98		10	73	55			58			
B	Terrace Floor	0	0	0	0	0	0	0	0	10	16	0	0	0	0	0	0	0	0	0
	Grand Total	0	39	0	20	50	0	32	20	108	16	10	73	55	0	0	58	0	0	0
	Load Per Unit	100	100	200	200	1000	1280	8	12	15	10	22	36	33	2	10	35	35	35	50
	Total Load	0	3900	0	4000	50000	0	256	240	1620	160	220	2628	1815	0	0	2030	0	0	0

IN W 66,869.00

IN KW 66.87

A. Light + Fan Load : 12.97 KW

Consider Diversity Factor @ 80% 10.38 KW

Load (in Amps) : 
$$\frac{P = \sqrt{3} V I \cos \Phi}{3 V I \cos \Phi}$$
 17.29 Amp.

B. Plug & Power Plug Load: 53.90 KW

Consider Diversity Factor @ 60% 32.34 KW 12.94

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VICO_s}}{\Phi}$	53.90 Amp.
-------------------------	-----------------------------------	------------

C.	<u>HVAC Load (As Per Annexure):</u>	304.00 KW
	<u>Consider Diversity Factor @ 80%</u>	273.60 KW

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VICO_s}}{\Phi}$	456.03 Amp.
-------------------------	-----------------------------------	-------------

D.	<u>Light &amp; Sound Load</u>	150.00 KW
	<u>Consider Diversity Factor @ 80%</u>	135.00 KW

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VICO_s}}{\Phi}$	225.01 Amp.
-------------------------	-----------------------------------	-------------

<u>Total Load (In kW) :</u>	451.32 KW
-----------------------------	-----------

<u>Total Load (In kVA) :</u>	564.14 KVA
------------------------------	------------

UPS Selection Sheet Auditorium Block				
SL. NO.	DESCRIPTIONS	CONNECTED LOAD (kW)	DEMAND FACTOR	DEMAND LOAD (kW)
1	TOTAL DEMAND LOAD FOR 250 LIGHT POINT @ 36W EACH	9.00	0.80	7.20
2	UPS POINT LOAD FOR 20 COMPUTER POINTS @ 200W EACH	4.00	0.80	3.20
3	AUDI SOUND SYSTEM & OTHER EQUIPMENT LAOD	100.00	0.80	80.00
	<b>TOTAL</b>			<b>90.40</b>

MAX. DEMAND LOAD	-	90.40 kW
Consider overall diversity as 100%		90.40
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	90.40 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>113.00 kVA</b>
<b>SAY</b>	-	<b>113.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>2 x 60 KVA</b>

### Schedule of point

## **Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

## Name of Building- Museum Block

[illegible]

	<b>TERRACE FLOOR</b>																				
1	Staircase-l									2											
2	Terrace										2					2					
	<b>Total-E</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b>Grand Total</b>	<b>0</b>	<b>56</b>	<b>2</b>	<b>39</b>	<b>55</b>	<b>0</b>	<b>12</b>	<b>10</b>	<b>48</b>	<b>2</b>	<b>4</b>	<b>74</b>	<b>3</b>	<b>0</b>	<b>12</b>	<b>8</b>	<b>46</b>	<b>0</b>	<b>0</b>	<b>1</b>
	<b>Load Per Unit</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>200</b>	<b>1000</b>	<b>1280</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>22</b>	<b>36</b>	<b>36</b>	<b>50</b>	<b>50</b>	<b>10</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>50</b>
	<b>Total Load</b>	<b>0</b>	<b>5600</b>	<b>400</b>	<b>7800</b>	<b>55000</b>	<b>0</b>	<b>96</b>	<b>120</b>	<b>720</b>	<b>20</b>	<b>88</b>	<b>2664</b>	<b>108</b>	<b>0</b>	<b>600</b>	<b>80</b>	<b>1610</b>	<b>0</b>	<b>0</b>	<b>50</b>

IN W 74,956.00

IN KW 74.96

A. Light + Fan Load : 13.96 KW

Consider Diversity Factor @ 80% 11.16 KW

Load (in Amps) : 
$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$
 18.61 Amp.

B. Plug & Power Plug Load: 61.00 KW

Consider Diversity Factor @ 50% 30.50 KW

Load (in Amps) : 
$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$
 50.84 Amp.

C. HVAC Load (As Per Annexure): 106.00 KW

Consider Diversity Factor @ 100% 106.00 KW

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**176.68 Amp.**

**D.**

**Elevator Load :**

**- KW**

**Consider Diversity Factor @ 80%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**Total Load (In kW) :**

**147.66 KW**

**Total Load (In kVA) :**

**184.58 KVA**

<u>UPS Selection Sheet Museum Blocks</u>				
SL. NO.	DESCRIPTIONS	CONNECTED LOAD (kW)	DEMAND FACTOR	DEMAND LOAD (kW)
1	TOTAL DEMAND LOAD FOR 50 LIGHT POINT @ 36W EACH	1.80	0.80	1.44
2	UPS POINT LOAD FOR 39 COMPUTER POINTS @ 200W EACH	7.80	0.80	6.24
3	SERVER ROOM LOAD	10.00	0.80	8.00
	<b>TOTAL</b>			<b>15.68</b>

MAX. DEMAND LOAD	-	15.68 kW
Consider overall diversity as 100%		15.68
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	15.68 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>19.60 kVA</b>
<b>SAY</b>	-	<b>20.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>1 x 20 KVA</b>



### Schedule of point

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

Name of Building- Health Center Block

S.No	Location	5A Plug Point On Board	5A Plug Point Separate from Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	Occupancy Sensor	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b>GROUND FLOOR</b>																			
1	Registration & Waiting Area		4	1	4	6							10			1	7			
2	Corridor					6			41											
3	Cabin 1&2		2		2	2							4				2			2
4	Consultant Room		1		1	1	1	1	1			4				1	2			1
5	Examination Room		1		1	1						4				1	2			1
6	Consultant Room		1		1	1	1	1	1			4				1	2			1
7	Toilet Male & Handicap					1	4	4	2							1				
8	Toilet Female					1	4	3	1							1				
9	Staircase-1								2											
10	Lobby					1						2					1			
12	X-Ray & Change Room		4		2	4					1	4					1			
13	Ultrasound & Console Room		4		2	4			2			4	2				1			
14	Changing Area					2			8											
15	OT Area		8		8	8						8								
16	Recovery Room		2		2	2					3	4					3			
17	General Ward & Toilet		6		6	6	7	4			3	6					5			

18	Dr Duty		2		1	2		1	1	1			4				1	2			1
19	Nurse Duty		2		1	2		1	1	1			4				1	2			1
	Total-A	0	37	1	31	50	0	19	15	60	0	7	48	16	0	0	8	30	0	0	7
	<u>TERRACE FLOOR</u>																				
1	Staircase-1									2											
9	Terrace										2					2					
	Total-E	0	0	0	0	0	0	0	0	2	2	0	0	0	0	2	0	0	0	0	0
	Grand Total	0	37	1	31	50	0	19	15	62	2	7	48	16	0	2	8	30	0	0	7
	Load Per Unit	100	100	200	200	1000	1280	8	12	15	10	22	36	36	50	50	10	35	35	35	50
	Total Load	0	3700	200	6200	50000	0	152	180	930	20	154	1728	576	0	100	80	1050	0	0	350

IN W 65,420.00

IN KW 65.42

A. Light + Fan Load : 11.52 KW

Consider Diversity Factor @ 80% 9.22 KW

Load (in Amps) :  $P = \frac{\sqrt{3} \times V \times I \times \cos\phi}{1000}$  15.36 Amp.

B. Plug & Power Plug Load: 53.90 KW

Consider Diversity Factor @ 50% 26.95 KW

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	44.92 Amp.
-------------------------	------------------------------------	------------

C.	<u>HVAC Load (As Per Annexure):</u>	52.00 KW
----	-------------------------------------	----------

	<u>Consider Diversity Factor @</u>	52.00 KW
--	------------------------------------	----------

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	86.67 Amp.
-------------------------	------------------------------------	------------

D.	<u>Elevator Load :</u>	- KW
----	------------------------	------

	<u>Consider Diversity Factor @ 80%</u>	- KW
--	--	------

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	- Amp.
-------------------------	------------------------------------	--------

<u>Total Load (In kW) :</u>	88.17 KW
-----------------------------	----------

<u>Total Load (In kVA) :</u>	110.21 KVA
------------------------------	------------

<u>UPS Selection Sheet Health Center Blocks</u>				
SL. NO.	DESCRIPTIONS	CONNECTED LOAD (kW)	DEMAND FACTOR	DEMAND LOAD (kW)
1	TOTAL DEMAND LOAD FOR 50 LIGHT POINT @ 36W EACH	1.80	0.80	1.44
2	UPS POINT LOAD FOR 31 COMPUTER POINTS @ 200W EACH	6.20	0.80	4.96
3	SERVER ROOM LOAD	10.00	0.80	8.00
	<b>TOTAL</b>			<b>14.40</b>

MAX. DEMAND LOAD	-	14.40 kW
Consider overall diversity as 100%		14.40
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	14.40 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>18.00 kVA</b>
<b>SAY</b>	-	<b>18.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>1 x 20 KVA</b>

### Schedule of point

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

Name of Building- Guest House Block

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	Occupancy Sensor	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b>GROUND FLOOR</b>																				
1	Reception		4		3	4								15				12			
2	Corridor					8				58											
3	Staircase					1				2			1								
4	Staircase					1				2			1								
5	Side Staircase-1									2											
6	Side Staircase-2									2											
7	Side Staircase-3									3											
8	Side Staircase-4									3											
9	Electrical Room					2						2									
10	Kitchen					8						6									
11	Dinning Area		8			4								15			1	11			
12	Cook Room		1			1	1	1	1			3						1			
13	Cook Room		1			1	1	1	1			3						1			
14	Single Room-1	1	4	1		2	1	1	1	4								2			1
15	Single Room-2	1	4	1		2	1	1	1	4								2			1
16	Single Room-3	1	4	1		2	1	1	1	4								2			1
17	Single Room-4	1	4	1		2	1	1	1	4								2			1
18	Single Room-5	1	4	1		2	1	1	1	4								2			1
19	Single Room-6	1	4	1		2	1	1	1	4								2			1
20	Single Room-7	1	4	1		2	1	1	1	4								2			1

21	Single Room-8	1	4	1		2	1	1	1	4								2			1
22	Single Room-9	1	4	1		2	1	1	1	4								2			1
23	Room With Living-1	2	6	2		5	1	1	1	10								4			1
24	Room With Living-2	2	6	2		5	1	1	1	10								4			1
25	Room With Living-3	2	6	2		5	1	1	1	10								4			1
26	Room With Living-4	2	6	2		5	1	1	1	10								4			1
27	Room With Living-5	2	6	2		5	1	1	1	10								4			1
28	Room With Living-6	2	6	2		5	1	1	1	10								4			1
	Total-A	21	86	21	3	78	17	17	17	168	0	14	2	30	0	0	1	67	0	0	15
	TERRACE FLOOR																				
1	Staircase					1				2		1									
2	Staircase					1				2		1									
5	Side Staircase-1									2											
6	Side Staircase-2									2											
7	Side Staircase-3									3											
8	Side Staircase-4									3											
11	Terrace										6					6					
	Total-E	0	0	0	0	2	0	0	0	14	6	2	0	0	0	6	0	0	0	0	0
	Grand Total	21	86	21	3	80	17	17	17	182	6	16	2	30	0	6	1	67	0	0	15
	Load Per Unit	100	100	200	200	1000	2000	8	12	15	10	22	36	36	50	50	10	35	35	35	50
	Total Load	2100	8600	4200	600	80000	34000	136	204	2730	60	352	72	1080	0	300	10	2345	0	0	750

IN W      137,539.00

IN KW      137.54

A.      Light + Fan Load :      8.64 KW

Consider Diversity Factor @ 80%      6.91 KW

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**11.52 Amp.**

**B. Plug & Power Plug Load:**

**128.90 KW**

**Consider Diversity Factor @ 50%**

**38.67 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**64.45 Amp.**

**C. HVAC Load (As Per Annexure):**

**- KW**

**Consider Diversity Factor @ 100%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**D. Elevator Load :**

**KW**

**Consider Diversity Factor @ 80%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**Total Load (In kW) :**

**45.58 KW**

**Total Load (In kVA) :**

**56.98 KVA**

### Schedule of point

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

Name of Building- Diploma Boys Hostel Block

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	Occupancy Sensor	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b>GROUND FLOOR</b>																				
1	Entrance Lobby		5		1	2									6				4		
2	Corridor		2			3				15											
3	Staircase-1									3											
4	Liftwell-1					1					1										
5	Staircase-2									3											
6	Liftwell-2					1					1										
7	Central Staircase & Lift Lobby					1				6											
8	Liftwell-3					1					1										
9	Liftwell-4					1					1										
10	Common Toilet-1					1	2	8	3											3	
11	Common Toilet-2					1	2	8	3											3	
12	Room-1	1	3		3	1				1		4						2			
13	Room-2	1	3		3	1				1		4						2			
14	Room-3	1	3		3	1				1		4						2			
15	Room-4	1	3		3	1				1		4						2			
16	Room-5	1	3		3	1				1		4						2			
17	Handicap Room	1	2		2	1		1	1	1		4						2			
18	Warden office	1	2	1	1	1	2			1		3						1			1
19	Visitors Room	1	2			1	2			1		4						2			1
20	Dinning Hall		4			4						20						15			





8	Liftwell-4					1					1										
9	Common Toilet-1					1	2	8	3											3	
10	Common Toilet-2					1	2	8	3											3	
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
	Total-C	10	32	0	30	20	4	16	6	37	4	40	0	0	0	0	0	20	0	6	0
	<u>TERRACE FLOOR</u>																				
1	Staircase-1									2											
2	Staircase-2									2											
3	Central Staircase & Lift Lobby					1				6											
4	Liftwell-1					1					1										
5	Liftwell-2					1					1										
6	Terrace										8					8					
	Total-E	0	0	0	0	3	0	0	0	10	10	0	0	0	0	8	0	0	0	0	0
	Grand Total	26	101	1	73	76	22	49	19	117	22	159	0	0	6	8	0	81	4	18	2
	Load Per Unit	100	100	200	200	1000	1280	8	12	15	10	22	36	36	50	50	10	35	35	35	50
	Total Load	2600	10100	200	14600	76000	28160	392	228	1755	220	3498	0	0	300	400	0	2835	140	630	100

IN W 142,158.00

IN KW 142.16

A. Light + Fan Load : 25.10 KW

Consider Diversity Factor @ 80% 20.08 KW

**Load (in Amps) :** 
$$\frac{P = \sqrt{3VIC}}{\cos\Phi}$$
 **33.47 Amp.**

**B. Plug & Power Plug Load:** **117.06 KW**

**Consider Diversity Factor @ 50%** **58.53 KW**

**Load (in Amps) :** 
$$\frac{P = \sqrt{3VIC}}{\cos\Phi}$$
 **97.56 Amp.**

**C. HVAC Load (As Per Annexure):** **- KW**

**Consider Diversity Factor @ 100%** **- KW**

**Load (in Amps) :** 
$$\frac{P = \sqrt{3VIC}}{\cos\Phi}$$
 **- Amp.**

**D. Elevator Load :** **30.00 KW**

**Consider Diversity Factor @ 80%** **24.00 KW**

**Load (in Amps) :** 
$$\frac{P = \sqrt{3VIC}}{\cos\Phi}$$
 **40.00 Amp.**

**Total Load (In kW) :** **102.61 KW**

**Total Load (In kVA) :** **128.26 KVA**

<b><u>UPS Selection Sheet Diploma Boys Blocks</u></b>				
<b>SL. NO.</b>	<b>DESCRIPTIONS</b>	<b>CONNECTED LOAD (kW)</b>	<b>DEMAND FACTOR</b>	<b>DEMAND LOAD (kW)</b>
<b>1</b>	<b>TOTAL DEMAND LOAD FOR 150 LIGHT POINT @ 20W EACH</b>	3.00	0.80	2.40
<b>2</b>	<b>UPS POINT LOAD FOR 73 COMPUTER POINTS @ 200W EACH</b>	14.60	0.80	11.68
<b>3</b>	<b>SERVER ROOM LOAD</b>	10.00	0.80	8.00
	<b>TOTAL</b>			<b>22.08</b>

MAX. DEMAND LOAD	-	22.08 kW
Consider overall diversity as 100%		22.08
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	22.08 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>27.60 kVA</b>
<b>SAY</b>	-	<b>28.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>1 x 30 KVA</b>

## **Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

[illegible]

	<b><u>FIRST FLOOR</u></b>																				
1	Corridor		4			6				34											
2	Staircase-1									2											
3	Staircase-2									2											
4	Central Staircase & Lift Lobby					1				4											
5	Liftwell-1					1					1										
6	Liftwell-2					1					1										
7	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
8	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
9	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
10	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
11	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
12	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
13	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
13	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
	<b>Total-B</b>	<b>16</b>	<b>12</b>	<b>0</b>	<b>16</b>	<b>25</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>66</b>	<b>2</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>16</b>
	<b><u>SECOND FLOOR</u></b>																				
1	Corridor		4			6				34											
2	Staircase-1									2											
3	Staircase-2									2											
4	Central Staircase & Lift Lobby					1				4											
5	Liftwell-1					1					1										
6	Liftwell-2					1					1										
7	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
8	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
9	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
10	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
11	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
12	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
13	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
14	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
15	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	

	<b>Total-C</b>	<b>18</b>	<b>13</b>	<b>0</b>	<b>18</b>	<b>27</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>69</b>	<b>2</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>18</b>
	<b><u>THIRD FLOOR</u></b>																				
<b>1</b>	Corridor		4			6				34											
<b>2</b>	Staircase-1									2											
<b>3</b>	Staircase-2									2											
<b>4</b>	Central Staircase & Lift Lobby					1				4											
<b>5</b>	Liftwell-1					1					1										
<b>6</b>	Liftwell-2					1					1										
<b>7</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
<b>8</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
<b>9</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
<b>10</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
<b>11</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
<b>12</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
<b>13</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
<b>14</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
<b>15</b>	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2			2
	<b>Total-D</b>	<b>18</b>	<b>13</b>	<b>0</b>	<b>18</b>	<b>27</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>69</b>	<b>2</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>18</b>
	<b><u>TERRACE FLOOR</u></b>																				
<b>1</b>	Staircase-1									2											
<b>2</b>	Staircase-2									2											
<b>3</b>	Central Staircase & Lift Lobby					1				6											
<b>4</b>	Liftwell-1					1					1										
<b>5</b>	Liftwell-2					1					1										
<b>6</b>	Terrace										8					8					
	<b>Total-E</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b>Grand Total</b>	<b>68</b>	<b>54</b>	<b>0</b>	<b>69</b>	<b>109</b>	<b>34</b>	<b>34</b>	<b>34</b>	<b>279</b>	<b>18</b>	<b>68</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>8</b>	<b>69</b>	<b>68</b>	<b>4</b>	<b>0</b>	<b>68</b>
	<b>Load Per Unit</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>200</b>	<b>1000</b>	<b>2000</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>22</b>	<b>36</b>	<b>36</b>	<b>50</b>	<b>50</b>	<b>9</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>50</b>
	<b>Total Load</b>	<b>6800</b>	<b>5400</b>	<b>0</b>	<b>13800</b>	<b>109000</b>	<b>68000</b>	<b>272</b>	<b>408</b>	<b>4185</b>	<b>180</b>	<b>1496</b>	<b>0</b>	<b>0</b>	<b>150</b>	<b>400</b>	<b>621</b>	<b>2380</b>	<b>140</b>	<b>0</b>	<b>3400</b>

IN W 216,632.00

IN KW      216.63

A.	<u>Light + Fan Load :</u>		27.43 KW
	<u>Consider Diversity Factor @ 80%</u>		21.95 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	36.58 Amp.
B.	<u>Plug &amp; Power Plug Load:</u>		189.20 KW
	<u>Consider Diversity Factor @ 50%</u>		94.60 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	157.68 Amp.
C.	<u>HVAC Load (As Per Annexure):</u>		- KW
	<u>Consider Diversity Factor @ 100%</u>		- KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	- Amp.
D.	<u>Elevator Load :</u>		15.00 KW
	<u>Consider Diversity Factor @ 80%</u>		12.00 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	20.00 Amp.
	<u>Total Load (In kW) :</u>		128.55 KW
	<u>Total Load (In kVA) :</u>		160.68 KVA



<b><u>UPS Selection Sheet Research Boys Blocks</u></b>				
<b>SL. NO.</b>	<b>DESCRIPTIONS</b>	<b>CONNECTED LOAD (kW)</b>	<b>DEMAND FACTOR</b>	<b>DEMAND LOAD (kW)</b>
<b>1</b>	<b>TOTAL DEMAND LOAD FOR 150 LIGHT POINT @ 20W EACH</b>	3.00	0.80	2.40
<b>2</b>	<b>UPS POINT LOAD FOR 69 COMPUTER POINTS @ 200W EACH</b>	13.80	0.80	11.04
<b>3</b>	<b>SERVER ROOM LOAD</b>	10.00	0.80	8.00
	<b>TOTAL</b>			<b>21.44</b>

MAX. DEMAND LOAD	-	21.44 kW
Consider overall diversity as 100%		21.44
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	21.44 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>26.80 kVA</b>
<b>SAY</b>	-	<b>27.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>1 x 30 KVA</b>

## **Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

[illegible]

	<b><u>FIRST FLOOR</u></b>																				
1	Corridor		4			6				34											
2	Staircase-1									2											
3	Staircase-2									2											
4	Central Staircase & Lift Lobby					1				4											
5	Liftwell-1					1					1										
6	Liftwell-2					1					1										
7	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
8	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
9	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
10	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
11	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
12	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
13	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
13	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
	<b>Total-B</b>	<b>16</b>	<b>12</b>	<b>0</b>	<b>16</b>	<b>25</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>66</b>	<b>2</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>16</b>
	<b><u>SECOND FLOOR</u></b>																				
1	Corridor		4			6				34											
2	Staircase-1									2											
3	Staircase-2									2											
4	Central Staircase & Lift Lobby					1				4											
5	Liftwell-1					1					1										
6	Liftwell-2					1					1										
7	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
8	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
9	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
10	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
11	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
12	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
13	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
14	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	
15	2 Room + Lobby + Toilet	2	1		2	2	1	1	1	3		2					2	2		2	

	<b>Total-C</b>	<b>18</b>	<b>13</b>	<b>0</b>	<b>18</b>	<b>27</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>69</b>	<b>2</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>18</b>
	<b><u>TERRACE FLOOR</u></b>																				
<b>1</b>	Staircase-1									2											
<b>2</b>	Staircase-2									2											
<b>3</b>	Central Staircase & Lift Lobby					1				6											
<b>4</b>	Liftwell-1					1					1										
<b>5</b>	Liftwell-2					1					1										
<b>6</b>	Terrace										8					8					
	<b>Total-E</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b>Grand Total</b>	<b>50</b>	<b>41</b>	<b>0</b>	<b>51</b>	<b>82</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>210</b>	<b>16</b>	<b>50</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>8</b>	<b>51</b>	<b>50</b>	<b>4</b>	<b>0</b>	<b>50</b>
	<b>Load Per Unit</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>200</b>	<b>1000</b>	<b>2000</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>22</b>	<b>36</b>	<b>36</b>	<b>50</b>	<b>50</b>	<b>9</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>50</b>
	<b>Total Load</b>	<b>5000</b>	<b>4100</b>	<b>0</b>	<b>10200</b>	<b>82000</b>	<b>50000</b>	<b>200</b>	<b>300</b>	<b>3150</b>	<b>160</b>	<b>1100</b>	<b>0</b>	<b>0</b>	<b>150</b>	<b>400</b>	<b>459</b>	<b>1750</b>	<b>140</b>	<b>0</b>	<b>2500</b>

IN W 161,609.00

IN KW 161.61

A. Light + Fan Load : 20.51 KW

Consider Diversity Factor @ 80% 16.41 KW

Load (in Amps) : 
$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$
 27.35 Amp.

B. Plug & Power Plug Load: 141.10 KW

Consider Diversity Factor @ 50% 70.55 KW

Load (in Amps) : 
$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$
 117.59 Amp.

**C. HVAC Load (As Per Annexure): - KW**

**Consider Diversity Factor @ 100%** - KW

$$\text{Load (in Amps) : } \frac{P = \sqrt{3} \text{VIC} \cos\Phi}{\text{Amp.}}$$

**D. Elevator Load : 15.00 KW**

**Consider Diversity Factor @ 80%** **12.00 KW**

$$\text{Load (in Amps) : } \frac{P = \sqrt{3} \text{VIC} \cos\Phi}{20.00 \text{ Amp.}}$$

**Total Load (In kW) :** **98.96 KW**

**Total Load (In kVA) :** **123.70 KVA**

<b><u>UPS Selection Sheet Research Girls Blocks</u></b>				
<b>SL. NO.</b>	<b>DESCRIPTIONS</b>	<b>CONNECTED LOAD (kW)</b>	<b>DEMAND FACTOR</b>	<b>DEMAND LOAD (kW)</b>
<b>1</b>	<b>TOTAL DEMAND LOAD FOR 150 LIGHT POINT @ 20W EACH</b>	3.00	0.80	2.40
<b>2</b>	<b>UPS POINT LOAD FOR 51 COMPUTER POINTS @ 200W EACH</b>	10.20	0.80	8.16
<b>3</b>	<b>SERVER ROOM LOAD</b>	10.00	0.80	8.00
	<b>TOTAL</b>			<b>18.56</b>

MAX. DEMAND LOAD	-	18.56 kW
Consider overall diversity as 100%		18.56
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	18.56 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>23.20 kVA</b>
<b>SAY -</b>		<b>23.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>1 x 30 KVA</b>



	Total-A	14	58	3	37	41	11	26	8	46	4	94	0	0	6	0	0	54	4	7	2
	FIRST FLOOR																				
1	Corridor		2			4				22											
2	Side Staircase & Lift Lobby					1				3											
3	Liftwell-1					1					1										
4	Side Staircase & Lift Lobby					1				3											
5	Liftwell-1					1					1										
6	Central Staircase & Lift Lobby					1				4											
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Common Toilet-1		1			1	2	12	3											3	
10	Common Toilet-2		1			1	2	12	3											3	
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
21	Room-11	1	3		3	1				1		4						2			
22	Room-12	1	3		3	1				1		4						2			
23	Room-13	1	3		3	1				1		4						2			
24	Room-14	1	3		3	1				1		4						2			
25	Room-15	1	3		3	1				1		4						2			
26	Room-16	1	3		3	1				1		4						2			
	Total-B	16	52	0	48	29	4	24	6	48	4	64	0	0	0	0	0	32	0	6	0
	SECOND FLOOR																				
1	Corridor		2			4				22											
2	Side Staircase & Lift Lobby					1				3											
3	Liftwell-1					1					1										
4	Side Staircase & Lift Lobby					1				3											
5	Liftwell-1					1					1										
6	Central Staircase & Lift Lobby					1				4											
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Common Toilet-1		1			1	2	12	3											3	



10	Common Toilet-2		1			1	2	12	3										3		
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
21	Room-11	1	3		3	1				1		4						2			
22	Room-12	1	3		3	1				1		4						2			
23	Room-13	1	3		3	1				1		4						2			
24	Room-14	1	3		3	1				1		4						2			
25	Room-15	1	3		3	1				1		4						2			
26	Room-16	1	3		3	1				1		4						2			
27	Common Room		4	1		4				2		6						3			
	Total-C	16	56	1	48	33	4	24	6	50	4	70	0	0	0	0	0	35	0	6	0
	THIRD FLOOR																				
1	Corridor		2			4				22											
2	Side Staircase & Lift Lobby					1				3											
3	Liftwell-1					1					1										
4	Side Staircase & Lift Lobby					1				3											
5	Liftwell-1					1					1										
6	Central Staircase & Lift Lobby					1				4											
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Common Toilet-1		1			1	2	12	3										3		
10	Common Toilet-2		1			1	2	12	3										3		
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
21	Room-11	1	3		3	1				1		4						2			
22	Room-12	1	3		3	1				1		4						2			



7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Common Toilet-1		1			1	2	12	3										3		
10	Common Toilet-2		1			1	2	12	3										3		
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
21	Room-11	1	3		3	1				1		4						2			
22	Room-12	1	3		3	1				1		4						2			
23	Room-13	1	3		3	1				1		4						2			
24	Room-14	1	3		3	1				1		4						2			
25	Room-15	1	3		3	1				1		4						2			
26	Room-16	1	3		3	1				1		4						2			
27	Common Room		4	1		4				2		6						3			
	Total-F	16	56	1	48	33	4	24	6	50	4	70	0	0	0	0	0	35	0	6	0
	TERRACE FLOOR																				
1	Side Staircase & Lift Lobby					1				2		2									
2	Liftwell-1					1					1										
3	Side Staircase & Lift Lobby					1				2		2									
4	Liftwell-1					1					1										
5	Central Staircase & Lift Lobby					1				2		2									
6	Liftwell-1					1					1										
7	Liftwell-2					1					1										
8	Terrace										8					8					
	Total-H	0	0	0	0	7	0	0	0	6	12	6	0	0	0	8	0	0	0	0	0
	Grand Total	94	334	7	277	209	31	146	38	300	36	444	0	0	6	8	0	226	4	37	2
	Load Per Unit	100	100	200	200	1000	2000	8	12	15	10	22	36	36	50	50	9	35	35	35	50
	Total Load	9400	33400	1400	55400	209000	62000	1168	456	4500	360	9768	0	0	300	400	0	7910	140	1295	100

IN W 396,997.00

IN KW 397.00

A. Light + Fan Load : 81.80 KW

**Consider Diversity Factor @ 80%**

**65.44 KW**

$$\text{Load (in Amps) : } \frac{\frac{P = \sqrt{3} \text{VICos}}{\Phi}}$$

**109.07 Amp.**

**B. Plug & Power Plug Load:**

**315.20 KW**

**Consider Diversity Factor @ 50%**

**157.60 KW**

$$\text{Load (in Amps) : } \frac{\frac{P = \sqrt{3} \text{VICos}}{\Phi}}$$

**262.68 Amp.**

**C. HVAC Load (As Per Annexure):**

**- KW**

**Consider Diversity Factor @ 100%**

**- KW**

$$\text{Load (in Amps) : } \frac{\frac{P = \sqrt{3} \text{VICos}}{\Phi}}$$

**- Amp.**

**D. Elevator Load :**

**30.00 KW**

**Consider Diversity Factor @ 80%**

**24.00 KW**

$$\text{Load (in Amps) : } \frac{\frac{P = \sqrt{3} \text{VICos}}{\Phi}}$$

**40.00 Amp.**

**Total Load (In kW) :**

**247.04 KW**

**Total Load (In kVA) :**

**308.80 KVA**

<b><u>UPS Selection Sheet UG/PG Boys Hostel Blocks</u></b>				
<b>SL. NO.</b>	<b>DESCRIPTIONS</b>	<b>CONNECTED LOAD (kW)</b>	<b>DEMAND FACTOR</b>	<b>DEMAND LOAD (kW)</b>
<b>1</b>	<b>TOTAL DEMAND LOAD FOR 300 LIGHT POINT @ 20W EACH</b>	6.00	0.80	4.80
<b>2</b>	<b>UPS POINT LOAD FOR 277 COMPUTER POINTS @ 200W EACH</b>	55.40	0.80	44.32
<b>3</b>	<b>SERVER ROOM LOAD</b>	15.00	0.80	12.00
	<b>TOTAL</b>			<b>61.12</b>

MAX. DEMAND LOAD	-	61.12 kW
Consider overall diversity as 100%		61.12
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	61.12 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>76.40 kVA</b>
<b>SAY</b>	-	<b>76.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>2 x 40 KVA</b>



	Total-A	14	58	3	37	41	11	26	8	46	4	94	0	0	6	0	0	54	4	7	2
	FIRST FLOOR																				
1	Corridor		2			4				22											
2	Side Staircase & Lift Lobby					1				3											
3	Liftwell-1					1					1										
4	Side Staircase & Lift Lobby					1				3											
5	Liftwell-1					1					1										
6	Central Staircase & Lift Lobby					1				4											
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Common Toilet-1		1			1	2	12	3											3	
10	Common Toilet-2		1			1	2	12	3											3	
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
21	Room-11	1	3		3	1				1		4						2			
22	Room-12	1	3		3	1				1		4						2			
23	Room-13	1	3		3	1				1		4						2			
24	Room-14	1	3		3	1				1		4						2			
25	Room-15	1	3		3	1				1		4						2			
26	Room-16	1	3		3	1				1		4						2			
	Total-B	16	52	0	48	29	4	24	6	48	4	64	0	0	0	0	0	32	0	6	0
	SECOND FLOOR																				
1	Corridor		2			4				22											
2	Side Staircase & Lift Lobby					1				3											
3	Liftwell-1					1					1										
4	Side Staircase & Lift Lobby					1				3											
5	Liftwell-1					1					1										
6	Central Staircase & Lift Lobby					1				4											
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Common Toilet-1		1			1	2	12	3											3	

10	Common Toilet-2		1			1	2	12	3										3		
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
21	Room-11	1	3		3	1				1		4						2			
22	Room-12	1	3		3	1				1		4						2			
23	Room-13	1	3		3	1				1		4						2			
24	Room-14	1	3		3	1				1		4						2			
25	Room-15	1	3		3	1				1		4						2			
26	Room-16	1	3		3	1				1		4						2			
27	Common Room		4	1		4				2		6						3			
	Total-C	16	56	1	48	33	4	24	6	50	4	70	0	0	0	0	0	35	0	6	0
	THIRD FLOOR																				
1	Corridor		2			4				22											
2	Side Staircase & Lift Lobby					1				3											
3	Liftwell-1					1					1										
4	Side Staircase & Lift Lobby					1				3											
5	Liftwell-1					1					1										
6	Central Staircase & Lift Lobby					1				4											
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Common Toilet-1		1			1	2	12	3										3		
10	Common Toilet-2		1			1	2	12	3										3		
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
21	Room-11	1	3		3	1				1		4						2			
22	Room-12	1	3		3	1				1		4						2			



23	Room-13	1	3		3	1				1		4						2			
24	Room-14	1	3		3	1				1		4						2			
25	Room-15	1	3		3	1				1		4						2			
26	Room-16	1	3		3	1				1		4						2			
27	Common Room		4	1		4				2		6						3			
	Total-D	16	56	1	48	33	4	24	6	50	4	70	0	0	0	0	0	35	0	6	0
	FORTH FLOOR																				
1	Corridor		2			4				22											
2	Side Staircase & Lift Lobby					1				3											
3	Liftwell-1					1					1										
4	Side Staircase & Lift Lobby					1				3											
5	Liftwell-1					1					1										
6	Central Staircase & Lift Lobby					1				4											
7	Liftwell-1					1					1										
8	Liftwell-2					1					1										
9	Common Toilet-1		1			1	2	12	3											3	
10	Common Toilet-2		1			1	2	12	3											3	
11	Room-1	1	3		3	1				1		4						2			
12	Room-2	1	3		3	1				1		4						2			
13	Room-3	1	3		3	1				1		4						2			
14	Room-4	1	3		3	1				1		4						2			
15	Room-5	1	3		3	1				1		4						2			
16	Room-6	1	3		3	1				1		4						2			
17	Room-7	1	3		3	1				1		4						2			
18	Room-8	1	3		3	1				1		4						2			
19	Room-9	1	3		3	1				1		4						2			
20	Room-10	1	3		3	1				1		4						2			
21	Room-11	1	3		3	1				1		4						2			
22	Room-12	1	3		3	1				1		4						2			
23	Room-13	1	3		3	1				1		4						2			
24	Room-14	1	3		3	1				1		4						2			
25	Room-15	1	3		3	1				1		4						2			
26	Room-16	1	3		3	1				1		4						2			
27	Common Room		4	1		4				2		6						3			
	Total-E	16	56	1	48	33	4	24	6	50	4	70	0	0	0	0	0	35	0	6	0
	TERRACE FLOOR																				
1	Side Staircase & Lift Lobby					1				2		2									
2	Liftwell-1					1					1	2									
3	Side Staircase & Lift Lobby					1				2		2									
4	Liftwell-1					1					1										
5	Central Staircase & Lift Lobby					1				2		2									
6	Liftwell-1					1					1										



Total Load (In kW) :

211.93 KW

Total Load (In kVA) :

264.92 KVA

<u>UPS Selection Sheet UG/PG Girls Hostel Blocks</u>				
SL. NO.	DESCRIPTIONS	CONNECTED LOAD (kW)	DEMAND FACTOR	DEMAND LOAD (kW)
1	TOTAL DEMAND LOAD FOR 250 LIGHT POINT @ 20W EACH	5.00	0.80	4.00
2	UPS POINT LOAD FOR 229 COMPUTER POINTS @ 200W EACH	45.80	0.80	36.64
3	SERVER ROOM LOAD	15.00	0.80	12.00
	<b>TOTAL</b>			<b>52.64</b>

MAX. DEMAND LOAD	-	52.64 kW
Consider overall diversity as 100%		52.64
POWER FACTOR	-	1.00
TOTAL DEMAND LOAD	-	52.64 kVA
UPS LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>65.80 kVA</b>
<b>SAY</b>	-	<b>66.00 kVA</b>
<b>HENCE SELECTED UPS SET</b>	-	<b>2 x 40 KVA</b>

### Schedule of point

### **Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

**Name of Building- Type-I Residential Block (G+7) Floor**

[illegible]

[illegible]

i	Drawingroom	1	2	1		2				1		2					1	1			1
ii	Kitchen	1	2			2						1					1				
iii	Bath						1										1				
iv	WC																1			1	
v	Bedroom	1	2	1		1						1					1	1			
12	Flat																				
i	Drawingroom	1	2	1		2				1		2					1	1			1
ii	Kitchen	1	2			2						1					1				
iii	Bath						1										1				
iv	WC																1			1	
v	Bedroom	1	2	1		1						1					1	1			
	Total-B	24	50	16	0	46	8	0	0	30	3	32	0	0	0	0	40	16	0	8	8
	Total-C (2nd to 8th Floor)	168	350	112	0	322	56	0	0	210	21	224	0	0	0	0	280	112	0	56	56
	<u>TERRACE FLOOR</u>																				
1	Staircase-1									2											
2	Staircase-2									2											
3	Machine Room					1				6											
4	Liftwell-1					1					1										
5	Liftwell-2					1					1										
5	Liftwell-2					1					1										
6	Terrace										8					3					
	Total-E	0	0	0	0	4	0	0	0	10	11	0	0	0	0	3	0	0	0	0	0
	Grand Total	192	400	128	0	375	64	0	0	250	38	280	0	0	0	3	320	128	0	64	64
	Load Per Unit	100	100	200	200	1000	2000	8	12	15	10	22	36	36	50	50	9	35	35	35	50
	Total Load	19200	40000	25600	0	375000	128000	0	0	3750	380	6160	0	0	0	150	2880	4480	0	2240	3200

IN W 611,040.00

IN KW 611.04

A. Light + Fan Load : 23.24 KW

**Consider Diversity Factor @ 80%**

**18.59 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**30.99 Amp.**

**B. Plug & Power Plug Load:**

**587.80 KW**

**Consider Diversity Factor @ 25%**

**146.95 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**244.93 Amp.**

**C. HVAC Load (As Per Annexure):**

**- KW**

**Consider Diversity Factor @ 100%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**D. Elevator Load :**

**22.50 KW**

**Consider Diversity Factor @ 80%**

**18.00 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**30.00 Amp.**

**Total Load (In kW) :**

**183.54 KW**

**Total Load (In kVA) :**

**229.43 KVA**



**Schedule of point**

**Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

**Name of Building- Type-II Residential Block (G+7) Floor**

S.No	Location	5A Plug Point On Board	5A Plug Point Separate 2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9W Wall LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b><u>Stilt Floor</u></b>																			
1	Parking										12									
2	Corridor										2									
3	Staircase-1										2									
4	Staircase-2										2									
5	Lift Lobby									2										
6	Liftwell-1				1					1										
7	Liftwell-2				1					1										
	<b>Total-A</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b><u>FIRST FLOOR</u></b>																			
1	Corridor		2		2				16											
2	Staircase-1								2											
3	Staircase-2								2											
4	Lift Lobby				1				2											
5	Liftwell-1				1					1										
6	Liftwell-2				1					1										
7	<b>Flat</b>																			
i	Drawingroom	1	2	1	2				1		2					1	1			1
ii	Kitchen & Utility	1	2		3						1					2				

iii	Bath						1										1				
iv	WC																1			1	
v	Bedroom	1	2	1		1				1		1					1	1			
vi	Bedroom	1	2	1		1						1					1	1			
8	Flat																				
i	Drawingroom	1	2	1		2				1		2					1	1			1
ii	Kitchen & Utility	1	2			3						1					2				
iii	Bath						1										1				
iv	WC																1			1	
v	Bedroom	1	2	1		1				1		1					1	1			
vi	Bedroom	1	2	1		1						1					1	1			
9	Flat																				
i	Drawingroom	1	2	1		2				1		2					1	1			1
ii	Kitchen & Utility	1	2			3						1					2				
iii	Bath						1										1				
iv	WC																1			1	
v	Bedroom	1	2	1		1				1		1					1	1			
vi	Bedroom	1	2	1		1						1					1	1			
10	Flat																				
i	Drawingroom	1	2	1		2				1		2					1	1			1
ii	Kitchen & Utility	1	2			3						1					2				
iii	Bath						1										1				
iv	WC																1			1	
v	Bedroom	1	2	1		1				1		1					1	1			
vi	Bedroom	1	2	1		1						1					1	1			
	<b>Total-B</b>	<b>16</b>	<b>34</b>	<b>12</b>	<b>0</b>	<b>33</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>2</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>12</b>	<b>0</b>	<b>4</b>	<b>4</b>
	<b>Total-C (2nd to 10th Floor)</b>	<b>144</b>	<b>306</b>	<b>108</b>	<b>0</b>	<b>297</b>	<b>36</b>	<b>0</b>	<b>0</b>	<b>270</b>	<b>18</b>	<b>180</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>252</b>	<b>108</b>	<b>0</b>	<b>36</b>	<b>36</b>
	<b><u>TERRACE FLOOR</u></b>																				
1	Staircase-1									2											
2	Staircase-2									2											
3	Machine Room					1				4											
4	Liftwell-1					1					1										
5	Liftwell-2					1					1										
6	Terrace										8					3					

	Total-E	0	0	0	0	3	0	0	0	8	10	0	0	0	0	3	0	0	0	0	0
	Grand Total	160	340	120	0	335	40	0	0	308	34	218	0	0	0	3	280	120	0	40	40
	Load Per Unit	100	100	200	200	1000	2000	8	12	15	10	22	36	36	50	50	9	35	35	35	50
	Total Load	16000	34000	24000	0	335000	80000	0	0	4620	340	4796	0	0	0	150	2520	4200	0	1400	2000

IN W 509,026.00

IN KW 509.03

A. Light + Fan Load : 20.03 KW

Consider Diversity Factor @ 80% 16.02 KW

Load (in Amps) : 
$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$
 26.70 Amp.

B. Plug & Power Plug Load: 489.00 KW

Consider Diversity Factor @ 25% 122.25 KW

Load (in Amps) : 
$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$
 203.76 Amp.

C. HVAC Load (As Per Annexure): - KW

Consider Diversity Factor @ 100% - KW

Load (in Amps) : 
$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$
 - Amp.

D. Elevator Load : 15.00 KW

Consider Diversity Factor @ 80%

12.00 KW

Load (in Amps) :

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

20.00 Amp.

Total Load (In kW) :

150.27 KW

Total Load (In kVA) :

187.84 KVA

**Schedule of point**

**Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

**Name of Building- Type-III Residential Block (G+7) Floor**

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9W all LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<u>Stilt Floor</u>																				
1	Parking											12									
2	Corridor											2									
3	Staircase-1											2									
4	Staircase-2											2									
5	Lift Lobby										2										
6	Liftwell-1					1					1										
7	Liftwell-2					1					1										
	<b>Total-A</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>FIRST FLOOR</u>																				
1	Corridor		1			1				6											
2	Staircase-1									2											
3	Staircase-2									2											
4	Lift Lobby					1				2											
5	Liftwell-1					1					1										
6	Liftwell-2					1					1										
7	<b>Flat</b>																				
i	Drawingroom	1	2	1		2	1			1		3					2	1			1
ii	Kitchen & Utility	1	2			3						1					2				
iii	Toilet		1				1	1	1								1			1	
iv	Bedroom	1	2	1		1	1			1		1					1	1			

v	Bedroom	1	2	1		1	1					1					1	1			
vi	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
8	Flat																				
i	Drawingroom	1	2	1		2	1			1		3					2	1			1
ii	Kitchen & Utility	1	2			3						1					2				
iii	Toilet		1				1	1	1								1			1	
iv	Bedroom	1	2	1		1	1			1		1					1	1			
v	Bedroom	1	2	1		1	1					1					1	1			
vi	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
	Total-B	10	23	8	0	20	10	4	4	22	2	14	0	0	0	0	16	8	0	4	2
	Total-C (2nd to 14th Floor)	130	299	104	0	260	130	52	52	286	26	182	0	0	0	0	208	104	0	52	26
	<u>TERRACE FLOOR</u>																				
1	Staircase-1									2											
2	Staircase-2									2											
3	Machine Room					1				4											
4	Liftwell-1					1					1										
5	Liftwell-2					1					1										
6	Terrace										8					3					
	Total-E	0	0	0	0	3	0	0	0	8	10	0	0	0	0	3	0	0	0	0	0
	Grand Total	140	322	112	0	285	140	56	56	316	42	214	0	0	0	3	224	112	0	56	28
	Load Per Unit	100	100	200	200	1000	2000	8	12	15	10	22	36	36	50	50	9	35	35	35	50
	Total Load	14000	32200	22400	0	285000	280000	448	672	4740	420	4708	0	0	0	150	2016	3920	0	###	1400

IN W 654,034.00

IN KW 654.03

A. Light + Fan Load :

20.43 KW

Consider Diversity Factor @ 80%

16.35 KW

Load (in Amps) :

$$\frac{P = \sqrt{3} V I \cos \Phi}{\Phi}$$

27.25 Amp.

B.	<u>Plug &amp; Power Plug Load:</u>	633.60 KW
	<u>Consider Diversity Factor @ 25%</u>	158.40 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3V \cos \Phi}}{3V \cos \Phi}$ 264.02 Amp.
C.	<u>HVAC Load (As Per Annexure):</u>	- KW
	<u>Consider Diversity Factor @ 100%</u>	- KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3V \cos \Phi}}{3V \cos \Phi}$ - Amp.
D.	<u>Elevator Load :</u>	15.00 KW
	<u>Consider Diversity Factor @ 80%</u>	12.00 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3V \cos \Phi}}{3V \cos \Phi}$ 20.00 Amp.
	<u>Total Load (In kW) :</u>	186.75 KW
	<u>Total Load (In kVA) :</u>	233.43 KVA

**Schedule of point**

**Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

**Name of Building- Type-IV Residential Block (G+11) Floor**

S.No	Location	5A Plug Point On Board	5A Plug Point Separate 2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9W Wall LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b><u>Stilt Floor</u></b>																			
1	Parking										18									
2	Corridor										2									
3	Staircase-1										2									
4	Staircase-2										2									
5	Lift Lobby									2										
6	Liftwell-1				1					1										
7	Liftwell-2				1					1										
	<b>Total-A</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b><u>FIRST FLOOR</u></b>																			
1	Corridor		1		1				6											
2	Staircase-1								2											
3	Staircase-2								2											
4	Lift Lobby				1				2											
5	Liftwell-1				1					1										
6	Liftwell-2				1					1										
7	<b>Flat</b>																			
i	Drawing + Living Room	2	4	2	4	2			1		4					4	2			1
ii	Kitchen & Utility	1	2		3						1					2				



iii	Toilet		1				1	1	1								1			1	
iv	Bedroom	1	2	1		1	1			1		1					1	1			
v	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
vi	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
8	Flat																				
i	Drawing + Living Room	2	4	2		4	2			1		4					4	2			1
ii	Kitchen & Utility	1	2			3						1					2				
iii	Toilet		1				1	1	1								1			1	
iv	Bedroom	1	2	1		1	1			1		1					1	1			
v	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
vi	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
	Total-B	12	27	10	0	24	12	6	6	28	2	16	0	0	0	0	20	10	0	6	2
	Total-C (2nd to 11th Floor)	108	243	90	0	216	108	54	54	252	18	144	0	0	0	0	180	90	0	54	18
	<b>TERRACE FLOOR</b>																				
1	Staircase-1									2											
2	Staircase-2									2											
3	Machine Room					1				4											
4	Liftwell-1					1					1										
5	Liftwell-2					1					1										
6	Terrace										8					3					
	Total-E	0	0	0	0	3	0	0	0	8	10	0	0	0	0	3	0	0	0	0	0
	Grand Total	120	270	100	0	245	120	60	60	288	34	184	0	0	0	3	200	100	0	60	20
	Load Per Unit	100	100	200	200	1000	2000	8	12	15	10	22	36	36	50	50	9	35	35	35	50
	Total Load	12000	27000	20000	0	245000	240000	480	720	4320	340	4048	0	0	0	150	1800	3500	0	###	1000

IN W      562,458.00

IN KW      562.46

A.      Light + Fan Load :      18.46 KW

Consider Diversity Factor @ 80%      14.77 KW

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	24.61 Amp.
-------------------------	------------------------------------	------------

B.	<u>Plug &amp; Power Plug Load:</u>	544.00 KW
----	------------------------------------	-----------

	<u>Consider Diversity Factor @ 25%</u>	136.00 KW
--	--	-----------

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	226.68 Amp.
-------------------------	------------------------------------	-------------

C.	<u>HVAC Load (As Per Annexure):</u>	- KW
----	-------------------------------------	------

	<u>Consider Diversity Factor @ 100%</u>	- KW
--	---	------

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	- Amp.
-------------------------	------------------------------------	--------

D.	<u>Elevator Load :</u>	15.00 KW
----	------------------------	----------

	<u>Consider Diversity Factor @ 80%</u>	12.00 KW
--	--	----------

<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	20.00 Amp.
-------------------------	------------------------------------	------------

<u>Total Load (In kW) :</u>		162.77 KW
-----------------------------	--	-----------

<u>Total Load (In kVA) :</u>		203.46 KVA
------------------------------	--	------------

**Schedule of point**

**Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

**Name of Building- Type-IV Residential Block (G+8) Floor**

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9W LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b><u>Stilt Floor</u></b>																				
1	Parking											18									
2	Corridor											2									
3	Staircase-1											2									
4	Staircase-2											2									
5	Lift Lobby										2										
6	Liftwell-1					1					1										
7	Liftwell-2					1					1										
	<b>Total-A</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b><u>FIRST FLOOR</u></b>																				
1	Corridor		1			1				6											
2	Staircase-1									2											
3	Staircase-2									2											
4	Lift Lobby					1				2											
5	Liftwell-1					1					1										
6	Liftwell-2					1					1										
7	<b>Flat</b>																				
i	Drawing + Living Room	2	4	2		4	2			1		4					4	2			1

ii	Kitchen & Utility	1	2			3						1					2				
iii	Toilet		1				1	1	1								1			1	
iv	Bedroom	1	2	1		1	1			1		1					1	1			
v	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
vi	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
8	Flat																				
i	Drawing + Living Room	2	4	2		4	2			1		4					4	2			1
ii	Kitchen & Utility	1	2			3						1					2				
iii	Toilet		1				1	1	1								1			1	
iv	Bedroom	1	2	1		1	1			1		1					1	1			
v	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
vi	Bedroom	1	2	1		1	1	1	1	3		1					1	1		1	
	Total-B	12	27	10	0	24	12	6	6	28	2	16	0	0	0	0	20	10	0	6	2
	Total-C (2nd to 8th Floor)	84	189	70	0	168	84	42	42	196	14	112	0	0	0	0	140	70	0	42	14
	TERRACE FLOOR																				
1	Staircase-1									2											
2	Staircase-2									2											
3	Machine Room					1				4											
4	Liftwell-1					1					1										
5	Liftwell-2					1					1										
6	Terrace										8					3					
	Total-E	0	0	0	0	3	0	0	0	8	10	0	0	0	0	3	0	0	0	0	0
	Grand Total	96	216	80	0	197	96	48	48	232	30	152	0	0	0	3	160	80	0	48	16
	Load Per Unit	100	100	200	200	1000	2000	8	12	15	10	22	36	36	50	50	9	35	35	35	50
	Total Load	9600	21600	16000	0	197000	192000	384	576	3480	300	3344	0	0	0	150	1440	2800	0	###	800

IN W 451,154.00

IN KW 451.15

A. Light + Fan Load : 14.95 KW

**Consider Diversity Factor @ 80%**

**11.96 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**19.94 Amp.**

**B. Plug & Power Plug Load:**

**436.20 KW**

**Consider Diversity Factor @ 25%**

**109.05 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**181.76 Amp.**

**C. HVAC Load (As Per Annexure):**

**- KW**

**Consider Diversity Factor @ 100%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**D. Elevator Load :**

**15.00 KW**

**Consider Diversity Factor @ 80%**

**12.00 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**20.00 Amp.**

**Total Load (In kW) :**

**133.01 KW**

**Total Load (In kVA) :**

**166.27 KVA**

### Schedule of point

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

Name of Building- Type-V Residential Block (G+7) Floor

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9W all LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<u>Stilt Floor</u>																				
1	Parking											18									
2	Corridor											2									
3	Staircase-1											2									
4	Staircase-2											2									
5	Lift Lobby										2										
6	Liftwell-1					1					1										
7	Liftwell-2					1					1										
	<b>Total-A</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<u>FIRST FLOOR</u>																				
1	Corridor		1			1				6											
2	Staircase-1									2											
3	Staircase-2									2											
4	Lift Lobby					1				2											
5	Liftwell-1					1					1										
6	Liftwell-2					1					1										
7	<b>Flat</b>																				
i	Drawing + Living Room	2	4	2		4	2			12		4					4	3			1
ii	Kitchen & Utility	1	2			3						1					2				

iii	Toilet		1				1	1	1								1			1		
iv	Bedroom	1	2	1			1	1		1		1					1	1				
v	Bedroom	1	2	1			1	1	1	1	3		1				1	1		1		
vi	Bedroom	1	2	1			1	1	1	1	3		1				1	1		1		
vii	Bedroom	1	2	1			1	1	1	1	3		1				1	1		1		
viii	Servent Room	1	2	1			1	1			1		1				1	1				
8	Flat																					
i	Drawing + Living Room	2	4	2			4	2			12		4				4	3			1	
ii	Kitchen & Utility	1	2				3						1				2					
iii	Toilet		1					1	1	1							1			1		
iv	Bedroom	1	2	1			1	1			1		1				1	1				
v	Bedroom	1	2	1			1	1	1	1	3		1				1	1		1		
vi	Bedroom	1	2	1			1	1	1	1	3		1				1	1		1		
vii	Bedroom	1	2	1			1	1	1	1	3		1				1	1		1		
viii	Servent Room	1	2	1			1	1			1		1				1	1				
	Total-B	16	35	14	0		28	16	8	8	58	2	20	0	0	0	0	24	16	0	8	2
	Total-C (2nd to 7th Floor)	96	210	84	0		168	96	48	48	348	12	120	0	0	0	0	144	96	0	48	12
	TERRACE FLOOR																					
1	Staircase-1										2											
2	Staircase-2										2											
3	Machine Room						1				4											
4	Liftwell-1						1					1										
5	Liftwell-2						1					1										
6	Terrace											8					3					
	Total-E	0	0	0	0		3	0	0	0	8	10	0	0	0	0	3	0	0	0	0	0
	Grand Total	112	245	98	0		201	112	56	56	414	28	164	0	0	0	3	168	112	0	56	14
	Load Per Unit	100	100	200	200		1000	2000	8	12	15	10	22	36	36	50	50	9	35	35	35	50
	Total Load	11200	24500	19600	0		201000	224000	448	672	6210	280	3608	0	0	0	150	1512	3920	0	###	700

IN W 499,760.00

IN KW 499.76

A.	<u>Light + Fan Load :</u>		19.46 KW
	<u>Consider Diversity Factor @ 80%</u>		15.57 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	25.95 Amp.
B.	<u>Plug &amp; Power Plug Load:</u>		480.30 KW
	<u>Consider Diversity Factor @ 25%</u>		120.08 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	200.14 Amp.
C.	<u>HVAC Load (As Per Annexure):</u>		- KW
	<u>Consider Diversity Factor @ 100%</u>		- KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	- Amp.
D.	<u>Elevator Load :</u>		22.50 KW
	<u>Consider Diversity Factor @ 80%</u>		18.00 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	30.00 Amp.
	<u>Total Load (In kW) :</u>		153.64 KW
	<u>Total Load (In kVA) :</u>		192.05 KVA



### Schedule of point

**Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

**Name of Building- Type-6 Residential Block**

S.No	Location	5A Plug Point On Board	5A Plug Point Separate 2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9W wall LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell	
I	GROUND FLOOR	7	28	7	12	14	10	6	4	61	4	1	12			4	12		6	1	
II	FIRST FLOOR	4	8	2		5	4	2	2	24	2	1				2	5		2		
III	TERRACE FLOOR								4						3						
	Grand Total	11	36	9	12	19	14	8	6	89	6	2	12	0	0	3	6	17	0	8	1
	Load Per Unit	100	100	200	200	1000	2000	8	12	15	10	22	36	36	50	50	9	35	35	35	50
	Total Load	1100	3600	1800	2400	19000	28000	64	72	1335	60	44	432	0	0	150	54	595	0	280	50

IN W      59,036.00

IN KW      59.04

A.      Light + Fan Load :      5.54 KW

Consider Diversity Factor @ 80%      4.43 KW

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**7.38 Amp.**

**B. Plug & Power Plug Load:**

**53.50 KW**

**Consider Diversity Factor @ 25%**

**13.38 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**22.29 Amp.**

**C. HVAC Load (As Per Annexure):**

**- KW**

**Consider Diversity Factor @ 100%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**D. Elevator Load :**

**- KW**

**Consider Diversity Factor @ 80%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**Total Load (In kW) :**

**17.80 KW**

**Total Load (In kVA) :**

**22.25 KVA**

### Schedule of point

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

#### Name of Building- Facility Center

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9W LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
I	GROUND FLOOR		22		14	22		6	5	30		10	40					17			5
III	TERRACE FLOOR									4						3					
	<b>Grand Total</b>	<b>0</b>	<b>22</b>	<b>0</b>	<b>14</b>	<b>22</b>	<b>0</b>	<b>6</b>	<b>5</b>	<b>34</b>	<b>0</b>	<b>10</b>	<b>40</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>5</b>
	<b>Load Per Unit</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>200</b>	<b>1000</b>	<b>2000</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>22</b>	<b>36</b>	<b>36</b>	<b>50</b>	<b>50</b>	<b>9</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>50</b>
	<b>Total Load</b>	<b>0</b>	<b>2200</b>	<b>0</b>	<b>2800</b>	<b>22000</b>	<b>0</b>	<b>48</b>	<b>60</b>	<b>510</b>	<b>0</b>	<b>220</b>	<b>1440</b>	<b>0</b>	<b>0</b>	<b>150</b>	<b>0</b>	<b>595</b>	<b>0</b>	<b>0</b>	<b>250</b>

IN W 30,273.00

IN KW 30.27

A. Light + Fan Load : 6.07 KW

Consider Diversity Factor @ 80% 4.86 KW

Load (in Amps) :  $P = \frac{3VIC}{\cos\Phi}$  8.10 Amp.

B.	<u>Plug &amp; Power Plug Load:</u>		24.20 KW
	<u>Consider Diversity Factor @ 25%</u>		6.05 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	10.08 Amp.
C.	<u>HVAC Load (As Per Annexure):</u>		- KW
	<u>Consider Diversity Factor @ 100%</u>		- KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	- Amp.
D.	<u>Elevator Load :</u>		- KW
	<u>Consider Diversity Factor @ 80%</u>		- KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3VIC}}{\cos\Phi}$	- Amp.
	<u>Total Load (In kW) :</u>		10.91 KW
	<u>Total Load (In kVA) :</u>		13.64 KVA

### Schedule of point

**Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

**Name of Building- Maintenace office**

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9Wall LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
1	Enquiry		1	1	1	1	1							2				1			1
2	office		6		6	6	2							4				2			2
3	Plumbing Supervisor		1		1	1	1			2								1			
4	Elec. Supervisor		1		1	1	1			2								1			
5	Toilet F					1		2	1												
6	Toilet M					1		1	1												
7	Pantry					2				2											
8	Store					2						4									
9	Mech. Supervisor		1		1	1	1			2								1			
10	Civil Supervisor		1		1	1	1			2								1			
11	Manager office		1	1	1	2							4					1			1
12	Meeting Room		1		4								4					2			1
13	Corridor					2				5								1			
	<b>Grand Total</b>	<b>0</b>	<b>13</b>	<b>2</b>	<b>16</b>	<b>21</b>	<b>7</b>	<b>3</b>	<b>2</b>	<b>15</b>	<b>0</b>	<b>4</b>	<b>8</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>5</b>
	<b>Load Per Unit</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>200</b>	<b>1000</b>	<b>2000</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>22</b>	<b>36</b>	<b>36</b>	<b>50</b>	<b>50</b>	<b>9</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>50</b>
	<b>Total Load</b>	<b>0</b>	<b>1300</b>	<b>400</b>	<b>3200</b>	<b>21000</b>	<b>14000</b>	<b>24</b>	<b>24</b>	<b>225</b>	<b>0</b>	<b>88</b>	<b>288</b>	<b>216</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>385</b>	<b>0</b>	<b>0</b>	<b>250</b>

IN W      41,400.00

IN KW      41.40

A.      Light + Fan Load :      4.70 KW

Consider Diversity Factor @ 80%      3.76 KW

Load (in Amps) :      
$$\frac{P = \sqrt{3VIC}}{\cos\Phi}$$
      6.27 Amp.

B.      Plug & Power Plug Load:      36.70 KW

Consider Diversity Factor @ 25%      9.18 KW

Load (in Amps) :      
$$\frac{P = \sqrt{3VIC}}{\cos\Phi}$$
      15.29 Amp.

C.      HVAC Load (As Per Annexure):      - KW

Consider Diversity Factor @ 100%      - KW

Load (in Amps) :      
$$\frac{P = \sqrt{3VIC}}{\cos\Phi}$$
      - Amp.

D.      Elevator Load :      - KW

Consider Diversity Factor @ 80%      - KW

Load (in Amps) :      
$$\frac{P = \sqrt{3VIC}}{\cos\Phi}$$
      - Amp.

Total Load (In kW) :      12.94 KW

Total Load (In kVA) :      16.17 KVA

### Schedule of point

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

Name of Building- Police Choki

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC/Geyser Socket Outlet	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	36W 1X4 LED Panel	Double Height Light	50W Flood Light	9W LED Bulb	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
I	GROUND FLOOR		8		5	6		2	2			2		10				7			2
III	TERRACE FLOOR																				
	<b>Grand Total</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>5</b>	<b>6</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>2</b>
	<b>Load Per Unit</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>200</b>	<b>1000</b>	<b>2000</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>22</b>	<b>36</b>	<b>36</b>	<b>50</b>	<b>50</b>	<b>9</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>50</b>
	<b>Total Load</b>	<b>0</b>	<b>800</b>	<b>0</b>	<b>1000</b>	<b>6000</b>	<b>0</b>	<b>16</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>44</b>	<b>0</b>	<b>360</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>245</b>	<b>0</b>	<b>0</b>	<b>100</b>

IN W 8,589.00

IN KW 8.59

A. Light + Fan Load : 1.79 KW

Consider Diversity Factor @ 80% 1.43 KW

Load (in Amps) :  $P = \frac{\sqrt{3} \times V \times I \times \cos\Phi}{1000}$  2.39 Amp.

B.	<u>Plug &amp; Power Plug Load:</u>		6.80 KW
	<u>Consider Diversity Factor @ 25%</u>		1.70 KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	2.83 Amp.
C.	<u>HVAC Load (As Per Annexure):</u>		- KW
	<u>Consider Diversity Factor @ 100%</u>		- KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	- Amp.
D.	<u>Elevator Load :</u>		- KW
	<u>Consider Diversity Factor @ 80%</u>		- KW
	<u>Load (in Amps) :</u>	$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$	- Amp.
	<u>Total Load (In kW) :</u>		3.13 KW
	<u>Total Load (In kVA) :</u>		3.91 KVA



### Schedule of point

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.

#### Name of Building- Utility Block

S.No	Location	5A Plug Point On Board	5A Plug Point Separate	2x5A Plug Point Separate On Raw Power	2x5A Plug Point Separate On UPS	15A Power Point	AC Socket Outlet	TV Socket Outlet	Telephone Point	Data Point	8W LED Down Light	12W LED Mirror Light	15W LED Down Light	10W LED Bulk Head	20W LED Batten	36W 600x600 LED Panel	Occupancy Sensor	Ceiling Fan 1200mm	Wall Fan	Exhaust Fan 300mm	Call Bell
	<b><u>GROUND FLOOR</u></b>																				
1	Guard Room 1&2		2		2	2	2		2	2				2	4			2			
2	VCB & Meter Room		2	2		2								2	4				1	2	
3	Pump Room		4			4								1	6					2	
	<b>Grand Total</b>	<b>0</b>	<b>8</b>	<b>2</b>	<b>2</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>0</b>
	<b>Load Per Unit</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>200</b>	<b>1000</b>	<b>2000</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>22</b>	<b>36</b>	<b>36</b>	<b>50</b>	<b>50</b>	<b>9</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>50</b>
	<b>Total Load</b>	<b>0</b>	<b>800</b>	<b>400</b>	<b>400</b>	<b>8000</b>	<b>4000</b>	<b>0</b>	<b>24</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>180</b>	<b>700</b>	<b>0</b>	<b>0</b>	<b>70</b>	<b>35</b>	<b>140</b>	<b>0</b>

IN W 14,779.00

IN KW 14.78

A. Light + Fan Load : 1.58 KW

Consider Diversity Factor @ 80% 1.26 KW

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**2.11 Amp.**

**B. Plug & Power Plug Load:**

**13.20 KW**

**Consider Diversity Factor @ 25%**

**3.30 KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**5.50 Amp.**

**C. HVAC Load (As Per Annexure):**

**- KW**

**Consider Diversity Factor @ 100%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**D. Elevator Load :**

**- KW**

**Consider Diversity Factor @ 80%**

**- KW**

**Load (in Amps) :**

$$\frac{P = \sqrt{3} \text{VIC}}{\text{os}\Phi}$$

**- Amp.**

**Total Load (In kW) :**

**4.56 KW**

**Total Load (In kVA) :**

**5.70 KVA**

Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.						
COMMON SERVICES LOADS						
SL. NO.	DESCRIPTIONS	CONNECTED LOAD (kW)	NO. OF BLOCKS	TOTAL CLOONNECTED LOAD	DEMAND FACTOR	DEMAND LOAD (kW)
1	Admin Block	765.92	1.00	765.92	0.90	689.33
2	Academic Block	945.77	2.00	1891.54	0.90	1702.38
3	Library Block	476.82	1.00	476.82	0.90	429.14
6	Health Center Block	88.17	1.00	88.17	0.90	79.35
7	Guest House Block	45.58	1.00	45.58	0.90	41.02
8	Diploma Boys / Girls Hostel	102.61	2.00	205.22	0.90	184.70
9	Research Boys Hostel	128.55	1.00	128.55	0.90	115.69
10	Research Girls Hostel	98.96	1.00	98.96	0.90	89.06
11	UG & PG Boys Hostel	247.04	1.00	247.04	0.90	222.33
12	UG & PG Girls Hostel	211.93	1.00	211.93	0.90	190.74
14	Type-2 Residential Block (G+10)	150.27	5.00	751.35	0.90	676.22
15	Type-3 Residential Block (G+14)	186.75	2.00	373.49	0.90	336.14
17	Type-4 Residential Block (G+8)	133.01	2.00	266.03	0.90	239.42
18	Type-5 Residential Block(S+7)	153.64	1.00	153.64	0.90	138.28
19	Type-6 Residential Block	17.80	1.00	17.80	0.90	16.02
20	Facility Center	10.91	1.00	10.91	0.90	9.82
21	Maintenance office	12.94	1.00	12.94	0.90	11.64
22	Police Choki	3.13	1.00	3.13	0.90	2.82
23	Multipurpose Hall		1.00	0.00	0.90	0.00
24	ESS & Pump Room	4.56	1.00	4.56	0.90	4.11
3	PLUMBING LOAD				0.90	
a.	Plumbing Load	50.00			0.90	45.00
4	EXTERNAL AND FACADE LIGHTING	20.00			1.00	20.00
5	STP	100.00			0.90	90.00
6	FIRE FIGHTING	15.00			1.00	15.00
	TOTAL					5348.00

MAX. DEMAND LOAD = 5348.00 kW

MAX. DEMAND LOAD = 5348.00 kW

**Project - Proposed Construction of Horticulture & Forestry University at Gorakhpur.**

**PROPOSED SELECTION OF TRANSFORMER**

**TRANSFORMER SELECTION**

MAX. DEMAND LOAD	-	5348.00 kW
Consider overall diversity as 80%		4278.40 kW
POWER FACTOR	-	0.90
TOTAL DEMAND LOAD	-	4753.78 kVA
TRANSFORMER LOADING	-	80%
TOTAL DEMAND LOAD	-	<b>5942.22 kVA</b>

**SAY - 5942.00 kVA**

**HENCE SELECTED TRANSFORMER - 4 x 2000 KVA (3W+1S)  
11kV/0.433kV PACKAGE SUBSTATION  
(WITH OIL TYPE TRANSFORMER)**

