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Institutional Development Plan for HEIs

2022

UGC

Institution Development Plan for Higher Education Institutions (HEIs)

Part-1: Framework

University Grants Commission, Bahadur Shah Zafar Marg, New Delhi

2022

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ACKNOWLEDGEMENT

The IDP Committee acknowledges the contribution of the following experts and resource persons who have contributed to the Institutional Development Plan for HEIs and have added value in the compilation of this comprehensive document:

Statutory bodies:

1. AICTE [Er. Devadevan. V, & Ms. Mamta Rani]
2. NCHMCT [Mr. L. K. Ganguli, Director (A & F)]
3. PCI – Pharmacy Council of India [Dr. Archana Mudgal, Registrar cum Secretary]
4. NCTE – Prof Santosh Sarangi & Dr. Jayesh Patel
5. SAI – Sports Authority of India
6. Indian Nursing Council - Lt Col (Dr) Sarvjeet Kaur, Secretary
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18. Mr. SankarshanShivamurthy – Expert Acoustical Design-Director Sonics
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22. Mr. Ashish Rai – Expert IT Solutions

Master Plan:

23. Personal Appearance before the Board of Enquiry and Hearing meeting dated 17.11.2021 regarding draft Master Plan for Delhi- 2041 in response to the Public Notice dated 09.06.2021 and 23.07.2021 regarding 'Draft Master Plan for Delhi (MPD)- 2041' published in Extraordinary Gazette of India vide S.O. 2189(E) dated 09.06.2021 and vide S.O. 2915(E) dated 23.07.2021, also in newspapers on 09.06.2021 and 23.07.2021 for inviting objections /suggestions from the public.

Section 1

The Expert Committee to formulate the Institutional Development Plan (IDP) guidelines
Background

The National Education Policy 2020 envision creating an education system that contributes directly to transforming the country, providing high-quality education to all, and making India a global knowledge superpower:

- 50% Gross Enrolment Ration by 2035
- Holistic and Multidisciplinary Education- Flexibility of Subjects
- Multiple Entry/Exit
- UG Programme - 3 or 4 years
- PG programme - 1 or 2 years
- Integrated 5-year bachelor's/Master's
- M Phil to be discontinued
- Credit Transfer and Academic Bank of Credits
- HEIs: Research Intensive/ Teaching Intensive Universities and Autonomous Degree-Granting College
- Model Multidisciplinary Education and Research University (MERU)
- Use of Technology in
  - Education Planning, Teaching Learning & Assessment
  - Administration & Management
  - Regulation- Self Disclosure & Minimum Human Interface
  - Increasing Access for Disadvantaged Groups
  - Divyang Friendly Education Software
  - e-Content in Regional Language
  - Virtual Labs
  - National Educational Technology Forum (NETF)
  - Digitally Equipping Teachers and Students

To achieve the objectives, all HEIs are expected to develop IDPs to assess:

- human resources requirements, such as faculty shortages, administrative staff
- the physical infrastructural facilities
- ICT related technology requirements
- Learning infrastructure, such as labs, libraries, etc.
- CPD requirements
- Student Support related areas
- Teaching infrastructure

The IDPs will be used for the assessment of the institution, its programmes, and also its faculty. In order to formulate the NHEQF and make appropriate recommendations the University Grants Commission constituted an Expert committee

1. Working of the Committee

UGC held four virtual meetings of the IDP Expert Committee. The meetings were held on 28.5.21, 7.6.21, 21.06.2021, and 20.07. 2021 respectively. A WhatsApp group was also created to facilitate sharing of inputs and documents between members.

Notifications: The Expert Committee constituted by the Hon'ble Chairman (list given below) UGC vide orders no. F.No. 1-1/2021 (IDP/NEP) dated 22.03.2021 and 28.05.2021 to formulate the Institutional Development Plan (IDP). Prof. A.C. Pandey, Director, IUAC, Delhi was appointed as Chairman of the Committee.

Chairman, UGC has assigned the NIIMT guidelines Committee comprising of the following members to formulate the Institutional Development Plan (IDP) guidelines for the assessment of institutions, their programmes, and faculty as mentioned in NEP 2020:

1. Prof.(Dr) A. C. Pandey, Director, IUAC, New Delhi	Chairperson
2. Prof.(Dr) J. B. Nadda, Director, CEC, New Delhi	Member
3. Prof.(Dr)Upinder Dhar, VC, Shri Vaishnav Vidyapeeth, Indore	Member
4. Prof.(Dr) Anup K Singh, DG, Nirma University, Ahmedabad	Member
5. Prof.(Dr)Yoginder Verma, Retd. Director, HRDC, H.P University,	Member
6. Prof.(Dr) Amit Hajela, Architect &Urban Designer Director, ASAP, Amity University. Noida	Co-opted Member
7. Dr. Archana Thakur, JS, UGC, New Delhi	Coordinating Officer

A. General Introduction

CREATION OF THE CONDUCIVE ECOSYSTEM, STRUCTURE, AND CONTEXT FOR EFFECTIVE MENTORING IN HEIs

While being provided with adequate funding, legislative enablement, and autonomy in a phased manner, all HEIs, in turn, will display a commitment to institutional excellence, engagement with their local communities, and the highest standards of financial probity and accountability:

- All students and educators will have access to a robust and comprehensive infrastructure when and where they need it for learning
- Preparing students to be successful for the future requires a robust and flexible learning infrastructure capable of supporting new types of engagement and providing ubiquitous access to the technology tools that allow students to create, design, and explore.
- The essential components of an infrastructure capable of supporting transformational learning experiences include the following:

  • Ubiquitous connectivity. Persistent access to high-speed Internet in and out of school

  • Powerful learning devices. Access to mobile devices that connect learners and educators to the vast resources of the Internet and facilitate communication and collaboration

  • High-quality digital learning content. Digital learning content and tools that can be used to design and deliver engaging and relevant learning experiences

  • Responsible Use Policies (RUPs). Guidelines to safeguard students and ensure that the infrastructure is used to support learning

INSTITUTIONAL DEVELOPMENT PLAN (IDP):

Internal governance of Higher Education Institutions needs to be more autonomous, accountable, decentralized, and transparent. A flexible pattern of governance, which is responsive to the changing needs of society, global trends, and knowledge, can be a powerful factor in accelerating progress. In the wake of the internationalization of education, coupled with globalization and competition, the higher educational institutes need to be managed more professionally. The traditional university administration being run with 19th-century tools have to be replaced with modern management techniques with qualified, professionally trained, and pro-active administrators suited for the fast-changing world. Administrative machinery, which is not equipped with the necessary skills, knowledge, and attitude and is not in harmony with the needs of the progress, can retard the pace of development of a university. Finally, the same set of norms may not apply to all. Individual institutions must decide their mission, vision, and goals and it should be documented in the form of the Institutional Development Plan (IDP).Institutional Development Plan based on which institutions will develop initiatives, assess their progress, and reach the goals set therein, which could then become the basis for further public funding.

The Section on Effective Governance and Leadership for Higher Education Institutions aims at Independent, self-governed higher education institutions with capable and ethical leadership. Major activities for this are a Three-level phased system of graded autonomy and degree-granting power to institutions; Mandatory accreditation of all Institutions; IDP as measurable parameters for monitoring IoE performance; ERP management in HEIs; Robust Grievance Redressal Mechanism at Institution level; and Leadership training and Continuous Professional Development.

Strengthening the student support system in Higher Education Institutions is a continuous process. UGC shall provide a framework for Institutional Development Plan (IDP) keeping in view the requirements of all the HEIs, and in turn, the HEIs shall develop their IDPs based on the framework prepared as per the NEP 2020 to assess the requirements such as faculty shortage, administrative staff, ICT, physical infrastructure for teaching-learning, continuous professional development, student support, and to address the ad-hoc teachers, tenure track faculty, promotion and facilitating lateral transfer from autonomous to teaching to research universities. The institutions will be ready to face challenges in progressing towards multi-disciplinarity in its letter and spirit as per NEP 2020. The framework shall provide an insight to HEIs as to how infrastructure facilities will be upgraded, student support systems like sports facilities will be augmented, academic deficiencies like laboratories, etc will be addressed to bring them at par with the best institutions to attract the best talent in teaching and learning. IDPs will not only be standalone plans but shall have multifaceted interfaces to look into the perspective of the institution holistically.

INSTITUTIONAL DEVELOPMENT PLAN (IDP) IN THE CONTEXT OF NATIONAL EDUCATIONAL POLICY (2020):

National Education Policy (NEP) 2020 recognises the importance of Institutional Development Plan and recommend that each institution will make a strategic Institutional Development Plan shall be prepared with the joint participation of Board members, institutional leaders, faculty, students, and staff based on which institutions will develop initiatives, assess their progress, and reach the goals set therein, which could then become the basis for further public funding as evidenced from the policy statements quoted below:

Para 12.3: Second, each institution will integrate its academic plans ranging from curricular improvement to quality of classroom transaction - into its larger Institutional Development Plan (IDP). Each institution will be committed to the holistic development of students and create strong internal systems for supporting diverse student cohorts in academic and social domains both inside and outside formal academic interactions in the classroom. For example, all HEIs will have mechanisms and opportunities for funding of topic-cantered clubs and activities organized by students with the help of faculty and other experts as needed, such as clubs and events dedicated to science, mathematics, poetry, language, literature, debate, music, sports, etc. Over time, such activities could be incorporated into the curriculum once appropriate faculty expertise and campus student demand are developed. Faculty will have the capacity and training to be able to approach students not just as teachers, but also as mentors and guides.

Para 13.2 As the most basic step, all HEIs will be equipped with the basic infrastructure and facilities, including clean drinking water, clean working toilets, blackboards, offices, teaching supplies, libraries, labs, and pleasant classroom spaces and campuses. Every classroom shall have access to the latest educational technology that enables better learning experiences.

Para 13.6: In keeping with the vision of autonomous institutions empowered to drive excellence, HEIs will have clearly defined, independent, and transparent processes and criteria for faculty recruitment. Whereas the current recruitment process will be continued, a 'tenure-track' – i.e., suitable probation - period shall be put in place to further ensure excellence. There shall be a fast-track promotion system for recognising very high-impact research and contribution. A system of multiple parameters for proper assessment of performance, for 'tenure' (i.e., confirmed employment after probation), promotion, salary increases, recognitions, etc., including peer reviews, student reviews, innovations in teaching and pedagogy, quality and impact of research, professional development activities, and other forms of service to the institution and the community, shall be developed by each HEI and clearly enunciated in the institution's Institutional Development Plan (IDP).

Para 18.4: The primary mechanism to enable such regulation will be accreditation. The second vertical of HECI will, therefore, be a 'meta-accrediting body', called the National Accreditation Council (NAC). Accreditation of institutions will be based primarily on basic norms, public self-disclosure, good governance, and outcomes, and it will be carried out by an independent ecosystem of accrediting institutions supervised and overseen by NAC. The task to function as a recognized accreditor shall be awarded to an appropriate number of institutions by NAC. In the short term, a robust system of graded accreditation shall be established, which will specify phased benchmarks for all HEIs to achieve set levels of quality, self-governance, and autonomy. In turn, all HEIs will aim, through their Institutional Development Plans (IDPs), to attain the highest level of accreditation over the next 15 years, and thereby eventually aim to function as self-governing degree-granting institutions/clusters. In the long run, accreditation will become a binary process, as per the extant global practice.

Para 18.5: The third vertical of HECI will be the Higher Education Grants Council (HEGC), which will carry out funding and financing of higher education based on transparent criteria, including the IDPs prepared by the institutions and the progress made on their implementation. HEGC will be entrusted with the disbursement of scholarships and developmental funds for launching new focus areas and expanding quality programme offerings at HEIs across disciplines and fields.

Para 19.5: While being provided with adequate funding, legislative enablement, and autonomy in a phased manner, all HEIs, in turn, will display a commitment to institutional excellence, engagement with their local communities, and the highest standards of financial probity and accountability. Each institution will make a strategic Institutional Development Plan on the basis of which institutions will develop initiatives, assess their own progress, and reach the goals set therein, which could then become the basis for further public funding. The IDP shall be prepared with the joint participation of Board members, institutional leaders, faculty, students, and staff.

B. Template for IDP

General Instructions

I. Objectives of the IDP

i. Clearly define the mission of the institution.

ii. In light of the mission, carry out a needs assessment based on wide consultations to identify the goals, priorities, and commitments of the institution.

iii. Quantify the institution's goals using indicators and time-bound targets.

iv. Based on goals and priorities— identify capacity (human and financial) and organizational gaps and steps to bridge these gaps.

v. Develop annual activity plans that result, sequentially, in achieving the institution's goals. These activity plans will also serve as a tool for monitoring the implementation of the IDP.

II. The IDP will be prepared for five years, and contain a description of measures for sustainably beyond this period.

III. The IDP will be a living document, evolving as the strategic planning capacity of the institution increases. The indicators and targets, however, will be agreed upon in an MOU between the Department of Higher Education and the institution. These can only be amended with the Department of Higher Education'sconsent.

IV. The section titled 'Baseline Data' specifies the sources of data to be used for each table. Data on any variable contained in these tables shall be drawn from the same source when it appears in any other part of the IDP.

V. IDP DevelopmentSteps:
- Identify the Coordinator in charge of developing the IDP and assign responsibilities to other staff.
- Carry out SWOC analysis and needs assessment, documenting the consultations held and the conclusions and recommendations reached.
- Based on the needs assessment, identify the goals, priorities, and commitments of the institution.
- Draft an initial version of the IDP including indicators and time-bound targets.
- Share the initial draft of the IDP for consultations with all stakeholders.
- Finalise the IDP, based on the comments received.
- Identify the activities required to achieve the goals stated in the IDP and incorporate them into annual activity plans.

VI. IDP implementation grants will be awarded based on a competitive selection process carried out by a committee appointed by the Department of Higher Education. Approved IDPs will be published on the institution's website.

VII. The institution will be responsible for reporting to the Department of Higher Education on IDP implementation and progress against targets, based on timelines and formats prescribed by the Department and contained in the MOU.

1. VISION & MISSION

Describe the institution's vision for its future— the institution's expectations for its future self, embodying where the institution wants to be in commensurate with the National Education Policy that envisions an education system rooted in Indian ethos that contributes directly to transforming India, that is Bharat, sustainably into an equitable and vibrant knowledge society, by providing high-quality education to all, and thereby making India a global knowledge superpower.
Describe the overall mission and purpose of the institution.

2. INSTITUTIONAL PROFILE (History and Current Situation /Administrative Organization and Facilities / Performance Indicators / Situational Analysis)

1. Institutional Basic Information

1.1. Institutional Identity
1.2. Academic Information
1.3. Establishment Details
1.4. Accreditation Details
1.5. Faculty Status (Regular/On-Contract Faculty as of March 31st,2021)
1.6. Course and Examination Details

1.7. Students 'Profile
1.8. Facilities (Lab/Library/Hostel)
1.9. Research and Development
1.10. Sports and Culture
1.11. Financial Reports

2. Need Assessment

2.1. CurriculumExcellence
2.2. PedagogicalExcellence
2.3. AcademicAdministration
2.4. Examination Reforms
2.5. Infrastructural Development &Maintenance
2.6. Collaboration / Partnering with Knowledge and skills hubs
2.7. Effective institutional governance
2.8. StakeholdersInvolvement
2.9. ManpowerManagement
2.10. LegalCompliances
2.11. Creating Institutional Brand Image
2.12. Research &Development
2.13. Social outreach programs
2.14. Monitoring and evaluation
2.15. Employment
2.16. Supporting Students from DisadvantagedBackgrounds

3. THE ROLE OF THE UNIVERSITY IN CONTEMPORANEITY

The Role of University in contemporaneity is to educate for the constant change, through development and induction of skills and competencies of critical rationality which provides the intellectual willingness for permanent change and production of new knowledge. The role of the University is to instill among the learners a deep-rooted pride in being Indian, not only in thought, but also in spirit, intellect, and deeds, as well as to develop knowledge, skills, values, and dispositions that support responsible commitment to human rights, sustainable development and living, and global well-being, thereby reflecting a truly global citizen. The University has a major role in the affirmation of a development project and the national sovereignty in the conditions of globalization of the contemporary world. Higher Education, thus, is a fundamental tool to combat poverty, eradicate misery and promote economic and social development, through the formation of responsible and active citizens committed to the construction of societies focused on defending peace, human rights, and democratic values. To achieve that, it's necessary to find a new structure of academic and professional formation and to renew its faculty practices with the incorporation of new teaching methodologies and new information and communication technologies.

4. FUTURE PERSPECTIVE

A University with international presence and sustainability of its actions, with the widespread use of information and communication technologies in academic practices, curricular flexibility in the formation and internal and external mobility, keeping the offer of courses in strategic areas and quality formation with new modes and continued education and being a reference in the production of knowledge in border and strategic areas for the socioeconomic development, pursuing innovation, with close interaction with society, public authorities, the productive sector, and social movements, fomenting public policies and sharing knowledge.

5. GOALS

The general goals of a University are focused on citizen formation, based on ethics, pluralism, democracy, contemporaneity, and its mission. They involve the formation of values, introduce their actions in moral, cultural, scientific, and technological order that struggle to account for changes in society.

Their interventions of the Universities are aimed at:

1. Assessing the operational strategies of knowledge, so that interdisciplinarity and teaching research-community service interrelations are performed according to the contemporary needs of the technical-scientific formation and the demands of the new sense of knowledge;

2. Incorporating, to teaching practices, an epistemological view that accounts for the complex nature of formal and informal, scientific and traditional knowledge, and that promotes a shift in focus

of the teaching-learning activity to understanding the pedagogical act as a process of formation of the educator and the learner to attain the highest global standards in quality education;

3. Maximizing the principle of flexibility and preparing teachers, technical-administrative staff, and alumni for multicultural interactions, needed to internal and external mobility, through credit transfer and mobility among various courses, programs, as well as among other national and international Higher Education institutions;

4. Preparing faculty, technical-administrative staff, and alumni so they can select and learn the new information and communication technologies in the teaching-learning process and research and community service activities;

5. Concerted curricular and pedagogical initiatives, including the introduction of contemporary subjects such as Artificial Intelligence, Design Thinking, Holistic Health, Organic Living, Environmental Education, Global Citizenship Education (GCED), etc. at relevant stages will be undertaken to develop these various important skills in students at all levels.

6. Enhancing university management, consolidating the process of planning and evaluation and the information systems, with state-of-the-art technology, so that they serve the administrative, academic, and human resources areas as facilitators with efficiency, efficacy, and effectiveness;

7. Incorporating to academic practices and administrative actions the principle of sustainability: environmentally correct, economically viable, socially fair, and culturally accepted.

6. GLOBAL GOALS

The global education development agenda reflected in Goal 4 (SDG4) of the 2030 Agenda for Sustainable Development, adopted by India in 2015 - seeks to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" by 2030. India will be promoted as a global study destination providing premium education at affordable costs thereby helping to restore its role as a Vishwa Guru.

An International Students Office at each HEI hosting foreign students will be set up to coordinate all matters relating to welcoming and supporting students arriving from abroad.

Research/teaching collaborations and faculty/student exchanges with high-quality foreign institutions will be facilitated, and relevant mutually beneficial MOUs with foreign countries will be signed.

Promotion of research collaboration and student exchanges between Indian institutions and global institutions through special efforts.

As the world is becoming increasingly interconnected, Global Citizenship Education (GCED), a response to contemporary global challenges, will have to be provided to empower learners to become aware of and understand global issues and to become active promoters of more peaceful, tolerant, inclusive, secure, and sustainable societies.

7. INSTITUTIONAL PEDAGOGICAL APPROACH

The fundamental methodological principle that guides all pedagogical activities is flexibility, communicating with ample and diversified competencies required by the job world, and, above all, with the new challenges of the "knowledge society". This concept entails the ideas of:

(a) Indivisibility: development of teaching, community service, and research activities integrated into the formal activities relevant to curricular content. Towards the attainment of such a holistic and multidisciplinary education, the flexible and innovative curricula of all HEIs shall include credit-based courses and projects in the areas of community engagement and service, environmental education, and value-based education. Environment education will include areas such as climate change, pollution, waste management, sanitation, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living. Value-based education will include the development of humanistic, ethical, Constitutional, and universal human values of truth (Satya), righteous conduct (dharma), peace (Shanti), love (prem), nonviolence (ahimsa), scientific temper, citizenship values, and also life-skills; lessons in Seva/service and participation in community service programmes will be considered an integral part of holistic education.

(b) Interdisciplinarity: integration of contents into the development of the study of a certain theme or conceptual axis, with their workload and evaluation calculated in the curricular components involved.

(c) Formation integrated to social reality: in addition to the solid theoretical formation, the University commits itself to the formation of the citizen, integrating contents to current social reality, emphasizing inclusion policies, equality of access, and respect to socioeconomic differences and those related to special educational needs individuals.

(d) Theory-Practice articulation: overcoming of the theory-practice dichotomy, performed, mainly, in the internship and community service curricular activities.

To achieve these broad objectives, the Pedagogical Practices and Policies shall be pivoted around the following:

7.1 - TEACHING POLICY

The Teaching Policy for **Undergraduate Studies**, **Open Distance Learning & MOOCs,** and **Graduate Studies** shall be driven by the NEP 2020 and the guidelines will be as per the prescribed framework of UGC-appointed Committees.

7.2 - RESEARCH POLICY

The Research Policy shall be driven by the NEP 2020 and the guidelines will be as per the prescribed framework of UGC-appointed Committees.

7.3 - COMMUNITY SERVICE POLICY

The Community Service Policy shall be driven by the NEP 2020 and the Universities are expected to engage with the local communities within their precincts, local areas, cities, and the region. The idea of ***'vocal for local'*** resonates with the notion of engaging with people through public participation. In order to achieve the objectives of social inclusion and to achieve the objectives of these SDG 11, it's important for developing nations to address issues and concerns of the communities, their well-being, and support endeavors to become self-sufficient. The Universities with their intellectual capitals can identify the critical issues of the committee, which may be specific to the region, and can provide appropriate solutions for the same.

7.4 - MANAGEMENT POLICY

The Management Policy shall be driven by the NEP 2020. Every Institution is expected to align its Policy of Governance and Management in line with its vision and mission statements, which is inclusive and ensures that every stakeholder participates in the process of delivery of education. An enabling mechanism is to be established which creates equal opportunities for all the stakeholders at respective levels, with an objective to ensure continuous improvement, which is focused on quality and achieving excellence in Higher Education. The institutions can pursue innovation in such approaches, which are relevant in times and meet the expectations of the students, faculties, and staff, besides providing greater access to higher education to achieve the target of 50% GER by 2035. The IDP should highlight the initiatives taken by institutions of higher education in establishing an efficient framework for management and governance.

7.5 - SOCIAL RESPONSIBILITY

The Social Responsibility Policy shall be driven by the NEP 2020. In the Indian context and our current demographics, the social capital if transformed and harnessed appropriately can become a great resource for the nation which will foster growth and development and can transform our nation as one of the leading economies in the world. The universities can play a significant role as part of their social responsibility towards people residing in different regions of the country having differential socio-cultural diversities which demand variable response, which befits the local culture and the context. Various missions of Govt. of India and schemes are focused in this direction, while the universities can assist the local administration, State, and Central Govt. through their intellectual resource, research projects, research inquiries, and multiple feasibility studies which can contribute to social sustainability at large. The universities need to take up a stewardship role in this direction to service the people of India in various sectors of the economy, governmental and non-governmental agencies through an approach of equity and inclusion. The universities may establish their own agendas and develop programs for such social engagements and may be included as part of their prospective plan through IDP.

8. SERVING PEOPLE WITH SPECIAL EDUCATIONAL NEEDS

There are certain facets of exclusion, that are particular to or substantially more intense in higher education. These must be addressed specifically, and include lack of knowledge of higher education opportunities, the economic opportunity cost of pursuing higher education, financial

constraints, admission processes, geographical and language barriers, poor employability potential of many higher education programmes, and lack of appropriate student support mechanisms.

Institutional Development Plan must contain specific plans for action on increasing participation from SEDGs, including but not limited to the following items:

(a) Mitigate opportunity costs and fees for pursuing higher education
(b) Provide more financial assistance and scholarships to socio-economically disadvantaged students
(c) Conduct outreach on higher education opportunities and scholarships
(d) Make admissions processes more inclusive
(e) Make curriculum more inclusive
(f) Increase employability potential of higher education programmes
(g) Develop more degree courses taught in Indian languages and bilingually
(h) Ensure all buildings and facilities are wheelchair-accessible and disabled-friendly
(i) Develop bridge courses for students that come from disadvantaged educational backgrounds
(j) Provide socio-emotional and academic support and mentoring for all such students through suitable counselling and mentoring programmes
(k) Ensure sensitization of faculty, counsellor, and students on the gender-identity issue and its inclusion in all aspects of the HEI, including curricula
(l) Strictly enforce all no-discrimination and anti-harassment rules
(m) Develop and support technology tools for better participation and learning outcomes.
(n) Conduct outreach programmes on higher education opportunities and scholarships among SEDGs

9. FACULTY

The most important factor in the success of higher education institutions is the quality and engagement of their faculty. The various factors that lie behind low faculty motivation levels must be addressed to ensure that each faculty member is happy, enthusiastic, engaged, and motivated towards advancing her/his students, institution, and profession. A system of multiple parameters for proper performance assessment, for 'tenure' i.e., confirmed employment after probation, promotion, salary increases, recognitions, etc., including peer and student reviews, innovations in teaching and pedagogy, quality and impact of research, professional development activities, and other forms of service to the institution and the community, shall be developed by each HEI and enunciated in its Institutional Development Plan (IDP).

To this end, it is recommended that the following initiatives achieve the best, most motivated, and capable faculty in HEIs:

(a) All HEIs will be equipped with the basic infrastructure and facilities, including clean drinking water, clean working toilets, blackboards, offices, teaching supplies, libraries, labs, and pleasant classroom spaces and campuses. Every classroom shall have access to the latest educational technology that enables better learning experiences.
(b) Teaching duties also will not be excessive, and student-teacher ratios are not too high so that the activity of teaching remains pleasant and there is adequate time for interaction with students, conducting research, and other university activities. Faculty will be appointed to individual institutions and generally not be transferable across institutions so that they may feel truly invested in, connected to, and committed to their institution and community.
(c) Faculty will be given the freedom to design their own curricular and pedagogical approaches within the approved framework, including textbook and reading material selections, assignments, and assessments. Empowering the faculty to conduct innovative teaching, research, and service as they see best will be a key motivator and enabler for them to do truly outstanding, creative work.
(d) Excellence will be further incentivized through appropriate rewards, promotions, recognitions, and movement into institutional leadership. Meanwhile, faculty not delivering on basic norms will be held accountable.
(e) In keeping with the vision of autonomous institutions empowered to drive excellence, HEIs will have clearly defined, independent, and transparent processes and criteria for faculty recruitment. Whereas the current recruitment process will be continued, a 'tenure-track' i.e., suitable probation period shall be put in place to further ensure excellence.
(f) Faculty Selection Criterion- Experience- Academic Experience, Professional experience, Equivalence Criterion for Field/Industry experience to equivalent Academic Work- Equivalence Matrix. The above will guide the future growth and progression of each discipline, interdisciplinary engagement, bridging the gap between theory and practice, and industry institution interaction

(g) Procedures for Documentation of experience and Level Information to be shared with Selection Committee Experts for objective and transparent selection.
(h) Procedures for Transparent and Objective Mechanisms for Evaluation of in -house Faculty through Self Appraisal Documents, Peer review Committees on Annual Basis to review growth and contribution to Teaching (UG/PG/Doctoral), Core Research, Research Projects, Consultancy Projects, Extension Activities, Administrative/Leadership Role, Publications (Seminar/Conferences/Journals-Peer Reviewed /Scopus Indexed/Impact factor, etc.) AcomprehensiveEvaluation Matrix with objective grading is to be developed.
(i) Procedure and Constitution of Selection Committees concerning the position, expertise of members on Committees/Number of Internal and External Experts/Nominees.

10. TECHNICAL-ADMINISTRATIVE STAFF

The mechanism used to define personnel needs, for personnel allocation and internal move, is the assessment of the workforce, which consists of the formulation of matrices that indicate the quantity and the qualification of the technical staff necessary to the operation of the institution's administrative and academic units, considering the organizational environments, the organizational structure, and their competences. Associated with the practices of qualification, organizational socialization, and performance appraisal, the policy of formative promotion of specialized personnel integrates the Career Development Plan and implies the formation of personnel capable of contributing to the upgrading of the university management and supporting the achievement of the institutional goals. The performance appraisal consists of the establishment of sectorial and individual work plans with quantitative and qualitative performance standards over which work process agents issue valued grades that will be used as a reference for career progression as well as for corrective measures.

11. STUDENT BODY

A good educational institution is one in which every student feels welcomed and cared for, where a safe and stimulating learning environment exists, where a wide range of learning experiences are offered, and where good physical infrastructure and appropriate resources conducive to learning are available to all students. Attaining these qualities must be the goal of every educational institution. However, at the same time, there must also be seamless integration and coordination across institutions and all stages of education. Students are the prime stakeholders in the education system. Vibrant campus life is essential for high-quality teaching-learning processes. Towards this end, students will be given plenty of opportunities for participation in sports, culture/arts clubs, eco-clubs, activity clubs, community service projects, etc. In every educational institution, there shall be counselling systems for handling stress and emotional adjustments. Furthermore, a systematized arrangement shall be created to provide the requisite support to students from rural backgrounds, including increasing hostel facilities as needed. All HEIs will ensure quality medical facilities for all students in their institutions.

12. STRATEGIC PROGRAMS/ GOALS *(These are indicative only. Institutions can set their strategic goals in their own words)*

12.1 Supporting the overall academic success of students
12.2 Increasing overall graduation rates
12.3 Increasing overall retention rates
12.4 Creating opportunities to gain knowledge, skills, and credentials in high demand fields
12.5 Identifying new sources of funding for university activities
12.6 Enhancing the university's regional and national reputation
12.7 Increasing the graduation rates of under-represented students
12.8 Improving the employment placement rate of students after graduation
12.9 Improving communication with key stakeholders
12.10 Increasing the retention rates of underrepresented students
12.11 Increasing support for the academic success of underrepresented students
12.12 Increasing grants and contract activity
12.13 Enhancing institutional network capacity
12.14 Improving alumni engagement
12.15 Fostering greater engagement with the local community
12.16 Continuous Process for Campus Planning and Development
12.17 Building Environmentally Sustainable Campus Facilities
12.18 Improving the recruitment of non-traditional students
12.19 Any others

13. DEVELOPMENT OBJECTIVES *(For each heading, the number of objectives and the list of activities under each objective can be less than or more than three as per plan.)*

13.1 Curriculum Excellence Objectives (for universities/ autonomous colleges only)
13.2 Pedagogical Excellence
13.3 Academic Administration
13.4 Examination Reforms
13.5 Infrastructural Development &Maintenance
13.6 Partnering with Knowledge Hubs
13.7 Automation and Information Technology
13.8 Stakeholders Involvement
13.9 Manpower Management
13.10 Legal Compliances
13.11 Creating Institutional Brand Image/ Ranking
13.12 Research &Development
13.13 Social Outreach Programmes
13.14 Monitoring and Evaluation
13.15 Employment
13.16 Supporting Students from Disadvantaged Backgrounds
13.17 Others

Example: 13.1 Curriculum Excellence Objectives- (Define objectives and required activities for the goals exemplified above as applicable for the institution in the same format as above for all the developmental objectives listed from 13.1-13.17)
Goal: *Supporting the overall academic success of students*
Objective: Ensure high-quality academic counselling throughout the university
Objective: Ensure that students who are falling behind receive additional academic support
Objective: Expand tutoring and other academic assistance programs
Goal: *Creating opportunities to gain knowledge, skills, and credentials in high-demand fields*
Objective: Identify high-demand fields that fit with the mission of the university and complement the institution's current offerings
Objective: Add new programs and expand current programs in high-demand fields cont.

13. Curriculum Excellence Objectives

Based on the Needs Assessment undertaken in an earlier section, please define the objectives and the required activities **that these objectives are reasonably attainable considering your institutional capacity and likely funding support**	
Objective 1	
Objective 2	
Objective 3	

The activities mapped with the nodal person and milestones can be mapped like this-

List the activities required to meet Curriculum Excellence Objectives									
Objective (Number)									
Sl. No.	**Activity**	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Nodal person**	**Monitoring & Evaluation Plan**	**Sustainability plan**
1									
2									
3									

14. METRICS & TARGETS

Provide the targets against the deliverables as listed below

Indicator(s)	Present Rating	Target Rating (after 5 years)

GOVERNANCE QUALITY INDEX -		
% of Faculty Positions vacant		
% of Non-teaching staff to teaching Staff		
Total no of under graduation programs		
Total no of post graduate programs		
Total no of doctoral programs		
Faculty appointment - turn around/ cycle time in months		
Delay in payment of monthly salary payment of faculty		
ACADEMIC EXCELLENCE INDEX -		
Delay in exam conduction and declaration of results *		
Plagiarism Check *		
Accreditation		
Teacher Student ratio		
% of Visiting professors *		
% of students passing out with 60% or more marks		
% of graduates employed by convocation		
% Number of students receiving awards at National and International level		
% Of expenditure on Library, cyber library, and laboratories per year		
% Of faculty covered under pedagogical Training		
% Of faculty involved in "further education"		
Dropout rate		
No foreign collaborations		
Subscription to INFLIBNET		
EQUITY INITIATIVE INDEX -		
SC Student%		
ST Student%		
Gender Parity		
Existence of CASH (Committee Against Sexual Harassment)		
Existence of Social Protection Cell		
Language assistance programs for weak Students		
RESEARCH AND INNOVATION INDEX		
Per-faculty publications		
Cumulative Impact Factor of publication		
H Index of scholars		
% Of staff involved as principal researcher		
% Of research projects fully or more than 50% funded by external agencies, industries, etc.,		
Total no of patents granted		
% Of faculty receiving national/ international awards		
% of research income		
Doctoral degrees awarded per academic Staff		
% Doctoral degrees in the total number of degrees awarded		
% Expenditure on research and related Facilities		
Digitization of master's and Doctoral thesis		
UPE/CPE		
% Of Income generated from non- grant Sources		
STUDENT FACILITIES -		
No of new professional development Programs		
Existence of Placement Cells and Placement Plan		
% Of expenditure on infrastructure maintenance and addition		
Availability of hostel per out-station female student		
Availability of hostel per out-station male student		
Student Experience Surveys		
Infrastructure and Others -		
%Income generated from training courses		
% Income generated from consulting		
Computer coverage		
Internet connectivity of Campus		

15. INSTITUTIONAL PROJECT BUDGET

S.No	Activities	Project Life Allocation	Financial year				
1	Infrastructure						
	1. Modernization and strengthening of laboratories including contractual technicians' recruitment						
	2. Establishment of new laboratories for existing UG and PG programs and new PG programs including contractual technicians' recruitment						
	3. Modernization of classrooms						
	4. Updation of Learning and Training Resources						
	5. Procurement of furniture						
	6. Establishment/ Upgradation of Central and Departmental Computer Centres including contractual technicians' recruitment						
	7. Modernization/improvements of supporting departments						
	8. Modernization and strengthening of libraries and increasing access to knowledge resources						
	9. Refurbishment (Minor Civil Works)						
	10. Staff and Students residential infrastructure like a hostel, mess, etc.,						
	10. Enhancing Sports, Cultural and Recreational Facilities with emphasis on the creation of Social Spaces						
	11. Creation of Public Realm and enhancing Quality of Life on Campus						
	12. Investment in preparation of comprehensive masterplan to guide future growth of campus						
2	Research and development support						
	Providing Teaching and Research Assistantships to existing and new M.Phil. and Ph.D. programs						
	Provision of resources for research support						
	Enhancement of R&D and institutional consultancy activities						
3	Faculty Development Support						
	Faculty and Staff Development (including pedagogical training, and organising/participation of faculty in workshops, seminars, and conferences) for improved competence based on Training Needs Assessment						
4	Institutional reforms						

	Technical assistance for procurement and academic activities						
	Institutional management capacity enhancement						
5	Academic support						
	Creation of new departments/courses						
	Enhanced Interaction with Industry						
	Temporary faculty engagement						
	Student support activities						
6	Others						
	TOTAL						

16. GAP ANALYSIS / SWOT analysis

16.1 Self-Assessment for Need Analysis
16.2 Financial Reports
16.3 Goals
16.4 Detailed description of Goals
16.5 Year-wise Activity Plan (description of milestones and activities)
16.6 Institutional Project Budget
16.16 Overall Institutional Performance Targets
16.8 Implementation Plan
16.9 Measures to ensure Sustainability
16.10 Bridging the Resource Gap

17. FINANCIAL AND BUDGETARY SUSTAINABILITY

18. DOCUMENTS ON STAKE HOLDER'S CONSULTATION

19. FOLLOW-UP AND EVALUATION

20. TEMPLATE FOR MANDATORY DISCLOSURES about INSTITUTIONAL DEVELOPMENT PLAN (IDP)

	Research Universities/Teaching Universities/Autonomous Colleges	***Remarks***
Mandatory Disclosures	**(a) Up-to-date copies of -** **the Act, Statutes, and Ordinances.** **(b) Minimum working days in the university, period of vacations, examination days, and the number of days when actual teaching is conducted excluding the days for the preparation for the examination.** **(c) Where there are admission tests a note indicating the minimum criteria laid down along with admission policy and variations, if any, from the basis specified for admission.** **(d) The statistics of the students admitted below the minimum qualifications referred to in clause (c) and justification for the same.** **(e) Residential accommodation for students.** **(f) Residential accommodation for staff.** **(g) The annual accounts of the university shall be prepared on an accrual basis as per the "Formats of Accounts" approved by the Ministry of Human Resource Development, including the Audit Report.** **(h) The total staff strength in different categories with qualifications and**	

	research experience. This could be intimated by the university once in every three years, with changes, if any, to be intimated every year **(i) Courses offered at different levels.** **(j) Student's strength at various stages.** **(k) Teacher-student ratio.** **(l) Results of examinations with divisions.** **(m) Status of accreditation of the University and its colleges by a recognised agency.** **(n) Status of compliance with various regulations of University Grants Commission/Regulating Body.** **(o) Status of off-campus centres or study centres and distance education centres being operated by the university.** **(p) Self-financing courses are being offered by the university.** **(q) Teaching staff - non-teaching staff ratio.** **(r) Position of vacancies against teaching staff posts.** **(s) Innovation in academics, research, and management, if any.** **(t) Conformity with norms and requirements or regulations of various professional Councils.** **(u) Grants received from Funding Agency or Central Agencies, scheme-wise during the last financial year and position of utilization.** **(v) Pending utilization certificate in respect of University Grants Commission grants, if any.** **(w) Programmes of study being offered in collaboration with any foreign university, with details thereof.**	
Digital InterfaceONE Nation ONE Data		**Frequency updates or disclosures**
Unique ID for HEIs	PAN	Constant except in case of merger/takeover etc
Unique ID for Teacher	Teacher Information Format (TIF) designed to collect the data on each teachers' details of all the teachers employed with the University/ Institution of Higher Education through Data Capture Format (DCF) of AISHE (2016-17 onwards) may generate unique end-to-end encrypted data.	Periodic in case of employee turnover
Unique ID For Students	End to End Encrypted Unique Student ID [Aadhar Number (12 Digit Numeric) – Not mandatory OR DDMMYYYY(DoB)/YY (Year of Admission)/XXXXXXXXXX (PAN of Institution)/ZZZZ (Serial No of Admission in HEI in that session) (To be generated automatically by HEI Portal at the time of registration of DHE/MoE). The Unique ID shall be generated for each student across the country in a given academic session at the time of first entry to HEI and shall remain invariant throughout the life capturing	In every academic session

	the following details: • Name of Student • Date of Birth (DD/MM/YYYY) • Gender (M / F/ T) • Reservation Category (GN /OBC/ SC/ST) • A person with Disability (Yes / No) • Year of Admission (YYYY) • Mode of Admission (R/O//P/L): regular, ODL, Part Time/Lateral Entry • HEI Code • State Code (SS) as per transport authority. • Course Level (B- Bachelor, M-Masters-Doctoral, etc.) • Course Stream (A- Agriculture, H-Horticulture, F-Fisheries, etc.) • Email Id • Mobile (10 Digit Numeric) • Nationality • Blood Group (Optional) • Address • Admission Date (DD/MM/YYYY)	
Physical Infrastructure [Within the framework of DST F.No.SM/25/02/2020 (Part-I) dated 15th February 2021: Guidelines for acquiring and producing Geospatial Data and Geospatial Data Services includingMaps]	Following Thematic Maps by the integration of Remote Sensing with GIS data [spatially referenced data represented by vector and raster forms (including imagery) and attribute tables represented in tabular format] shall be uploaded by HEIs for online monitoring of the following features: • Boundary with a schedule of boundaries of related pockets of HEIs • Footprints of each building (structure) and its use (residential, commercial, etc.), number of levels (storeyies), community centres, community toilets, schools, health clinics/post offices, and religious structures. - Structures related to garbage collection, boundary walls and fencing and other utilities, plinth level of each building structure. - Open (vacant) plots, playgrounds, parks, and gardens - Commercial and non-household-based activity areas such as small factories and manufacturing units if any. Data Layers in GIS A layer represents geographic data, such as a particular theme of data. Examples of map layers include streams and lakes, terrain, roads, political boundaries, parcels, building footprints, utility lines, and orthophoto imagery. Each map layer is used to display and work with a specific GIS dataset. Various layers can be superimposed over each other to create various maps and do spatial analysis as described below: • Width and length of plots of all occupants within the building footprints of HEIs. • Approach road, streets, lanes, by-lanes in the HEI. • Existing land use such as residential, commercial including petty shops or others. • Type and length of existing roads (CC, BT, WBM, and earthen)	***After the details are uploaded once, only incremental changes as and when affected shall be uploaded***

	• Existing water supply lines and details of Public Stand Posts (PSPs), bore wells, hand pumps, and individual connections. • Details of sewerage system and Sanitation services – individual, community, and public toilets. • Details of storm water drains and the pucca / kutcha drains leading to final disposal points. • Solid waste management system with details of dustbins and collecting points. • Street lighting with pole number, location, type of fixture, and distance to the transformer and its capacity. • Community Hall, Health Centre, primary school, and other educational institutions. • Contours at 0.5 m and 1.0 m intervals shall be incorporated through total station or similar spatial survey techniques. The third-party **Data Verification and Validation (DVV)** through its Technical Cell experts and/or its designated officials or Empaneled Agency shall carry out checks to ensure the following: o Index grid and inventory of the cadastral sheets, as much as available. o Inventory of the other maps like development plan, infrastructure/ facility/amenity maps with the date(s) of production o Clarity and readability of the scanned files. o Correct mosaic o Digitization accuracy o Layers name in digitization and colour codes o Topological accuracy o Metadata for scanned files o Correctness, mapping accuracy, and consistency of the output produced with respect to the input map. The geotagged images that shall be required to be uploaded are given as follows: • Land records and survey data for property, land, water, and holding, etc. (The spatial features can be extracted from Ariel imagery using photogrammetry methods.) • Utility infrastructure GIS data capture for water lines, road network, pavements, sewerage network, and other related features. • Environmental and geological GIS Data capture from geological maps, weather maps, mining and mineral exploration maps, etc. • Details of transportation facilitation, hydrographic mapping, vegetation, and other types of related features; with analysis of regional/cultural issues, • Electrical power networks • Navigation data for easy navigation The Disclosures regarding Physical Infrastructure and relief features must support the following: ¬Spatio-Temporal Analysis (Land use:	

	what has changed over the previous years in the vicinity of HEIs, garbage dump, etc., and why?) ¬ Resources inventory (what is available and where?) ¬ Network Analysis (How to get to a place in the shortest amount of time?) ¬ Location Analysis (Where is the best place to locate a garbage dump, industry, warehouse, etc.?) ¬ Terrain Analysis (Which areas are most vulnerable to a natural disaster such as flood? Or where to locate a cyclone shelter?) ¬ Calculation of areas, distances, route lengths. ¬ Proximity Analysis (finding out the area surrounding a place or an event for decision making) The threshold value prescribed by DST for 1. On-site spatial accuracy shall be one meter for horizontal or Planimetry and three meters for vertical or Elevation. 2. Gravity anomaly shall be 1 milli-gal. 3. The vertical accuracy of Bathymetric data in Territorial Waters shall be 10 meters for up to 500 meters from the shoreline and 100 meters beyond that. 4. the attributes in the negative list, different threshold values as well as regulations as warranted can be laid down.	
Conformity to IDP and roadmap for improving the conducive Teaching-learning environment based on SWOC to be earmarked on land parcels available with HEIs	• Strategic Framework for Campus Development • Academic Facilities on Campus • Residential Facilities –Staff and Students • Sports Recreation and Campus Facilities • Campus Utilities	
Modern Record Rooms/Land Records Management Centres	Support for upgrading modern record rooms/land records management centres with a) a storage area with compactors/storage devices for physical storage of records and maps, b) an operational area with computers/servers, storage area network (SAN), printers, etc., and c) a public services area for waiting/reception, etc. The land records details may be indexed and stored. A document management system, i.e., scanning of old records, digital storage, and retrieval system should be introduced for online storage and retrieval of the records, indexing of data and images, etc. so as to move towards cyber record	

	rooms/maintenance of land records in the dematerialized (demat) format.	
Data Security	The asset safeguarding and data integrity may conform to the sets of standards codified by the International Organization for Standardization (ISO): one is the ISO/IEC 27001, also called the information security management system (ISMS) standard of 2005; the other is ISO/IEC 27002:2005, a codification of practices for information security management. The ISO/IEC 27001 (earlier called ISO/IEC BS-17799) lists the standards required from any management in implementing information system security functions.	

A. Suggested Minimum Standards for HEIs Framework for Institutional Development Plan- Physical Planning Imperatives: Campus Planning & Design, Campus Planning concept, Models for Development, Design Parameters affecting Development of Campus form, etc.

In the light of NEP 2020 the HEIs can strategize actions for arriving at a common uniform framework as enabled by specific regulations:

(a) Academic infrastructure/facilities commensurate to the requirements of three-tiered multidisciplinary degree-granting institutions or for those who have to evolve and upgraded so that teaching-learning in all HEIs could be improved to ensure that all HEIs have the state-of-the-art academic infrastructure, including technology-enabled/assisted learning ecosystem that is required for effective organization of teaching-learning activities with special focus on Blocks/districts which have GERs below the national average. The HEIs shall achieve the Faculty/ Teacher - Student Ratio as per below;

For Under Graduate Courses (FSR)

- Social Sciences (1:30); Sciences (1:25); Mass Media (1:15); Commerce/Management (1:30); Professional Courses (1:25); Vocational Course (1:30), Engineering & Pharmacy-1:15, Architecture and Design Streams-1:10
- Autonomous degree-granting College can be given the flexibility of not more than 10-15% in STR
- The Elective courses, SEC, and AEC courses are undertaken as per the preference of the student. Hence, they can have variable STR. The minimum number of students in a Class shall be 20.
- For Practical/Experiment classes the proposed STR 1:15

For Post Graduate Courses (FSR)

- Science 1:10
- Humanities 1:15
- Commerce/Management 1:15
- Mass Media 1:10
- Professional Courses 1:10
- Engineering & Management- 1:10
- Architecture & Design: 1:5
- Pharmacy 1:5

In addition to the above, the HEIs may also observe the following considerations regarding FSR:

a. Teaching Universities /Autonomous Colleges to have 25% student strength of the number of students in its Undergraduate Courses
b. Tribal Universities/ Universities in a remote area can be allowed an FSR of 20 in undergraduate courses, in their first five years of establishment
c. The implementation of TSR to bridge the teaching-learning gap
d. Academic collaborations with supporting staff need to be encouraged to provide effective ways of teaching and learning.
e. Based on technological infrastructure, some online courses are to be designed and developed to assist in reducing student numbers by retaining the quality of education.
f. There are various E-learning platforms available by HRD-UGC. Other similar more advanced versions of E-learning platforms including self-learning, blended e-learning need to be developed to address challenges of effective learning.

g. Team-teaching activity can be used to ensure the quality of teaching and learning practices to minimize the overload faced by teachers and to maintain TSR in HEIs.
h. The implementation of TSR will be subject to budgetary allocation by the competent authority in a phased manner
i. Transparency in maintaining records of TSR by Institutions will assist in a fair evaluation of standards of education

(b) Suggestive upgrade plans for academic infrastructure/facilities for blended learning modes, online learning, etc.; and other academic infrastructure such as the library, laboratories, etc.; infrastructure for the differently-abled students; facilities/infrastructure required for faculty, facilities/infrastructure for promoting sports and wellness and arts.
(c) Improve student support systems required to optimize learning and promote overall learner development to make available high-quality academic support for educationally disadvantaged groups ensuring students' physical health and emotional wellness.
(d) Address disparity to assess academic infrastructure/facility-related qualitative as well as quantitative deficiencies in various states: Currently, there is a data deficit relating to the status regarding the availability of academic infrastructure in HEIs. It is proposed to obtain and collate information from State governments regarding several low-performing Universities/& non-accredited colleges in each State/UT to assess the adequacy of infrastructure and academic facilities available in HEIs.
(e) Develop effective CPD of their faculty: including capacity development in the field/discipline, pedagogical capacities, research, and contribution to practice to achieve the following:
    - Each faculty member is happy, enthusiastic, engaged, and motivated towards advancing her/his students, institution, and profession.
    - All HEIs must-have essential infrastructure viz, modern digital-enabled classrooms, clean drinking water, clean working toilets, offices, teaching supplies, labs, and pleasant classroom spaces. Every classroom shall have access to the latest educational technology that enables a better learning experience.
    - Teaching duties will not be excessive, and student-teacher ratios not too high; inculcate a sense of belongingness
    - Empower the faculty to conduct innovative teaching, research, and service; freedom to creatively design their own curricular and pedagogical approaches within the approved framework
    - Incentivize the excellence of faculty.
    - Faculty recruitment must be through clearly defined, independent, and transparent processes and criteria.
    - Fast-track promotion system for recognizing high-impact research and contribution.
    - Excellent faculty with high academic and service credentials as well as demonstrated leadership and management skills will be identified early and trained through a ladder of leadership positions.
(f) In the faculty cadre distribution can be worked out in the ratios of Professor: Associate Professor: Assistant Professor shall be as follows:
    a. Sciences – 1:2:4
    b. Humanities, Social Sciences – 1:1:4
    c. Commerce and Management – 1:2:4
    d. Engineering and Pharmacy – 1:2:4
    e. Architecture and Design streams – 1:2:6
(g) The service conditions shall determine the criteria for faculty recruitment rules and progressive growth of the faculty. Further for synchronisation of vocational education, skills, and general education in view of recognition of prior knowledge/ experiential knowledge will be qualified by suitable quality packs and equivalence frameworks shall be dealt with relevant guidelines for HEIs.
(h) In order to bridge the gap between academics and profession (professional streams) and to support industry institution interaction,50% of the total Faculty requirement can be Contractual (Tenured) or Visiting from the profession/industry to ensure that the balance between theory and practice is maintained besides the NEP 20 also suggests the appointment of full-time Professors from Research and Professors from Profession.

Thus, the IDPs shall be a comprehensive framework for a minimum viable plan for "Institutional Development" having multifaceted interfaces:

(i) To Prepare Institutional Development Plans for Better Quality Assessment and Enhancement of Human Resources and Infrastructural Requirements as detailed in NEP2020:
    - abiding by the environmental, sustainability standards and statutory framework of a subject

that is in the concurrent list
- for the three-tiered structure of HEIs as envisaged in NEP2020
- with special reference to the requirements of these institutions as Brownfield vs. Greenfield

(ii) Develop Institutional Development Plans that contain specific plans for action on increasing participation from SEDGs, including but not limited to the above items. IDP to be based on the futuristic needs of education and the holistic development of the student. Each institution will integrate its academic plans ranging from curricular improvement to quality classroom transactions into its larger Institutional Development Plan.

(iii) All HEIs will develop IDPs to assess:
- human resources requirements, in terms of faculty and administrative staff shortages,
- the physical infrastructural facilities
- ICT related technology requirements
- Learning infrastructure, such as labs, libraries, etc.
- CPD requirements
- Student Support related areas
- Teaching infrastructure

(iv) To improve teaching-learning in all HEIs, it is necessary to ensure that all HEIs have the state-of-the-art academic infrastructure, including a technology-enabled/assisted learning ecosystem that is required for effective organization of teaching-learning activities with a special focus on Blocks/districts which have GERs below the national average. Specific initiatives will include the following:

(a) Upgrade academic infrastructure/facilities: An action plan will be prepared to upgrade academic facilities/infrastructure, including a technology-enabled/assisted learning ecosystem, in each identified HEI to support them to transform into large multi-disciplinary institutions. This would include the creation of video-based classes, and infrastructure for blended learning modes, online learning, etc.; and other academic infrastructure such as a library, laboratories, etc.; infrastructure for the differently-abled students; facilities/infrastructure required for faculty, facilities/infrastructure for promoting sports and wellness and arts, Financial support will be made available to selected HEIs to improve academic facilities required for effective organization of teaching-learning activities.

(b) Improve student support systems: Financial support will also be made available to selected HEIs to improve student support systems that are required to optimize learning and promote overall learner development. Students from socio-economically disadvantaged backgrounds will be supported with necessary learning resources to enable them to complete undergraduate and graduate education successfully. Universities and colleges will be encouraged to make available high-quality academic support for educationally disadvantaged groups. Adequate funds and academic resources will be made available for this purpose. An appropriate mechanism will be put in place to make available counseling services in all HEIs. Also, each HEI will help students through placement assistance and career guidance to help them decide on their occupational choices, facilitate processes to identify employment opportunities, and set up interactions with potential employers. An efficient mechanism for grievance handling/redressal will also be created or upgraded. Each HEI will endeavour to create systems and processes that are required to ensure students' physical health and emotional wellness. Facilities for physical and emotional health support for students such as medical care and treatment in cases of illness or distress will be made available.

(c) Collect data to assess academic infrastructure/facility-related deficiencies: Currently, there is a data deficit relating to the status regarding the availability of academic infrastructure in HEIs. It is proposed to obtain and collate information from State governments regarding the number of low-performing Universities/& non-accredited colleges in each State/UT to assess the adequacy of infrastructure and academic facilities available in HEIs.

(d) HEIs will be responsible for the effective CPD of their faculty

All institutions will develop a CPD plan for the faculty and determine the process for its implementation – this would be part of the IDP. The plan should include capacity development in the field/discipline, pedagogical capacities, research, and contribution to practice.

Section 2

2.0 Guidelines for Campus Development

The IDP proposes the development controls given below in the table which need to be correlated to the existing development controls as per provisions of development controls prescribed through Masterplans of various cities and for Greenfield campuses in accordance with URDPFI guidelines.

1. The IDP suggests that for enrolment of 30000 students the maximum land area shall be 350 to 400 acres for a residential campus with 90% residential facilities for students, 85% residential facilities for staff, sports, and recreational areas along with the academic and research infrastructure.
2. The IDP suggests that for enrolment of 20000 students the maximum land area shall be 300 to 350 acres for a residential campus with 90% residential facilities for students, 85% residential facilities for staff, sports, and recreational areas along with the academic and research infrastructure.
3. The IDP suggests that for enrolment of up to 20000 students the maximum land area shall be 250 to 300 acres for a residential campus with 90% residential facilities for students, 85% residential facilities for staff, sports, and recreational areas along with the academic and research infrastructure.
4. The IDP suggests that the existing brownfield campuses shall engage in capacity building and retrofitting through redevelopment initiatives to optimally and efficiently utilize the real-estate assets of the campus appropriately which shall be governed by the existing development controls as per the Masterplans of the host cities. The redevelopment should consider the interdisciplinary approach with provision for expansion in a phased manner. Such campuses will engage in the preparation of comprehensive masterplans to guide future growth and development in a planned manner, which should emphasize the integration of ICT infrastructure, campus services, and utilities, besides creating shared central facilities as an approach towards the capacity building with emphasis on sustainable development and green architecture with appropriate retrofitting strategies.

Proposed Development Controls for University Campuses				
ZONE	**% Zonal Area**	**Maximum G.C.**	**Maximum FAR**	**Maximum Ht. (m)**
Academic	45%	30%	**2.4**	45
Residential	25%	30%	**2.25**	37
Sports & Recreation	15%	25%	**1**	24
Park & Landscape	15%	N.A.	N.A.	N.A.
Parking – ECS 1 (to promote public transport)				

Note: The Central Government funded and State Govt. funded institutions shall pursue the modifications in the proposed development control with their respective Ministry of Urban Development for necessary modification in the development controls as suggested above.

2.1 Campus Planning Principles and Strategies For Greenfield and Brownfield Campuses

The learning from the tradition of Campus Development in India in response to our socio-cultural values, an ethos of ***Guru Shishya Parampara*** which has transcended over centuries need to provide a unique character to our campuses manifested in the physical form and are required to be developed around strong themes which drive the planning process in response to context. The invigorating interactions need to happen beyond the classroom and an enabling environment has to be created around appurtenant spaces, transition spaces, and outdoor spaces which facilitate interactions between students and faculty or between students themselves translating into a lifelong learning experience on the campus. The social and co-working spaces within the campuses should be created and reinforced where possible to transform the learning process from highly structured instructions to unstructured interactions.

The campuses are entities of social, economic, cultural, and physical inclusion having a contemporary character with a global outlook in the 21st century. Some of the dimensions which essentially need to be considered for greenfield campuses also find great relevance for brownfield campuses which can be achieved through redevelopment initiatives. The campuses in India have contributed towards imageability and legibility to their host cities through the historic character of their buildings and many campus precincts are now part of Area Based Development (ABD) Projects

in the Smart City Mission. The campuses act as an oasis and act as green lungs within the dense urban fabric of Indian Cities. This phenomenon can be identified as a common thread across the globe that needs to be recognized as an instrument for the integration of campuses within the structure of our cities which synergize with their immediate surroundings to co-exist by complimenting their mutual interdependencies. Some of the strategies are described below which should guide the planning and development of our campuses of the future.

1. **Campus –Vision and Mission:** The purpose and objective need to be qualified by the Vision and Mission of every University giving it a direction for future growth and development. This needs to be reflected in the academic and research endeavours and how the institution wishes to position itself globally.
2. **Campus -Site and Environs:** The campus development should blend with the natural characteristics of the site in response to topography, geomorphology, and its immediate context which may or may not be defined at the inception but the scenario for the future should therefore be projected in response to the land uses and structure of the city.
3. **Campus -Natural Landscapes and Biodiversity:** Every Campus has a set of unique natural characteristics defined through its natural landscapes and biodiversity. The intervention demands preservation and conservation of the above and the planning strategy needs to be minimalistic and should reinforce the existing systems through planning and design initiatives.
4. **Campus -Response to Context and Historicity:** The structure and buildings of the campus have to establish a dialogue with precincts that are embedded in the historic character of its immediate context and the city. The vocabulary should further the continuum to reinforce the richness of the response to the context.
5. **Campus –Interface:** The edge condition of the campus will be defined by the dispersal of uses around it and nature of development defined by the zonal development plan, a section of the street defining the edge, and the way they are stitched to make them vibrant and robust. This interface is the most significant aspect of the interaction of the campus with the precinct where most activities will flourish which need to complement each other in terms of use, form, scale, and typology reinforced through public space design strategies.
6. **Campus- Linkages:** The potential linkage to the campus needs to be identified from the perspective of ease of access, urban mobility, and the significant connections the campus will establish with the precincts and the city. In many ways, this becomes an important tool to guide the structuring of the campus in response to their hierarchies. By and large, most campuses are serviced by major arterial roads around which urban transport networks are defined. In the case of peri-urban areas, this is the most critical part of scenario planning and in many ways, the campus entries/exits may also orient the networks in the future.
7. **Campus –Zoning:** The zoning of the campus needs to be guided by surrounding uses and dispersal of functions in response to the site, context, linkages, and the interfaces the campus uses will establish with its immediate environment. The concept of core and periphery and the definition of transition zones will establish the campus zoning in a manner that can absorb future growth and expansion of each zone and yet they are interconnected parts of the complete whole.
8. **Campus –Structuring:** The campus structure plan establishes the interrelationship between various functional and conservation zones of the campus stitched through a network of movement with specified hierarchies to include vehicular movement, pedestrian, and bicycle networks besides its connections with urban mobility. The structure plan is an outcome of detailed evaluation and analysis of site, topography, land uses, context, linkages, open space system, urban services, and built form.
9. **Campus –Mobility**: The system of movement through a network and hierarchies' roads that facilitate vehicular, non-motorized transport, public transport system, cycling, the pedestrian movement which provide access to the campus are critical to the campus. In view of the above, the design of the road section is critical which ensures appropriate widths for each component. The movement networks and the connectivity is an important instrument in bringing transformations and points of drop-offs and pickups such as bus stops, ola -uber pickup points, rickshaw stands, metro stations all transform into student-oriented activities and become significant social spaces. Transport Demand management then becomes critical in reinforcing these movement patterns and organization of mobility for various modes. In some cases, the Universities may provide shuttle services between campuses of the University dispersed in the city or may enhance access from urban transit locations. Apart from the above parking demand on campus is yet another critical aspect of planning. The emphasis on the use of public transport contributes to sustainability besides social equity. The

campus may be provided with Multilevel Car parks and nodal points and can be developed in PPP Mode wherein it translates into paid parking which acts as a deterrent for use of automobiles and bringing down the infrastructural costs.

10. **Campus –Inclusion:** The campuses must be designed as inclusive environments which support people with disabilities-temporary or permanent or medical conditions to enable them to negotiate their path with ease and comfort without any encumbrance. The external and internal environments must be designed and provided with necessary detailing for pavements with tactile tiles, kerb cuts, level management, ramps, warning and information signages, Braille markings elevators, furniture design, displays with sign language, fixture, and fittings, and required application of technology to mainstream the Divyangjan with empathy and compassion besides giving them the confidence that they are at par with the other students. The established guidelines at par with international standards shall be followed.
11. **Campus Typology- Climatic Responsiveness:** The climate is an important determinant of the typology of the campus and is a function of the relationship between the ground coverage and dispersal of the FAR in terms of the volume besides the Building Use. The built form and the typology should respond to the climatic region wherein the Campus is being developed with appropriate utilization of materials and construction techniques to achieve the desired comfort conditions. The varieties of uses also determine the typology besides the mix of uses. The typological approach to campus development is therefore a plausible driver for planning and design.
12. **Campus Form:** The campus form as mentioned earlier is a derivative of Development Controls, the proposed ground Coverage and distribution of FAR on the number of floors. The building used in response to the above is also a generator of campus from the way they are dispersed and mixed. The variation in scale contributes to the campus skyline which also needs to be complementary to the precinct uses to define the edge conditions. A sensitive approach to the above provides desired shade which in turn contributes towards reinforcing activity patterns and pedestrian movement.
13. **Campus Expression- Materiality and Construction Technology, Façade: The** expression and aesthetics is an outcome of the designer's sensitivity towards local context, site, climate and usually gets reflected through the articulation of building elements, materials, and construction techniques adopted. A common thread should bind all the buildings of the campus which may be and therefore, Continuity and coherence become a significant aspect of campus development which should be achieved through typology, expression, and materiality.
14. **Campus Placemaking and Public Space Design:** The public realm and great public spaces of the campus contribute towards the creation of social spaces where interactions happen and translate into the most cherished experiences of campus life. The emphasis on placemaking thus becomes very critical to the campus environment and activity structure. The typology of enclosed, open, or interceding spaces is an outcome of functional disposition of various uses on the campus, their articulation which complements various hierarchies of spaces and the built form that define the space. The designed public spaces enhanced through sensitive and responsive Landscape Design of the campus contribute towards richness achieved through material applications, urban furniture, lighting, planting patterns, grading, views, vistas, etc. through the essence lies in structuring of the campus and its parts.
15. **Campus Controls- Envelop/Volumetric/Facade/Edge:** A well-articulated Master Plan guides the harmonious relationship between various components of the campus yet projects a scenario for the future. In order to foster coordinated growth, appropriate tools are required to be developed which specify the nature and pattern in which future development will be organized such that the old and the new complement each other. In order to achieve the above campus development controls in form of the envelope, volume facade, and material need to be defined and strictly implemented so that the genius of the campus organization is not lost. The Form-based Codes for the campus should be developed both for brownfield and green field campuses and should be an integral part of campus design initiative and to be respected by all administrators.
16. **Campus Phasing:** It is a fact that campuses are developed incrementally which demands appropriate phasing strategy to ensure organized growth and corresponding investment plans to be made which are in line with the vision and mission. This should also become an instrument for the design of facilities and campus infrastructure which is planned for modularity and incremental growth and subsequent grant of funds.
17. **Campus Landscape and Open spaces:** The Landscape and Open spaces in any campus complement the built form and contribute towards placemaking on campuses. A well-articulated landscape strategy is required to be developed as an integral instrument of the

Comprehensive Master Plan which ensures orderly development in each phase besides putting the available space to effective use during the plan period until developed. Apart from the above the strategy should emphasize on conservation and preservation of Natural Landscapes and add to legibility on campus through intermediate markers, landscape elements, public art, etc.

18. **Campus Safety:** It is of paramount importance that the safety concerns on campus at different levels are duly addressed which may include mitigation from natural disasters, fire safety, universal accessibility, safety during construction and expansion, safety from termites and other pests, surveillance in campus, or crime, etc. The above can be achieved through effective planning strategies in terms of disposition of various uses access, distribution of activity patterns, a network of movement, and integration of appropriate technology to instill confidence within the campus community and develop a safety culture at the level of building and site. The Campus Safety Guidelines should be prepared in detail and displayed at appropriate locations within and outside the buildings to identify the escape routes and a comprehensive evacuation plan should be drawn by each University.
19. **Campus Utilities and services:** These are the lifelines of any campus and demand efficient integration of networks that support incrementality and investment in a phased manner. The design should be modular to be able to plug in various parts of the campus and the resultant development to the trunk system, which is easily accessible, expandable, and maintainable. The trunk systems can be provided along peripheries in form of service tunnels which will house all MEP services from where branches can be tabbed and duly identified through the Masterplan. Apart from the above, a definite waste management strategy should be in place and appropriate alternative technologies can be identified and deployed for managing the waste on campus. An effort should be made to segregate waste at the source. It is desirable to efficiently utilise the alternative sources of energy or reduce the demand load by such integration. Water management on campus in the present context needs to be deployed through a strong strategic framework in terms of reusing, recycling, and renewing the aquifers. Campuses should be designed for efficient cooling and ventilation systems to translate into net-zero campuses. In the case of brownfield projects, a detailed audit of existing campus services needs to be undertaken and the above need to be augmented and upgraded with new technologies in a phased manner by utilising the existing resource to support future expansion programs and needs of the campus by utilising appropriate retrofitting strategies. In the present times, all campuses must add an additional layer of the ICT network to support all the uses within the campus and should be connected to the RMS (Resource Management Suite) and BMS (Building Management Systems) being provided at the building and site level.
20. **Campus Sustainability: The** university campuses are a microcosm of a city and they are self-sufficient entities that meet their own needs and are capable of servicing the communities on campus, besides finding appropriate linkages to the communities within the precinct neighbourhoods. The development of campuses in the 21st century must be embedded in sustainable design principles with a well-articulated sustainable policy, strategy, and tactics to ensure compliance. The Sustainable Development Goals should guide the development to achieve social, economic, and environmental sustainability. The sustainable strategies should be brought in response to the context, natural conditions, active and passive strategies, both at building and site level, and a holistic view on the above should be undertaken to reduce the carbon footprint.
21. **Campus Resilience: The** development of campuses should ensure resilience at all levels to mitigate natural disasters, accidents, pandemics, or any other hazards and each university / HEI should have a Campus Resilience strategy to overcome adverse events in the shortest possible time, which is achieved through planning, design, and application of technology to ensure the safety of the campus community. Apart from the above, the campuses should also offer opportunities to service their immediate neighbourhoods in events of natural disasters and extend a helping hand to the civic authorities in managing post-disaster rehabilitation. The detailed Campus resilience Guidelines should include all safety issues along with well-articulated protocols should be prepared to efficiently manage any adverse events on campus including demonstrations or social unrest within or outside the campus boundaries. A well-structured Disaster Mitigation Plan should be made available, and the above information should be shared through websites and other mediums of communication with all the users of the campus.

The IDP recommends that in view of the above aspects and dimensions of campus development which involves substantial investment and to keep pace with the academic and research demands, a cohesive group of experts which includes policymakers, administrators, academics, campus design, and planning experts, Architects, Structural and MEP engineers should be constituted under

the aegis of HECI/MOE which evaluates the Campus Planning and Infrastructural Initiatives of all HEI's to ensure that funds are utilized judiciously and provides necessary guidance for holistic growth of our campuses and monitors its development through the application of technology.

2.2 Sustainable development of Universities & Technology integration - Green Initiatives

Universities in the era of globalisation have a position to them to be globally competitive and need to be knowledge destinations sought for by the stakeholders in their quest for knowledge through an inherent holistic model built-in towards achieving excellence in higher education through an innovative academic environment duly supported by physical infrastructure utilizing enabling technologies. An investment in quality physical infrastructure is meant to achieve academic and research excellence as it facilitates quality outcomes. Apart from the above, the integration and utilization of digital technologies as part of teaching-learning processes and the creation of virtual campuses recognizing the transformation from personal computers to palmtops is the way forward. Alongside, there is an absolute need to envision a pioneering model of 'Sustainability' which is ingrained in its vision and ethos. University Campuses should demonstrate that academic and financial sustainability can go hand in hand with environmental sustainability and is centric to all University campus development. This approach should be integral to the Strategic Framework for any 21st century Campus development guidelines and environmental sensitivity should be a way of life, particularly for universities in developing nations. The University development in India has to be guided by a Long-Range Master Plan which ensures comprehensive and holistic development of our campuses driven by the academic vision.

2.3 Green Initiatives through Strategic Planning

Some of the initiatives in creating a sustainable built environment and eco-conscious campuses with an objective to conserve Energy, Water, and Natural Resources. It is desirable to design near Net Zero Campuses and buildings should be Griha Five Star Rated using appropriate simulation software for detailed scientific analysis for adequate design strategies and subsequent post-occupancy performance evaluation. Some desirable strategies are detailed as under:

- **Protecting the Ecological Footprint by Adopting a Natural Preservation and Conservation Strategy: trees** of various varieties and species existing in the ecosystem are required to be preserved and further replenished to maintain the balance following any human intervention on the sites.
- **Minimizing Carbon Footprint**: Climate responsive Planning by controlling ground coverage/ building footprint leaving more area for percolation and green cover. Adaptive reuse of existing buildings contributes to carbon credits.
- **Preserving Natural Resources and Water Conservation**: Campus development shall be undertaken to preserve natural resources on-site and invest in water conservation measures using appropriate technologies translating into zero discharge campuses.
- **Retaining the Natural topography of the Land:** Development to be responsive to site topography, slopes, gradients, and natural drainage systems in response to hydrology and geology.
- **Environmental Awareness and Sensitivity: The** University communities should be motivated and sensitized towards the protection and conservation of the natural environment and are encouraged to undertake plantation drives and engage in community activities. The plan also promotes the celebration of the environmental week during the monsoons wherein the University community is reminded of their role in conserving the larger environment we live in. The focus should be to develop an environmental strategy that is responsive to SDG.
- **Minimizing Fossil Fuel Consumption through Transport Demand Management Strategies**: Transforming campuses as Pedestrian centric precincts. The structure plans should support pedestrianization and cycling by developing street sections to support universal accessibility. All parking zones and MLCP's should be in the periphery and Shuttle services to provide connectivity to public transport. The internal movements should assist by battery-operated carts for differently-abled. The academic community should be motivated to use public transport thereby reducing the carbon emissions and parking demand on campus.
- **Use of Recycled Materials and Products**: The Planning should focus on the utilization of local and material selection for buildings emphasizes on utilization of building materials and products made from the high percentage of recycled materials. The planning initiative

builds a methodology towards utilization of all construction waste generated from the campus for brownfield developments.

- **Alternative Energy Utilization**: It is critical to utilize alternative sources of energy such as solar and wind energy besides the utilization of biomass. The strategic framework should focus on reducing the demand load by utilization of the above and avoiding substantial investments in captive power and battery banks. The same can also be utilized to preheat water and reduce energy demand for varied applications. Apart from the above where available gas-based turbines can be used to generate captive power dovetailed to heat recovery systems for HVAC applications etc. The passive cooling techniques to be utilized to create comfortable indoor environmental conditions in built spaces without enhancing carbon footprint. With global warming and increasing demand for indoor air quality, air conditioning will become a necessity; therefore, district cooling systems need to be implemented in conjunction with heat recovery systems. Energy Retrofits are key to efficient management and conservation of energy which should be undertaken for all existing buildings.
- **Optimization and Standardization Strategies**: It is emphasized that development of all campus projects and buildings with flexible planning principles through modular coordination to support incremental growth and phased development in a manner that operations of the campus are not impacted by construction activities. A design paradigm should be developed which is comprehensive in ensuring optimization and standardization at all levels be it the design of spaces, structure, and technology integration with an objective to achieve efficiency through optimization of embodied energy, safety, capital expenditure (CAPEX) operational expenditure (OPEX) and energy management.
- **Technology Adaptation**: The design philosophy should be structured around the principle of creating an enabling system backbone that is tiered, adaptable, scalable, and maintainable through the selection of appropriate technologies which are efficient and sustainable.

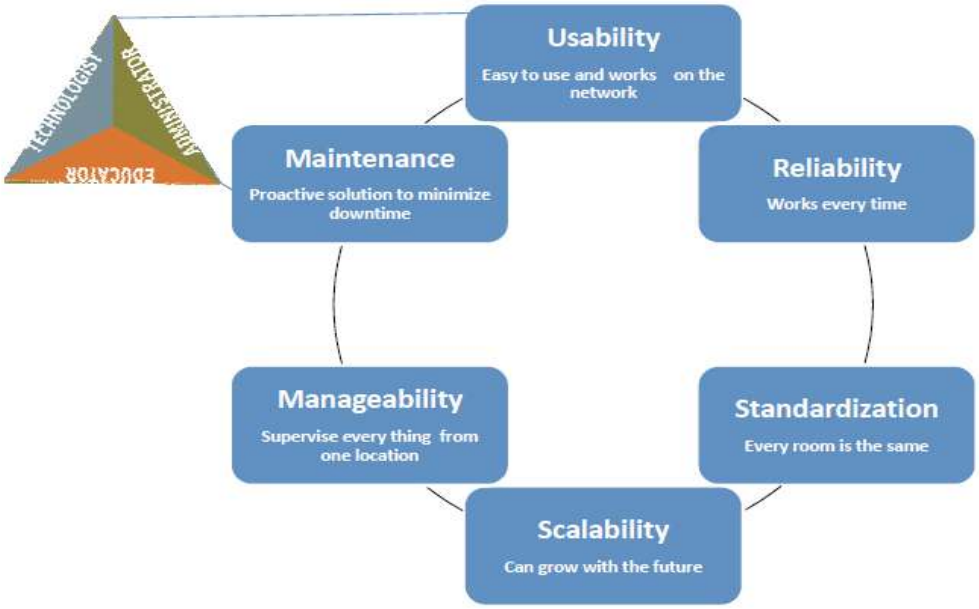
2.4 Policy Framework for Campus Level ICT Infrastructure

With advancements in ICT Technologies and their application in Higher Education, it is imperative to provide a robust ICT Infrastructure in all Campuses to facilitate communication and access to information. In view of the above, it is increasingly important to provide for a dedicated Campus Information and Communication Technology Centre (CICTC) to house the Data Centre, Broadcasting /Simulcast, Media Lab for Audio and Video Content Management, Central Command Room for Real-Time Monitoring, Security Monitoring, Management of UIMS and RMS Networks, Structured and Wi-Fi Networks, Intranet, and Internet, etc. The policy framework suggests adaptation of**5+3 years *of technology serviceability*** which may be extended to **5+5 Years Maximum** or the active side in order to recover the cost of investment. The passive side at the end-user level shall be designed to support the system for good 20-25 years.

1. The National Knowledge Network (NKN) Fibre will be provided through authorized Internet Service Provider (ISP) namely-BSNL/PGCIL/RailTel etc. at the gate of the campus duly terminated at multiplexer outside with min 1 STM are in 155 Mbps. The system design for the campus shall be developed using network architecture as per the scale after university with the provision of future scaling off facility as per requirement. The system shall be designed for a Structured Internal Architecture with High Availability Network Architecture and Modular Architecture will be developed for expansion as per the requirement to support interoperable devices which are maintainable. The MPLS (Multi-Level Switching Packet) connectivity shall be provided to ensure that all devices on the network are supported by MPLS, and the services are available to the end-user using the shortest path first protocol. The OSPF protocol shall be ready from day one and the system shall be designed with high availability of network designed for redundancy of 99.9%. The Software Defined Network (SBN) enable devices shall be application-based which can be remotely controlled for monitoring and management and shall be made available from day one. The Core Devices in Data Centre and distribution shall be in high availability mode provided with a firewall. The technology shall support next-generation network from day one which shall use IPV6 (Internet Protocol version 6), the Network Monitoring System (NMS) shall ensure real-time monitoring and it should be noted that no device should be the end of the sale, end of

support or end of life when network is being set up at the time of implementation. The routers in the Wi-Fi shall be provided with Broad Gateway Protocol (BGP) from day one and it is desirable to provide IPBX on the campus which should act as an extension to the interuniversity communication-NPLS cloud. Apart from the above, the technology selected should be enabled for satellite uplinking and streaming devices should be added and kept ready for future applications. The Campus shall be designed using a ***Three-Tier Architecture*** namely- ***Core, Distribution, and Access*** to be connected through fiber network G.657A1 compliant which should be flexible and bend sensitive. A Minimum of 100 gig Fibre optic Main Incoming Network (Min 48 cores) from one or more than one service provider to ensure that the system is supported 24x7 and is possible to switch in case of any snag with load balancing feature to take advantage of bandwidth of spectrum and speed. The load balancing feature will be integrated into a Firewall including a web application Firewall to block any malicious content further the distribution network will be supported by Min 40 gigs internal fiber-optic network (Min 24 cores) connecting various buildings to CICTC. The switches within buildings shall be networked in loops of internal Networks having a capacity of 10 gigs on copper followed by star local networks using Fibre Optic or Cat 6A cables on each floor supported by switches and hubs. The CICTC shall be provided with a customized SCADA platform to support multiple SAP applications, RMS (Resource Management Suits), etc using appropriate NMS Software for real-time monitoring. The backbone of the system shall be designed as ***FutureReady*** to adapt to emerging technologies including Artificial Intelligence and shall establish protocols for Data Security, operations, and management of services. It will be desirable to establish a Data Recovery Site (DRS) on Campus located in any building. The CICTC and DRS shall be designed for Disaster Resistance and all safety protocols as per codes with controlled access besides Cyber Security Protocols with Firewalls provided to mitigate cyber-attacks for the safety of valuable data.

2. Apart from the above, every University shall establish its own ***Dashboard*** which shall be connected to the respective state Directorate of Higher Education Dashboard which in turn will be connected to the AISHE Portal of UGC/MOE. The Universities will obtain ***Cloud Space*** from the UGC/MOE-approved Government agencies such as NIC or a body created under MOE on a chargeable basis as specified by UGC and revision of rates from time to time for the space taken to store Data/Information. This will ensure easy access, secure data, enhance mobility of students/faculty/staff, Credit Transfer, support Academic Bank of Credit (ABC) and also act as a Disaster Recovery Site besides creating a centralized infrastructure to ensure credibility of the system and policy framework.



3. The Universities through their Dashboards create a repository of information of every Student, Staff, and Faculty which shall be ***connected through the Unique ID (UID) generated through AISHE Portal and University ID*** provided by the Parent University where the above students are enrolled, faculty and staff employed. A ***dual mechanism of authentication*** will be

provided wherein the parent university will provide Data/Information to the Host University/Institution wherein Student is desirous of pursuing a course will be duly accepted by the Host Institution and on completion, of course, the Host Institution will provide Scores to the Parent University within 60 days of completion of a semester, the same will be authenticated by them to complete the loop and the scores obtained shall be retained in the Digi Locker. The Guidelines for maintenance of records by each University will be guided by the UGC policy defined in ABC Document, NSQF, and NHEQF Framework of UGC.

4. IPD suggests ***Geo-Tagging*** of all Universities using GIS Applications. In this pursuit, every University shall get itself Geo Tagged and renew its information on an Annual Basis not later than 30th June every year from any Government Body like- NATMO, IIRS, NHRC, NESAC, etc as per provisions suggested by DST-GOI. This shall be connected through the Dashboard and used as a standard tool for real-time monitoring of physical infrastructure, utilization of resources, grants provided for physical infrastructure development. Apart from the above, this information will provide all information on Ground Coverage, FAR provided, and Heights of buildings beside the relationship between open and built, and all detailed information will be correlated to the self-disclosure information provided by the Universities of their Campus Master Plans/ Building Plans along with other Academic and Administrative information on prescribed proforma. The information thus provided will also be utilized by the Accreditation Bodies while information of each space will be provided as data and through Video Content for review by the expert team. The application of technology will enhance quality and productivity by reducing the time and costs involved at all levels.

5. The campus shall be serviced by both structured Network and Wi-Fi duly supported by min 802.11 AC (Wi-Fi 5) preferable up-gradation to AX-Wi Fi 6to enable staff and students to seamlessly access information and to further support co-working even in external environments with inbuilt AI features which can support Firewall also. The system designers can also opt for Xi Fi if they deem it appropriate for system integration, design, and development.

6. The Data Centres shall be designed for expansion and incremental growth with all safety measures for access, Natural disaster mitigation, environmental and pest control. This shall be provided in a separate building and shall also be utilized for any ICT support as may be required for various Missions of Govt. Of India or collaborative interface with Universities and Industry. The Universities shall create a backbone to absorb future growth and expansion and become a significant partner in the expansion of National Missions to fulfill the needs of a developing nation.

Section 3

3.0 Redevelopment Strategies for Campuses in India in Urban Context - Framework for Campus Development.

The campuses before the independence in India have been developed heterogeneously and consist of several buildings at wrong locations and many of them are also in extremely poor conditions with identifiable structural distress which demands regeneration of the campuses. The studies have identified the following facts and realities which have resulted in the present state of our universities. Fundamentally lack of Vision of Academic Administrators to develop campus infrastructure holistically as a continuous process and adhocism and piecemeal growth in absence of any comprehensive planning and structuring has resulted in this chaos.

The campus services in most campuses have failed are obsolete and inadequate to meet the current requirement. Safety and public health have been grossly compromised particularly Seismic Safety Electrical Safety, Fire Safety, Disaster Mitigation, Waste Management Black and Grey Water Management. All the above if adequately addressed can make the campuses more sustainable which can also bring down the recurring expenditure. The policymakers and campus designers in India must recognize this phenomenon of growth and change and plan campuses to be an integral part of the urban matrix. Further, the inadequacies in campus planning itself have resulted in this discord. Campus Design and Planning in India is still in its infancy with no defined guidelines on the development of physical infrastructure, therefore the IDP addresses this gap through suggestive framework and guidelines for the development of HEI's. The Universities have not kept pace with the utilization and application of emerging technologies into teaching-learning processes and transformation in pedagogy using appropriate digital technologies. The Universities have not been able to connect with the industry adequately to peruse collaborative research.

All the above have led to mediocre campuses plagued by incoherence in campus structure, open spaces, public space design, circulation, architecture, inefficient structures, or incorrect placement of building types on campus resulting in a complete loss of identity and image. The campuses are usually low rise characterized by low density with a gross underutilization of Ground coverage and FAR due to Adhoc and amorphous development in absence of guiding development frameworks. The country continues to make mistakes with respect to the land area requirement with respect to enrolment (area per capita) even though UGC has considered the enrolment norm at a higher level of 30,000 for a residential university. The National Knowledge Commission has strongly recommended effective utilization of real estate assets in view of the central location of universities in the city and its real estate value in the current location. resulting in a complete loss of identity and image. The National Knowledge Commission has strongly recommended effective utilization of real estate assets in view of the central location of universities in the city and its real estate value in the current location.

The fundamental aspects which demand retrospective consideration:

- Convergence of Inter-Ministerial initiatives towards National Missions on Programs using Intellectual Capital of the Universities/Institutes.
- Flexibility to adapt to change (socio-economic, cultural, and technological dimensions).
- Demand and supply are linked to employment opportunities.
- Freedom for exploration and equal opportunities to all the academics.
- Innovation in teaching methodologies (From tutoring to learning).
- Reorganizing admission and evaluation systems.
- Making research an integral part of the education process and integration of cognate departments to share resources.
- Develop an interdisciplinary approach in teaching and learning processes by establishing research Centres and Centres of Excellence (COE) within them.
- Creation of schools for specialized domains/disciplines with supporting research facilities.
- Parity in Curricula Structure of University with inbuilt flexibility towards required autonomy to support credit transfer regime. The stakeholder can shop for knowledge in the desired field to achieve excellence.

Campus Design and Planning is a continuous process of development involving an audit of the physical infrastructure of the University viz. the academic agenda, enrolment, new disciplines, research, housing, supporting facilities on campus besides engagement with neighbourhoods, communities, and city authorities. A dedicated team of Campus Planners, Academicians, Architects, Engineers and Technologists, Energy Experts, etc are engaged in a well-structured process of campus planning with defined guidelines and master plan to guide the future development of campus structure and form in response the genius of campus design philosophy, campus architecture, engineering services, project delivery. processes, life cycle analysis, and sustainable development approach. The campus design and planning is a specialized area with professionals designated as experts in the discipline having vast experience involved in the process.

Universities are important contributors to economic growth and development through their interactions with the tertiary sectors and are microcosms within our cities. The Oxford Cambridge Model of locating campuses away from cities as ivory towers have no the present times as within growth of our cities they get subsumed into the city fabric, therefore, it is pertinent to plan and design them as Urban Campuses even though they may be proposed in the peri-urban areas or part of larger defined Urban Agglomeration through Master Plans, it is important that the surrounding land uses are compatible and provides for opportunities to absorb growth which could meet the demands for Housing (Both for staff and students) Co-Working and Living through a mix of uses, Research Institutions, Corporate Parks, Institutional Uses for Inter and Intra University Collaboration including FDI in Higher Education, etc to reinforce their synergies and mutual co-existence. A new paradigm for campus Development is being proposed through IDP for both Greenfield and Brownfield Campuses which demands the support of Urban Development Processes and Norms to achieve the planned objectives as envisaged. In either case, Land is an important commodity that needs to be adequately and appropriately utilized as the acquisition of the same is not easy. The demand for space will continue to rise even with the advancement in technology the demand does not reduce as new disciplines emerge and each has its own requirement for space for academics, research, and correspondingly Housing. This trend can be experienced in some of the Ivy League Universities in the USA like Harvard, Stanford, UC Berkeley, and many more having a very strong University tradition of campus development as compared to India which is about 164 years old and are undergoing phenomenal transformations in their precincts which are incongruous. Therefore, the Urban development Framework needs to address this phenomenon which can be observed even in campuses like IIT's/IIM's and other Indian Universities which were established post-independence.

The guidelines specified in the Master plan have been evaluated with reference to development priorities and demand for space with respect to academics, research, residential facilities, Campus services and facilities, and open areas, parks, and landscape. The IDP Committee of UGC has suggested modifications to the existing norms to MOHUA besides the inclusion of the above in URDPFI Guidelines. The Master Plan of Delhi is under revision for 2041 and is one of the most matured Master Plans prepared in the country which has guided several other Master Plan exercises in the country. In view of the above, the IDP Committee carefully reviewed the existing Norms for Development of Universities as stated in Delhi Master Plan 2021 and Guidelines are given in UBBL 2016 and there is an opportunity to address this phenomenon through ground realities for both brownfield and new upcoming greenfield campuses by exploring vertical growth of campuses by modifying the Norms for Ground Coverage and FAR and investing in Sustainable Development through the reduction in carbon footprint, preservation of biodiversity/ natural landscapes, urban ecology and through the application of Green technologies. This will allow and absorb future growth and expansion by optimally utilizing the land resource, more so in Greenfield Campuses which could also be developed through the framework of URDPFI Guidelines to save the potent agricultural land.

We are proposing the following modifications to the Development Controls and also be implemented through URDPFI Guidelines. A fair evaluation through the suggested Norms suggests that 30,000 students can be accommodated within a Campus Area of 350 Acres with 90% residential facilities for students and 85% residential facilities for staff besides the Academic and Research infrastructure with desired redundancy. In order to promote Sports amongst youth and the benefits thereof, the Ground Coverage and FAR for Sports and Recreational for Students activities has been increased thought the zonal distribution of land has been retained as proposed in the Master Plan which will result in an average of mid-rise development of 8 -10 floors as per height control defining the campus form having a mix of both low rise and mid-rise buildings under various uses. The IDP Committee proposes Form-Based Codes for Campuses as mandatory for all campus Development including Geo-tagging and Data of Campuses will be available on the Dashboard of MOE/UGC which can also be utilized by MOHUA for real-time monitoring and to ensure planned growth as per developmental norms which ensures safety and mitigation of disasters.

The IDP recommends a minimum of 25% Staff Housing and 50% Students Housing on campus in Urban Areas –Brownfield Campuses while a minimum of 75% Staff Housing and 90% Student Housing in Greenfield campuses and can be modulated as per demand.

Outcomes and Advantages:

- Optimizing the overall requirement of land.
- Reducing footprint to result in a compact built form with more carbon credits, incrementality, and better opportunity for modulation of campus form and scale to bring efficiency in overall use pattern and built form.
- Sustainable campus development model using green building design methodology and technologies. Development of Eco campuses.
- Generation of desirable open spaces by integration of appurtenant /incidental open spaces.
- Conservation of Natural Landscapes and Campus Landscape Design to compliment Architecture.
- Public spending and investment by the governments can also be judicious to cater to the increasing demand for higher education.
- More universities can be created in different regions to provide equitable access to a larger cross-section of the society keeping in view the age participation rating.

3.2 Framework for Space Planning

To ensure coordinated development and incremental growth of Campuses spatial guidelines for various buildings on Campus are provided for implementation which needs to be considered while planning and designing. The objective of these guidelines is to provide a flexible structure to meet the requirements of Teaching and research Universities besides Autonomous Institutions as per land bank and development controls specified. The flexible space planning approach embedded in the principles of modular coordination should be a new paradigm for the design of functional spaces which support incremental growth in an organized manner for efficient and optimally utilizing the resources which will meet future demands. It is envisaged that University buildings are planned for centuries and not a few decades therefore the vision for campus development should be aesthetically pleasing, sustainable, and holistic with emphasis on safety and comfort of users achieved through appropriate Structural Design and MEP Services integration. The components of the buildings should be adaptable, scalable, and maintainable to absorb change and accept emerging technologies at present and other evolving cutting-edge technologies which will transform the educational sector for which the backbone is required to be provided now. The system design should be structured and worked out to plug in new development to the existing infrastructure through Long-Range Developmental Plans for the Universities. The Design Basis Report (DBR) and DPR should incorporate a Comprehensive Strategic Framework with respect to the Life Cycle Cost Analysis to clearly define the return on investment through Cost-Benefit Analysis. It is suggested that Building Automation Systems should be plugged into Resource management Suites (RMS/RAMS) which is integrated into University Information and Management System (UIMS) Platform developed by each University specifically to support Academic and Administrative functions besides periodic performance monitoring of installations, facility management to control operating expenditure and effective utilization of resources.

The **Minimum space Standards for Design of Campus Buildings** have been prepared to meet the requirements of Teaching/ Research Universities and Autonomous Institutions and also for all Institutions offering Professional Degrees under Statutory Bodies to be now designated as PSSB's for compliance to meet the Academic and Research Objectives. The framework provides the required flexibility for transformation and articulation of space which meets the demands and provides an enabling environment for excellence in academics and research. The physical infrastructure should be at par with international standards and should provide an inspiring teaching-learning environment embedded in the principles of equity, access, and sustainability. It is incumbent on every Institution to invest in Strategic Development Framework guided by the Comprehensive Master Plans for each campus. The key principles and drivers for Building Design should meet the functional requirements of the user, comfort conditions, selection of appropriate materials and construction technology, Structural Systems, and Building Services by duly integrating the Information and Communication Technologies. The Green Strategies (Active/ Passive or Hybrid) should be developed both at the building and site level as per specified norms. The detailed Minimum requirements for each space are specified and the facilities to be provided are further qualified in the following sections.

ACADEMIC AREAS			
S.	**Spaces**	**Area**	**Unit**
No	**CLASSROOM**	**Proposed Guidelines**	
1	Classroom (strength as per intake)	1.5	sqm/st
2	Tutorial room (50% of intake)	1.5	sqm/st
3	Lecture hall (flat) - as per intake	1.5	sqm/st + additional 10% for dias and technology integration
4	Lecture hall (stepped) - as per intake	1.5	sqm/st + additional 15%for dias and technology integration
5	Seminar room (120 capacity) - multi-purpose/ joint class	1.5	sqm/st + additional 10%for dias for technology integration
6	Studio (as per intake)	3	sqm/st
7	AV room	50	Sqm
	Laboratories		
8	Lab 1 - General (50% of intake-students split in 2 batches for UG Programs)	3 to 5	sqm/st
9	Lab 2 - Specialised (PG & Research)	4 to 6	sqm/st
10	Lab 3 - Advanced (Research & Post Doc.)	6 to 8	sqm/st
11	Store, technician room	10	Sqm
12	Preparation room - Shared by 2	12	Sqm
13	Workshop	100 to 200	Sqm
14	Construction yard	200	Sqm
15	Museum + Exhibition area	2.5	sqm/exhibit + additional 50% (for stores & technical areas)
	LIBRARY		
1	Issue return Counters- (Self Help-Automation Preferred)/ Foyer	50 to 100	Sqm
2	Stack area (min. distance between stack c to c 1.2m)	10	sqm / 1000 volumes
3	Reading area (20% of student strength distributed in General, Periodical & Reference section)	2.5	sqm/person
4	Self-study carrels	2.5	sqm/person
5	General section	3.9 to 4.5	sqm / 1000 volumes
6	Periodical section	3.9 to 4.5	sqm / 1000 volumes
7	Reference section	4.5 to 4.8	sqm / 1000 volumes
8	Digital Library (10-15 terminals)	1.8	sqm/terminal
9	Binding / store room	18 to 20	Sqm
10	Accession room	25	Sqm
11	Processing room	20	Sqm
	Books/Titles		*Min 500 books/150 titles /600 volumes for each discipline and allied disciplines. Max40% E-Books of the total requirement duly accessed can be provided. For TBL Number of volumes can be added to meet the requirement of 75% students as per intake.*
	Journals/Volumes		*Min 8 for each discipline of which 25% should be International and*

			can also be in E format. Connectivity to NDL/NPTL/DELNET is mandatory
12	General store	12 to 15	Sqm
13	Reprographics room	15	Sqm
14	TBL issue and return	25 to 30	Sqm
15	TBL store	50	Sqm
16	Librarian	15	Sqm
17	Assistant Librarian	10	Sqm
18	Library assistants	6	Sqm
	AMENITIES		
1	Boys' common room	50 to 75	Sqm
2	Girls' common room	50 to 75	Sqm
3	Canteen (200 to 250 people)	2.25	sqm/st (including kitchen-Cooking Areas /stores-Gen, Cold,Vegetables/Preparation Aeas/Catering /Washing etc.)
4	Toilets- Male /Female and Handicapped		as per NBC
5	Housekeeping	12	Sqm
6	Medical Room	50	Sqm as per NABH Guidelines
7	Alumni Centre	360 to 500	Sqm
8	Reprographics & Stationery	36 to40	Sqm
9	First aid & sick room	25	Sqm
	FACULTY AREA (P: Asso. P: Asst. P - 1:2:4)		
1	Assistant Professor	10 to 12	sqm (open office)
2	Associate Professor	12 to 15	sqm (cubicles)
3	Professor	15 to 18	sqm (cubicles)
4	Research Scholar	6 to 8	sqm (open office)
5	Dept. Library	60 to 90	Sqm
6	HOD room	25 to 30	Sqm
7	Dept. Office	30 to 45	Sqm
8	Conference room	30 to 45	Sqm
9	Handicapped toilet	4.5 to 6	Sqm
	Meeting rooms (Faculty & Research scholar)		
10	Category 1- (8-15 Persons)	12 to 15	Sqm
11	Category 2 (15-20 Person)	20 to 30	Sqm
12	Category 3 (30-40 persons)	45 to 60	Sqm
	COMPUTER CENTRE		
1	Computer Centre	1.8	sqm/terminal + 30% (for system analyst, UPS, etc)
2	Lab with teaching format (50% of intake)	1.8	sqm/terminal + 10% (with LCD screens)
3	Server & switch room	1	sqm/terminal
4	Content creation centre	30	Sqm
5	Video recording room	30	sqm (with recording studio)
6	System in charge / Analyst	12	Sqm
7	UPS room	25	Sqm

8	Store	12	Sqm
9	Technician room (1 / 30 terminals)	6	sqm/technician
	ADMINISTRATION *		
1	Director's/VC's room	30-45	Sqm
2	Director's/VC's Secretariat & waiting	30	Sqm
3	Registrar room	20-25	Sqm
4	Registrars Secretariat	20	Sqm
5	Conference room (25 persons)	1.5	sqm/person
6	Administrative office (open office for junior staff & cubicles for Deputy Registrar & above)	Area to be modulated as per staffing pattern	
7	Establishment	50 to 75	Sqm
8	Academics	50 to 75	Sqm
9	Examination & control	75 to 100	Sqm
10	Storage for answer scripts using compactors	250 to 300	Sqm
11	Placement Cell	300	Sqm
12	Finance and accounts	75 to 100	Sqm
13	Stores & purchase	50 to 75	Sqm
14	Central store	100	Sqm
15	Maintenance room	50 to 75	Sqm
16	Security	25	Sqm
17	Central Command room	50	Sqm
18	Housekeeping room	12	Sqm
	SPECIAL REQUIREMENTS		
1	Exhibition space come storage **	100 to 150	
2	Drawing Hall	3	sqm/st
3	Language Laboratory	45	Sqm
4	Design and Innovation lab (also for start-ups) **	250 to 500	Sqm
5	Herbal Garden	Designated space	Open Area as per Master Plan
6	Animal House (Pharmacy)	100	Sqm
7	Departmental Centres for Research & projects	350 to 500	Sqm
8	Campus Health /Wellness Centre- 50 bedded with 10 bed ICU and Accidental and Medical Emergency facilities, Diagnostics, IPD and OPD facilities	50 00-6000	Sqm as per NABH Guidelines
9.	Campus IT Centre / Data centre & Media lab**	1500 to 2000	Sqm
10.	IQAC Cell	500	Sqm
	** Detailed program to be developed by University * Area norms for administrative staff		
	Deputy Registrar (cubicle/room) or equivalent	15	Sqm
	Asst. Registrar (open office) or equivalent	10	Sqm
	UDC or equivalent	3.25	Sqm
	LDC or equivalent	2.25	Sqm

	Technicians	6	Sqm
	Note: *1. Adequate storage (floor mounted & overhead) space to be integrated as part of flexible planning integrated to open office systems. All offices & workstations shall be serviced by IT infrastructures.* *2. Additional toilets (male, female & handicapped) as per NBC norms with respect to occupant load.* *3. Add 35% for Circulation, Wall Thickness, and Facilities to carpet areas prescribed above.*		

Special Areas

1. Drawing Hall
2. Language Laboratory
3. Design and Innovation Labs
4. Animal House
5. IQA Cell
6. Departmental Research & Project Centres
7. Health and Wellness Centre
8. Campus ICT Centre
9. Herbal Garden

3.2.1 Facility Planning for IOE Centres in addition to above minimum standards

IOE CENTRES FOR EXCELLENCE			
	Spaces	**Area**	**Units**
1	Advanced Research & Management Development Centre	4000 to 5000	sqm
2	Academic Staff College/ QIP Centre (including conferencing, seminar & residential facility)	4000	sqm
3	Industry Institution Collaboration Centre	5000 to 7500	sqm
4	Inter-University Collaboration Centre	7500 to 10000	sqm
5	Centre for Distant Education	5000-7500	sqm
6	Blended learning - MOOCS & Digital recording	1500 to 2000	sqm
7	Experience Centre	1500 to 2000	sqm
8.	Campus ICT and Data Centre including Command Centre	1500-2000	sqm
	Note: *1. Adequate storage (floor mounted & overhead) space to be integrated as part of flexible planning integrated to open office systems. All offices & workstations shall be serviced by IT infrastructures.* *2. Additional toilets (male, female & handicapped) as per NBC norms concerning occupant load.* *3. Add 35% for Circulation, Wall Thickness, and Facilities to carpet areas prescribed above.*		

3.2.2 Recreation and Sports Facilities

SPORTS & RECREATIONAL FACILITIES			
	SPACES:	**Area**	
1	Auditorium (1000 capacity). 1.5 sqm/seat + 50% (for stage & backstage)	2750	sqm
2	Pre-function zones	0.5	sqm/person
3	**Students' Activity Centre**	3000	sqm

4	Main Lobby	50	sqm
5	Café (50 persons) - 4	480	sqm
6	Thrift store	45 to 60	sqm
	Student clubs:		
7	Theatre	125	sqm
8	Indian music	125	sqm
9	Western Music	125	sqm
10	Fine Arts	125	sqm
11	Photography	125	sqm
12	Dance	125	sqm
13	Rotary/Lion's club	125	sqm
14	Environmental club	125	sqm
15	IT innovation club	125	sqm
16	OAT (500 persons) - including stage	500	sqm
17	Seminar room (100 persons)	150	sqm
18	Conference room (30 persons)	45	sqm
19	TV come reading room	150	sqm
20	Students' Council office	60	sqm
21	Facility management office	30	sqm
22	Storeroom	20	sqm
	Indoor Sports		
23	Chess	30	sqm
24	Carom	30	sqm
25	Billiards (4 tables)	90	sqm
	Indoor Sports facilities		
1	Table Tennis (4 tables)	150	sqm
2	Badminton (4 courts)	560	sqm
3	Gymnasium	200	sqm
4	Squash (4 courts)	400	sqm
5	Yoga (100)	225	sqm
6	Basketball (2 courts)	450	sqm
7	Volleyball (2 courts)	350	sqm
8	Wrestling (2 courts)	400	sqm
9	Weight lifting (4)	64	sqm
	Ancillary facilities		
1	Entrance lobby	50	sqm
2	Spectators for each facility @ 0.6 sqm/person		
3	Changing rooms (lockers + showers + toilets) @ 2.1sqm/person (*numbers to be modulated as per the sports)		
4	Instructor's room	12	sqm
5	First aid	20	sqm
6	Equipment room (multi-functional)	60	sqm
7	Equipment room (singular)	20	sqm
8	Housekeeping	5	sqm
9	Caretaken room	10	sqm

10	Stores / sport	10 to 15	sqm
	Toilets for players and staff		
11	Male	20	sqm
12	Female	15	sqm
	Note: Above areas are carpet areas add 35% for circulation, wall thickness, and facilities		

Note:
1. Effective areas may be referred from Time Saver Standards &Neuferts Architectural Standards in conjunction with the standards prescribed by respective Federations of different sports in India.
2. The Indoor Sports facilities can also be designed as an Integrated facility for various sports to share the resources, however, the minimum clear height required for each sport is required to be provided as per standards.
3. The specialized facilities can be shared amongst HEI's within a city or existing facilities under various authorities and Federations.

	Outdoor Sports facilities		
1	Swimming pool (Olympic size)	50 x 25	m
2	Deck area on all sides	4 to 5	m
3	Changing room (40 each) lockers + shower + toilets	2.1	sqm/person
4	Instructor / coach room	10	sqm
5	Attendant room	6	sqm
6	First aid room	12	sqm
7	Accessory room	20	sqm
8	Teaching / paddling pool	15 x 25	m
9	Spectators (100 to 200)	0.66	sqm/person
10	Treatment plant room (area as per pool area /water capacity)		
11	Lawn tennis (4 courts)	800	sqm
12	Hockey	90 x 60	m
13	Football	118 x85	m
14	Cricket	160 x 142	m
15	Athletic track (8 lanes 800m) + including other sports in the field area	177 x 104	m
16	Kabaddi	13 x 10	m
17	Kho kho	27 x 16	m
18	Basketball (Min 2 courts)	26 x 14	m
19	Volley ball (Min 2 courts)	24 x 15	m
	Ancillary facilities		
1	Entrance lobby	50-100	sqm
2	Spectators for each facility @ 0.6 sqm/person – 100-150 persons- Indoor Sports (Retractable Seating Systems can be used) 500-1500- Outdoor Sports		
3	Changing rooms (lockers + showers + toilets) @ 2.1sqm/person (*numbers to be modulated as per the sports)		
4	Instructor's room	12	sqm
5	First aid	20	sqm
6	Equipment room (multi-functional)	60	sqm
7	Equipment room (singular)	20	sqm

8	Housekeeping (2 rooms)	5	sqm
9	Caretaker's room	10	sqm
10	Stores / Sport	10 to 15	sqm
11	Toilets for players and staff*		
12	Male	20	sqm
13	Female	15	sqm
	**Additional toilets (male, female & handicapped) as per NBC norms concerning occupant load to support InterVarsity Tournaments* *Above areas are carpet areas add 35% for circulation, wall thickness, and facilities for built-up areas.*		

3.2.3 Staff and Students Housing

RESIDENTIAL FACILITIES		
STUDENT HOUSING		
Housing area for Students Housing on Campusavergae	16.8 sqm/student	
Single seated room	9	sqm/st
Double seated room	16	sqm/st
Triple seated room	24	sqm/st
Dining Hall	2.25	sqm/st
Recreational facilities	1	sqm/st
Administrative areas	0.25	sqm/st
Warden's office		
Assistant office		
Reception & entrance lobby		
Office superintendent		
Hostel administration office		
Warden's residence	140	sqm
Asst. warden's residence	110	sqm
Note: Add 35% for circulation, wall thickness, and facilities *Note: All supporting staff to be outsourced.*		

STAFF HOUSING				
TOTAL (Faculty)	2000	**Faculty Ratio = 1:2:4 (P : AP : L)**		
TOTAL (Non-Teaching Staff)	2200	**Non-Teaching Ratio = (1 : 1.1)**		
TOTAL STAFF	**4200**	**Teaching : Non-Teaching Ratio = 1:1.1 STR: 1:15Average)**		
Break up of Faculty Housing	**No. of Units**	**HSG TYPE**	**Area (Sqm)**	**Total Area (Sqm)**
No. of Professors - Group A (1)	286	T 6	180	51429
No. of Asso. Prof- Group B(2)	571	T 5	140	79940
No. of Asst. Prof- Group B(4)	1143	T 4	110	125730
Total no. of faculty	**2000**			**257099**
Break up of Non-Teaching Housing				
Group A= 2%	44	T 5	160	7040
Group B= 3%	66	T 4	120	7920

Group C= 35%	774	T 3	90	69750
Group D= 60%	1315	T 2	70	92050
Total no. of non-teaching staff	**2200**			**176760**
Total area				**433859**
Note: Add 30% circulation area (common areas) and wall thicknesses. Above unit areas inclusive of wall thickness.				

Note: All buildings to be designed should be compliant to a minimum 5-star GRIHA rating for sustainable strategies at the building & site level. Detailed program to be developed by University as per requirement and planned for incremental growth in a phased manner as per specified Indian & International standards with specific requirements for environmental control, clean environments, safety & sustainability to be addressed adequately. Refer to the table of standards and their subsequent revisions as applicable given for compliance.

	STANDARDS TO BE FOLLOWED
1	National Building Code (NBC 2016) & relevant BIS codes / subsequent revisions thereof
2	UBBL 2016 and subsequent revisions thereof
3	Provisions of Masterplans / ZDPs / LAPs & URDPFI guidelines
4	BEE - ECBC norms (Commercial & Residential buildings)
5	TERIGRIHA norms
6	GRIHA LD norms
7	IGBC / USGBC guidelines
8	Vulnerability Atlas of India
9	Relevant international standards as applicable:
	American standards (ASTM – American Society for Testing & Materials) / BS – British Standards / DIN –DeutschesInstitutfürNormunge.V. (German Institute for Standardization) / EU – European Standards etc.
10	ASHRAE / ISHARE standards and Guidelines including Clean Room Applications
11	Indian Electricity Rules,1956/2020 & Electrical Safety Manual/Safety considerations for equipment generating Electrical and Magnetic Fields.
12	NFPA /UL guidelines - Fire- BS/UL/ DIN
13	Harmonised Guidelines for Universal Accessibility 2021
14	CPWD - DSR / Analysis of Rates / PAR estimates
15	Guidelines of IEEE for IT Infrastructure
16	Health facilities at par with NABH norms
17	AERB Codes and Guidelines
18	IARP, BARC Guidelines for Radiation Protection
19	NDMA Guidelines for Disaster Management including Chemical, Biological, and Nuclear
20	NAPES&PESO Guidelines –From the office of Chief Controller of Explosives
21	NDPS Act and Rules-Guidelines for Stocking and Dispensing Essential Drugs-Research Institutions for Pharmacy and National Forensic Sciences Universities (NFSU)
22	Any other Safety Guidelines Indian and International required for Installation of types of equipment
23	UGC SATAT Guidelines

Note: All HEIs shall follow the prescribed UGC Guidelines for Campus Development and Space Planning Standards 2022 in conjunction with SATAT.

Institution Development Plan for Higher Education Institutions (HEIs)

Part-2: Campus Design and Space Planning

University Grants Commission Bahadur Shah Zafar Marg New Delhi

2022

Table of Contents

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Statutory bodies:

1. AICTE [Er. Devadevan. V, & Ms. Mamta Rani]
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3. PCI – Pharmacy Council of India [Dr. Archana Mudgal, Registrar cum Secretary]
4. NCTE – Prof Santosh Sarangi & Dr. Jayesh Patel
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6. Indian Nursing Council - Lt Col (Dr) Sarvjeet Kaur, Secretary
7. Dental Council of India - Dr. Ashu Gupta, Council Member
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Greenfield development of campuses:

10. South Asian University, New Delhi
    Ar. Anupam Bansal
    Mr. Rajesh Dongre – Partner ABRD Architects
11. Flame University Pune
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    Principal Space Design Consultants

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22. Mr. Ashish Rai – Expert IT Solutions

Campus Design and Planning for Higher Education in India

1.0 Introduction

The development of Universities in India as understood today is only 164 years old. The first ones having been established in 1857 one each at Bombay, Calcutta, Madras along the lines of the London University. The most famous universities of Oxford and Cambridge in England from where the idea was brought in India, the progenitors were the Universities of Paris and Bologna. The university system has undergone tremendous change over a period of time in terms of its educational objectives, administrative and management procedures as a consequence of the policy framework which governs them. In the present-day context, educational institutions have become the agents of change. The nature of changes is multifaceted and complex, either being endogenous or exogenous. The institutions are archetypal tertiary institutions that neither involve nor control any material production process but embody precisely definable server-client relationship which contributes to its role RAISON-D'-ETRE. Its activities cover a wide spectrum in terms of potential links with other sectors of the economy, particularly the other tertiary institutions. During the colonial rule around 1857, the first set of universities established by the Britons was developed on the philosophy of the Oxford Cambridge Model wherein educational centers were located away from the cities and were developed as university towns. The same model was applied in India but after independence, there has been a phenomenal growth in the development of educational campuses, and because of increasing demand, they have achieved a regional or national status. Most of our campuses over 100-150 years old were developed heterogeneously and are now amorphous entities in the overall urban fabric and are undergoing a series of transformations within the campuses and their precincts which include- the University of Calcutta, University of Madras, University of Bombay, University of Allahabad, University of Delhi University, Aligarh Muslim University, IIT, Roorkee, to list a few. Most of these centres for higher education in India negate the Oxbridge philosophy of campus development and have now become an integral part of their city due to increasing urbanization. The present state of adhoc transformations both in the campuses and their precincts are incongruous resulting in an unhealthy interaction between the two since the campus planning model nor the development of the precincts are compatible. Subsequently, after independence during the sixties, the same model for the location of educational centres was applied when most institutions were established. The large and complex structure of our urban universities/educational institutions in India represent a major segment of higher education, enroll large numbers of students, and offer a varied educational fare. Burgeoning enrolments are making increasingly heavy demands on the resources of the universities while the demand of the society for a large pool of trained manpower compel them to engage in instruction, research, and public functions unheard of a generation ago.

The existing institutions will continue to grow and expand, new ones will come into being with the global change in economic policies and opening of markets in various sectors including education. Therefore, all of them will be subjected to the increasing pressures from the society which demands a higher level of educational achievements of its people for its growth and development. Over the years, there is general degradation of standards and deterioration in campus environment having both social and physical implications. With the increasing needs of the society and demand and because of the above the need is to integrate the campuses with the fabric of the city with appropriate physical intervention. The Oxbridge Philosophy for Campus Development in India is no more relevant. In the Indian Context with increasing urban sprawl and rapid uncontrolled growth of our cities, the process of change and transformations are ahead of any planning initiative. The speculative organic development usually with very high densities has resulted in an incongruous relationship between the campus and its precincts, restricting the opportunity for the growth and expansion of campuses that have undergone a series of changes in their form and structure and even more pronounced are the structural changes in the precincts of the campuses. It is, therefore, important to recognize this phenomenon of urban growth and transformations, and is prudent to accept that our universities have to grow in an urban environment as part of the city matrix.

The process of transformation can be understood as a reversible process initiated because of the location of any major activity node in the city fabric or creation of a counter magnet which generates activities contributing to the overall activity patterns in a city and since these nodes are linked by movement networks along which certain activities generate which require space which in turn define forms. This is, therefore, is a reversible dynamic process associated with cities resulting in the transformation of the urban structure of various districts over a while and this process of change can be well identified in the case of the campuses and their precincts. A new paradigm for integrated development of Campus within a city as an Urban University needs to be developed in the Indian Context with appropriate campus design, city planning, and urban development initiatives to create a

cohesive whole. Because of the above, the campuses need to be more modern, urban catering to the needs and demands of a modern society geared to a mass rather than a highly selected entry. The country is heading towards creating a platform for a knowledge-based economy which will create tremendous demand for trained manpower. To fulfill the national agenda in this era of globalization the physical and supporting infrastructure of our universities have to be upgraded and enhanced to make them globally competitive. This demands a paradigm shift in the way we approach Campus Design and urban development particularly in the planning and dispersal of institutional uses within the urban fabric in India. The realities emerging from the urban sprawl, weak urban development processes, deteriorating urban infrastructure and environment is resulting in blight and obsolescence in adjoining neighborhoods usually characterized by uncontrolled densities, increasing congestion, poor public transport, deteriorating open spaces, lack of quality public spaces, and collapsing infrastructure which demands intervention through renewal and redevelopment initiatives which can be achieved through various Missions of Govt. of India such as Smart City, AMRUT, HRIDAY, Swach Bharat, etc.

1.1 Higher Education Policy and Campus Planning Imperatives

India has the third-largest higher education sector in the world, next only to the US and China. Education is undoubtedly one of the prominent reasons that decide the fate of a nation, be it economic prosperity, cultural and political influence, or its strategic geographic location. This mandates the need to shift from merit good to the public good for higher education, inviting a lot of expertise and professionalism to its share. Since the education sector post-independence in India had largely been in the domain of the public sector, but post-globalization the private players have arrived having a share of approx. 36.5% of the total number of universities play an active role to play and to discover various opportunities that the higher education sector promises. Even partnerships at different levels can be explored for the same and call for the public and private sector coming forward with efforts to head towards the common goal for a better, much more accessible higher education system in India as it existed in the past.

The country demands sincere efforts at all levels to restructure, reposition and reform the current educational system within the emerging global context. There are now over 1300 million people in India, 21% of who are below 14 years of age, 8% above 65 years, and 71% in the age group of 15-64. This mass of youth, more than the total population of the United States, if properly educated, is the hope of India. If the nation fails to educate this generation, democracy cannot survive long. The major difficulty is that traditional Indian society is restricted with centuries-old attitudes and habits so intensely that new thoughts and ways of living and working are resisted rather than readily accepted, particularly by those in policy and decision-making positions. The gross enrolment rate of higher education in India is roughly 23 percent now which tripled in the last decade from 7 percent. This will need to be further enhanced to 35% by 2025 and 50% by 2035 which will involve a substantial investment. To meet the demand, Government alone will not be able to meet the requirement, therefore, participation of the private sector particularly the corporate sector, and foreign direct investment in higher education would become imperative. There is a serious mismatch between demand and supply. Apart from the above concerning demand and supply, we could witness an oversupply of graduates in certain disciplines and the demand-supply equation is changing very fast, a high percentage of graduates are in IT Sector, while job creation is now expected in Construction, Infrastructure, Services, etc, the need of the hour is to build academic setups keeping in mind the employability of students. approach with flexibility for movement between streams, integration of research-oriented problems as part of academic programs, etc. The campus planning should also be able to absorb the shift through flexible planning concepts to provide Universities and Opportunities to modulate their intake accordingly and balance the faculty requirement through tenure-based employment of faculties. Therefore, the entire system becomes dynamic in its character. It is proven without a doubt that with a better education system, greater are the chances of its development at all levels in any country. Education is essentially connected with the socio-economic position of the country provided it contributes more at the level of skill resulting in more employability across the globe. It is not just a matter of attaining or creating a better education system for a nation that can offer better prospects of employment to its people, but the entire system has to be structured with an inclusive approach and a long-term vision. Acknowledging this change, countries across the world are realigning their academic goals in sync with the new demands of higher education. In recent times, the Bologna process, for instance, has come to the forefront, attempting to make an academic degree and quality assurance standards more comparable and compatible throughout Europe. (Yashpal Committee Report, 2009)

The size of demand and its projected growth, clearly indicate the need for new institutions imparting quality education in subject areas of contemporary relevance and job opportunities, and around 1500universitiesascompared to 1041atpresent will be required particularly in regions that are deficient in

providing access to higher education. The road ahead for India is directly linked to the creation of quality Higher Education Institutions in a big way to meet the challenge of the knowledge hub, which India is fast becoming. The Open Universities will have to be encouraged to offer greater access to a larger cross-section of the society with quality programs at a lesser cost. This becomes the most cost-effective way of providing higher education, including technical and vocational education besides effective utilization of Information Technology as an integral part of the Higher education system with the development of new pedagogic techniques and methodologies which can be facilitated through the Digital India Program.

India needs to have a proactive demand-based policy towards private higher education including foreign institutions/universities desirous of setting up a campus in India or entering into joint ventures. The issue of raising the fees upwards to meet the cost of education is critical if we are to maintain and sustain the quality of our government and aided institutions as private institutions have already fixed a higher fee structure. The need for financing of higher education for students, especially those coming from low-income households needs special attention. There is no doubt that an ideal education system should be without any financial discrimination. However, fee caps tend not only to bring down quality but also reduce the overall supply of education. Under these circumstances, there is a great need to go in for major financial innovations in education planning both at the student financing level and at the level of educational institutions. Like in the United States, we may also evolve a guarantee system, where students coming from low-income households are eligible for a student loan without parental security or guarantee so that there is no discrimination due to the financial background of the student. Subsidization of the interest rate for students should be based on his family income. (Yashpal Committee Report, 2009)

Higher education in India demands a gradual shift from an **"Over-regulating but under-governing"** regulatory regime: There is a need to encourage higher autonomy in the higher education sector. This autonomy needs to be three-dimensional with a focus on academic, administrative, and financial regulations. It is increasingly important to bring in higher accountability and transparency in institutions by permitting independence in the long-term having a clear direction and strategy as envisaged in the IDP.

To establish India' position as a global leader, economically, technologically, and ethically, it is imperative to look at our existing education system holistically in addition, it is equally crucial to evaluate the present system and create a conducive environment for a steady revolution in the education system of India. [5] The next decade will be very critical for the growth and development of the higher education sector in India. The reforms and policies must be pursued in the right earnest with a global perspective and an inclusive approach. The physical infrastructure must keep pace with the fast-changing educational environment in the country, consequently, the campuses need to conduct an audit of their existing infrastructure and space efficiency. A great opportunity is available in the University campuses to absorb growth if the conditions of physical facilities are objectively evaluated, and detailed development plans are prepared with a long-term vision addressing the current demands. The campuses have underutilized the real estate assets as in most cases a great development potential exists on most campuses wherein, they are characterized by low rise low-density development with balance Ground coverage and FAR equivalent to the minimum prescribed under Institutional use by the master plans of cities. A detailed study and spatial audit of the University of Allahabad campus and Jamia Hamdard University campus reveals that the Universities can build almost equivalent space of what exists on campus and add more academic, housing, and supporting facilities by appropriate distribution of functions on the properties owned by it along with other additional facilities by effectively and optimally utilizing the available real estate asset as per the existing development control norms and a huge developmental potential exists for future growth and expansion if the above Universities are guided by the Comprehensive Redevelopment Plan (Master Plan) prepared by them. A futuristic and Visionary approach towards academics and research besides creating inspiring teaching learning and living environment which provides good quality of life can contribute immensely to the development of our universities in the 21st Century as they have the capacity and potential to compete with the best in the world.

1.2 Campus Planning in India

The first universities were established at Calcutta, Madras, Bombay in 1857 and later in1887 at Allahabad in northern India, subsequently, the campuses which were developed in the early twentieth century include the Aligarh Muslim University, Delhi University, Lucknow University, Banaras Hindu University, etc., were developed amorphously in a piecemeal fashion. The universities were set up on lines of the London

University which were influenced by the Oxbridge philosophy of campus planning. Due to inconsistency in a well-structured design approach, the integrity of the campus form & character has been diluted.

After the independence, the amorphous development of the first IIT Campus at Kharagpur was undertaken on about 1000 acres of land. The campus had no definite hierarchy of form & space, a very loose structure resulting in unmaintained spaces in the campus and leading to excessive capital and recurring expenditure. The campus lacks unity and consistency as no controlling master plan existed. The IIT Madras campus was developed in the periphery of the city in 1961. The campus had very rigid zoning which divides the campus into specific zones leaving no flexibility for expansion leading to very low efficiency of the campuses plan. With the experience of different campuses, the idea of planning campuses homogeneously started with the campus design of IIT Kanpur. The plan provided sufficient flexibility for growth &expansion. There is a definite hierarchy of movement, opens spaces & the campus form is coherent in scale and typology, this trend of creating homogenous campuses was followed in the development of IIT, Delhi which was largely governed by a linear site resulting in a structure suitable to the site, but the concept of core and periphery can be identified here also. The campus forms an edge to a large institutional district defined by an urban green and residential district as an interface. (Kanvinde, A.P, Miller James H., 1969)

From the mid-1960s campus planning in India was pursued with great rigger with an attempt to generate a more cohesive built environment, the campus planners made a conscious attempt to create campuses suitable to the higher education philosophy of the time with a modernist approach to architecture fulfilling the aspiration of millions of Indians having a forward outlook of a young independent nation. A coherent campus development demands a consistent rationale of design approach to meet the academic objectives with flexibility for future expansion and growth, response to the vision, academic and research objectives, context, climatic conditions, site conditions, etc., such that campuses retain their identity and character as a definite entity while adapting to new demands of educational needs for academics, research, teaching methodologies and advancements in technologies, etc. However, most of the campuses failed to recognize that these campuses over a period will amalgamate into the urban fabric of the city. The creation of campuses as a counter magnet and the push with pull forces orient the development patterns leading to speculative growth along movement lines. The speculative real estate trends around campuses in peripheries of cities or in peri-urban areas which in most cases are not planned as an integral part of the Master Plans for the cities do to appropriately consider the development pattern around the campus leading to the incongruous relationship between the campuses and their precincts which tend to transform very fast leading to incompatibility. (Kanvinde, A.P, Miller James H., 1969)

Unfortunately, even today the same Oxbridge philosophy is being followed by allocation of phenomenal parcels of land at the fringe of the cities/peri-urban areas for Central Universities, IITs, IIMs, IIITs, IISERs, etc. negating the experience of campus development after the independence and most campuses developed after 1948 have become an integral part of cities. Yet again, the urban sprawl will result in in underdeveloped precincts with extremely poor environmental conditions. The precinct neighbourhoods will continue to be shanty, catering to cheap housing with single-room tenements, and other needs of the campus community which will develop much faster than the campus. The policy makers fail to recognize this phenomenon neither there is any attempt to learn from the past or examples from countries having a strong University tradition. Most of the Universities in the United States continue to be guided with the developmental framework to address their growth requirements and work towards establishing synergy between the campus and the city by involving the local development authorities, councils, environmental agencies, neighbourhood task force through active public participation process focused on redevelopment plans for mutual co-existence and in the common interest. By and large, campus planning in India has always been investigated as planning for a definite entity but not in the context of a larger urban whole. It is in this context that the University campuses fail to become integral parts of the city. Moreover, the development around the campus in absence of any organized developmental plan has resulted in direct conflict with the genius of the campus structure thereby generating an incoherent urban form & structure of the precincts.

With the growth of cities, increasing densities, unauthorized development of housing for the urban poor the deterioration of neighbourhoods has taken place. Since the cost of renewal and relocation is prohibitive due to meagre resources, weak legislative framework, many universities have been forced to remain in their existing location despite deteriorating conditions in their precincts on account of linkages, logistics, user comfort, urban transport connectivity, urban infrastructure and various other associations with the city. More so, the real estate values of the existing location are extremely high &beneficial by virtue of the prime location in the city and it is not viable neither desirable to move out. Rather the real

state asset has the potential to be capitalized. Moreover, in many cases, the University's land has been subject to encroachment which is difficult to retrieve due to social and political compulsions. The acquisition of land in the present times is becoming increasingly difficult. Therefore, all the campuses must undertake an audit of their campus and invest in efficient land utilization. For example, JNU, New Delhi, MANIT, Bhopal and many more wherein more than 500 acres of spare land is available which can be put to use for future growth or to establish linkages with industry, research organizations, and inter University collaboration.

The substantial rebuilding of the neighbourhood and within the campus precincts has become increasingly important which demands sensitive urban planning to reduce the vulnerabilities as stated above to urban processes. The location of urban universities frequently makes orderly growth and expansion difficult and physical expansion disproportionately expensive, hemmed in from all sides, the problem of expansion assumes mammoth proportions until comprehensive redevelopment strategies are developed as a joint initiative of the University, Development Authorities, and the Stake holders in the precinct neighbourhoods. Many institutions located in the heart of the city, and often established before mushrooming metropolitan growth have until recently given little thought to future growth. The real estate asset of the universities are also under-utilized with minimum Ground Coverage of 30% and a Floor area ratio (FAR) of 1.2 which has now been increased to 1.5 in most Master Plans for institutional land use have not been achieved. The Indian campus is characterized by low rise low-density development, inefficient dilapidated buildings or buildings at wrong locations in the campus are characterized by poor maintenance with poor structural conditions, failing infrastructure, and no defined plan for future growth. The development is usually amorphous and organic. A great development potential can be exploited by clearing inefficient, underutilized structures and restructuring the campus. This fact has been duly considered by the National Knowledge Commission 2006 and has strongly recommended assessment of real estate assets and optimum utilization of valuable land and creating mechanisms for its development.

1.3 Urban University Campus - Concept

Urbanism is becoming a dominant element in our culture, and in the years ahead more people will be conditioned by an urban society that is in a continuous state of flux. To improve the quality of urban life, the resources of the city must be organized so that the accumulated knowledge of the past and current findings can be utilized to achieve the desired objectives. A university should not be conceived as simply a "regional service station" passively responding to current demands and thereby endangering its intellectual integrity, nor should it be an ivory tower into which students and teachers can withdraw for a time accepting no responsibility for the improvement of society. It has to maintain an ambivalent position, balancing itself carefully between commitment and detachment - commitment in action, detachment in thought. It must be in a constant state of creating tension between the two knowing where to pioneer and where to support traditional values. In short, the university environment must and will serve, if well designed, as an island of excellence, the place where the progressive forces of the nation will be generated and disseminated, the place where the aspirations of the nation are fulfilled. (Pearce, M, 2001)

The Universities Master Plan is more than a road map for the university's future and a vehicle for learning for the university's students. The Implementation of the Master Plan is an open process and has encouraged a high level of engagement from students, faculty, community, and the private sector. The universities have to be potential city builders and its proposed master plan establishes synergy with the city development plan for an integrated development plan within the existing urban context that can generate a harmonious built environment and can contribute to SDG by utilizing the opportunity for providing Social, Economic and Environmental Sustainability. Most universities in the US such as Cornell, Harvard, UC Berkley, University of Pennsylvania, University of Arizona, and the University of Chicago, etc to name a few have launched similar initiatives, and they have met with tremendous success.

Our society is slowly becoming irretrievably urban. Since our cities are here to stay, the need is to take a new look at them requiring a major effort to reshape them. Universities can become an important instrument in the recreation of our cities. The importance and necessity of an accepted systematic approach to campus design are required if quality university environments are to be produced that are worthy places for education of the youth and future leadership.

1.4 Campus Planning and Urban Renewal

A narrow definition would confine campus planning to land owned by the institution as if it were a self-sufficient monastic enclave. This is a dangerous and myopic assumption. Colleges and institutions are dependent on the community in which they are located for housing, recreation, services, supplies, etc. and the appearance of the campus is affected by its environs. Some institutions have moved out to new sites because their neighbourhoods were not compatible with the institution because of the increasing size of the campus and other 'push-pull' relationships. It is difficult to establish the point where campus planning ends and another kind of physical planning begins. (Koltsche, J, 1975)

A few responsible institutions had started planning for the area of its immediate interest. Columbia University's interests in the rehabilitation of Morning Side Heights and the coordinated efforts of the hospitals and the institutions clustered around the Harvard Medical School are other examples. The west Philadelphia Corporation represented the interest of five institutions including the University of Pennsylvania, Drexel Institute of Technology – who could not afford to or did not want to move out from the blight which surrounded their institutions. In the United States, section 112 of the housing act amended in 1961 included the urban renewal laws which enable colleges and universities to assemble land for expansion and participate more fully than before in the renewal and redevelopment programs in their environs. (Sen, M., n.d.)

Urban Renewal constructively channels the normal processes of city growth by coordinating public and private improvements in accordance with the community's long-range development objectives through Zonal Development Plans and Local Area Planning. The key actions in any renewal effort can be qualified as under:

- Conservation – the preservation of built-up areas in good conditions; the provision of better municipal services through code enforcement; and the encouragement of private groups to maintain their facilities.
- Rehabilitation – the improvement of predominantly built-up areas threatened by blight; through the demolition of selected sub-standard structures, repair, and modernization of existing buildings, provision of public improvements, and services to restore the area to a useful condition.
- Redevelopment – the revision or replacement of existing land uses that are substandard or counter to the long-range redevelopment of the area. This action usually requires land clearance.

The educational goals of an institution are serviced by any preservation and rehabilitation measures taken in its environs. However, the redevelopment initiative has begun to play a special role in providing land and other advantages which allows the institution to expand beyond its existing boundaries under the provision of the federal legislation in the United States of America. The idea of renewal is required to be looked beyond just renewing the urban infrastructure but also renewing the incompatible uses which result in efficiently managing the real estate assets of the city and the university to mutually benefit each other.

1.5 Global Trends in Development of Universities

In mapping the history of universities since the Middle Ages one can identify four distinct architectural generations. The first-generation universities are Paris, Bologna, Oxford, and Cambridge, all integral to their host cities. In this case, the balance between civic and academic life has been altered to such an extent that the city lives through its university. (Kaul, S., 2007)

The advent of the second, redbrick, generation of universities marked an opening up of education through regionally-based institutions. At first these prepared candidates for the traditional examinations, but with time they developed their expertise and award-granting status. The third generation of universities sought a physical containment from their host cities through the establishment of out-of-town campuses. This development was the result of a post-war explosion in access to higher education and a commensurate need rapidly to establish new institutions and embodied Jefferson's idea of the academic village, autonomous in its location and operation. In cases such as Sussex, East Anglia, and York, the city has developed according to its commercial agenda and acts only as a kind of service vehicle for the academic satellite town. The fourth generation of universities, today in its infancy, marks a recognition of the fact that many institutions undertake higher educational roles to the same standards

as the established universities. In addition, changes in funding structures and the public / societal expectations regarding access to higher education with the advent of global education has done much to encourage established institutions to reappraise their traditional role. In just over a century the annual government funding of United Kingdom universities increased from 15000 pounds to 7000 million pounds. The pattern of growth has been exponential and dramatic post-war and continues to climb even more steeply in this millennium. In contrast to the Urban University Model, the university and city grow together within the urban matrix. Hence it is clear that we are increasingly moving towards a learning society. With the onset of the 21stcentury, knowledge and learning are fundamental elements of postmodern consumption.

1.6 Redevelopment Initiatives of Universities – Case American Universities

There is a great opportunity to survey the history of the American campuses and identify their distinctive traits. As the educational growth of the post-war decades slows down, colleges and universities can assess their goals and plans in a calmer atmosphere. And the new sympathy for traditional campus forms encourages American universities to retrospectively examine the planning process as an integral part of their historical developments. The history of the American campus reveals the varied and innovative forms this expression can take. These have included the open quadrangles of colonial Harvard, the informal, park-like campus plans of the early land grant schools reflecting populist values in reaction against the elitist formality of the classical college; the Beaux-Arts organization of the new American university with its complex and orderly system of parts; the revival of the English medieval enclosed quadrangle expressing the resurgence of conservative collegiate values; and the recent campus plans generated by circulation patterns reflecting the fluid and unpredictable nature of contemporary education. (Turner,1987)

Despite growth and change, most campuses have a special individual character that endures over time. This may be associated with a distinctive pattern of buildings – around a quadrangle or along a mall or with an individual structure – such as a campanile or old main; or with a style of architecture or it may be a less easily defined quality in the overall form of the campus. These characteristics often originated as expressions of the educational ideals or character of the school and acquired special significance that endured successive generations of students and faculty as a physical embodiment of the school's spirit. Which are among the most valuable assets of an institution, and their preservation ought to be a prime goal of the planning process.

The American Campuses are typically open and extroverted with buildings set in a landscape in contrast to the inward turning quadrangles or courts of traditional European institutions. There have been exceptions to this American pattern, as in the case of urban schools with the scarcity of land, or those institutions that were caught up in the early twentieth-century enthusiasm for the medieval English quadrangle. Eventually, as universities became larger and more complex, the term "campus" came to represent an aggregate and interconnected set of voids, the total figure of space in between the university's grounds and buildings, the total physical presence of an institution. The American campus was developed originally as a compact, distinct academic district with a central focus, a defined perimeter, and a clear relationship to the town that surrounded it. (Turner,1987)The result is that uniquely the campus is an American place. In the United States of America, the campus founded originally were planned to exist away from public life, the Campuses now constitute places in which elusive quality of community has been protected and sustained. The campuses share real-world constraints with their towns and cities.

The common thread that binds the American University tradition on the campus is the process of continuous physical change. The campus education was intended to convince students of the necessity for tradition and the possibility of cultural evolution. The architectural principles of campus urbanism in America are deeply embedded in the foundation of every university in the country. Many of the principles can be traced to the very beginning of campus making of the University of Virginia. The others have evolved in various forms after this. The architecture and urbanism imbued with the values express the best in the American character valuing the new. To draw a comparison, European urbanism was based on the aesthetic principle of arranging public space formally and figural, while the American urbanism deferred entirely having evolved through the informal incremental production of individual building and through them the definition of fluid and ambiguous public space.

The variety of building types on campus is normally set within the natural or created landscape. An understanding of the landscape as a language equal and parallel to the language of architecture has

been a central aspect of the American campus tradition. The cultivated landscape on campus is formally connected to all open spaces and not just only to its adjacent buildings. Its purpose is to define distinct settings for social interaction by its size, form, colour, texture, scale, and other architectural characteristics and the manner in which campus landscape can truly strengthen the unity of the entire campus. The intimacy of patios, the engaging social character of courtyards, the formality of quads, the monumentality of greens, and the informality of fields are all defined through the architectural disposition of their landscape components. The conceptual strategies for forming a coherent American campus rest on the recognition of the campus as a built pedestrian district. The individual projects contribute to the creation of one of the following three kinds of campus order:

Infill-adjusting buildings and places within existing campus precinct boundaries
Completion – designing projects that complete the form of existing campus precincts
Extension – expanding the campus by defining both the form of new precincts and the rule for achieving precinct completion over time.

A typological approach to campus making in America represents the ultimate balance between architecture and urbanism i.e. to build a unified campus of diverse parts. Typological continuity has resulted in projects to share architectural elements and to function cohesively in creating a public realm. The formal compatibility makes a campus that remains not only visually coherent but conceptually articulate in its development over time. The Architectural diversity has been truly meaningful only when read against a backdrop of formal continuity that transcends any one individual project. Indeed, a coherent architectural context is a condition for a unique expression in American campuses. Therefore, the discipline inherent in a campus structure that is defined typologically supports a stylistic variety. However, in the era of the master plans in some cases buildings became the dominant component of campus making. (Polyzodies,1997)

In many cases, the design of buildings is regulated by a development framework for example the Brown Book prepared by Stanford University or the New Century Plan of UC, Berkeley that establishes its typological character through the essential guidelines for form, density, and use. The emphasis on campus planning and development of campuses as an ongoing process and the commitment towards coordinated growth of the campuses with its surrounding context have been key to the success of campus planning in America. The well-detailed practice and procedures, campus audit, life cycle cost analysis, and cost modelling, focus on creating and accentuation of public space design, conservation of heritage, and respect for the campus form and structure, besides engagement of every campus in Energy Audits and energy conservation leading to reduction of carbon emissions with an approach towards sustainability makes campus planning an inclusive holistic process as part of the development agenda of their universities. This has been made possible on account of the clarity of approach, collective wisdom, and equal emphasis being given to campus development as an integral part of academic and intellectual growth. The American campuses have grown in time and space responding to their relationship with the adjoining neighbourhoods and the communities the campus serves and interacts with. The campus planning group in most universities is a group of professionals dedicated to reviewing, monitoring, and coordinating various projects with the academic community, the city development authorities, neighbourhood communities and interests' groups, architects, planners, and a diverse group of experts involved in the exercise of planning, construction, and development. The American Campuses are a kind of microcosm and have been shaped by the desire to create an ideal community and have often been a vehicle for expressing the utopian social visions of the imagination. Above all, the campus reveals the power that a physical environment can possess as the embodiment of an institution's character. The American campus-making tradition is an invaluable source of coherence, the source of many wondrous future projects, and a guarantee for the survival of the American university as an institution of coherence and meaning.

2.0 Redevelopment and Renewal Issues for Campus development in India

The tradition of the University system in India is very young but we have begun to confront various issues of growth, expansion, housing state of the art research facilities, and supporting campus infrastructure. In most of the State-funded Universities, the conditions are precarious with a complete failure of infrastructure, unhealthy living conditions with very meagre funds for maintenance and upkeep of facilities leading to the slow decay of the campus. It is becoming difficult to handle basic operations of the Universities with minimal grants and funds, inadequate staff, weak planning, and apathy of the state governments. With the poor management and long-drawn complex administrative procedures plagued by corruption in the system, the educational institutions are in very poor health while we advocate the

creation of a knowledge-based economy. The weak definition of priorities and statement of purpose is resulting in inappropriate utilization of the available resources.

The Redevelopment Approach leading to the revitalization of urban areas using tools of Conservation, Preservation, Rehabilitation with a community-sensitive approach is gaining ground across the globe. This approach can be well applied towards integration of Urban Campuses with the neighbourhoods and the precincts in India, however, some strong legislative measures with adequate developmental planning are required which controls ad-hoc, incongruous speculative development which usually precedes any formal planning effort and on account of various socio-political compulsions resulting in extremely downgraded neighbourhoods which makes the growth and campus expansion almost impossible.

The development of campuses in the Indian context has to conform with the local conditions. These university campuses and the precinct after suitable delineation need to be classified under special areas in the developmental plans or are classified as Special Area Development zones to undertake redevelopment of the campuses and their precincts. This would also enable coordinated growth and expansion of the campus with precincts and prevent ad-hoc developments incongruous to the structure of the campus. An organized effort in this direction would result in a better-built Environment and contribute to the image of the city as a whole. Moreover, adequate backup of legislation is required to implement redevelopment programs in the interest of both neighbourhood and the University. In the present context, the Universities will have to accept a stewardship role in the development of not their precincts but also the city and the region using their intellectual capital by pooling expertise from various disciplines for socio-economic, cultural, physical, and environmental growth and development. This pool of well-informed talented people needs to network, inform and advise the policy makers, local administration, focus groups, NGO's by synergizing with other research and academic institutions in the city in the larger interest of development and well-being of the citizens in line with the thrust areas and Mission Programs of the Central and State Governments.

2.1 Legal and Legislative Frameworks for Development

The Urban Renewal and Redevelopment Initiatives have not been implemented comprehensively as the legal and legislative framework in India are inadequate to support development plans and on account of inordinate delays in settlement of disputes in absence of supportive legislative framework the renewal efforts are impacted. Therefore, there is a need to develop a Legal and Legislative framework to support comprehensive redevelopment initiatives which include clearing of blighted areas with unsafe structures, inefficient, incorrectly located buildings, and acquisition of land for integrated development of neighborhoods and the centres for higher education. The Urban Development processes should be well covered under Acts with underlying rules and regulations resulting in minimum ambiguities. The Renewal and Redevelopment should be made an inclusive process of Urban Development as districts consistently demand up-gradation of urban infrastructure, conservation, adaptive reuse, modification of uses, relocation, rehabilitation, etc. The master plans should notify the detailed plan of action, proposals, procedures, and implementation methodology, usually, this effort is very inadequately described in an open-ended manner in the development plans. This initiative demands empowerment of the Task force to decide the future of the Educational District in consultation with Local Representatives, City Planners, Administrators, and Municipal Bodies by the development of Local Area Plans as per 74thConstitutional Amendment.

2.2 Financing Regimes

Any Urban Development model is sustainable if it is supported by a well-articulated financial model and regime that provides impetus and environment for growth and investment. In order to accomplish this objective, Funding mechanisms are required to be developed on the side lines to promote a knowledge-based economy through a techno-financial regime to provide incentives for development in form of Tax incentives benefits to promoters investing in the development of the educational districts & in capacity building of the educational, residential and research infrastructure. The renewal and redevelopment initiatives can be accomplished by creating a fund pool from schemes like AMRUT, part resources from University, MP, MLA, and local representative development fund, private collaborators, and Civic bodies for the execution of projects. The Public-Private Partnerships need to be encouraged for redevelopment initiatives and should also be engaged to cover maintenance of infrastructure. Apart from the above, large Infrastructure Financing Companies, International banks, National Banks should be involved to promote and invest in development by creating viable business models which are well supported by

providing promotional rights, additional incentives on implementing green technologies, concessions in FAR, etc. The above can be achieved by creating an SPV (Special Purpose Vehicle) with an equity model to undertake redevelopment.

2.3 Public Participation

A successful planning effort addresses the aspirations of the communities and in improving their quality of life. Therefore, the community processes structured with an objective to consider the viewpoint of all stakeholders including the campus community, public enterprises, City authorities, municipal agencies, RWAs, urban infrastructure service providers, and the neighbourhood interest groups are key to mutual co-existence and coordinated development of the campus and their precincts. The Universities need to become a resource and catalyst for change and development by creating mechanisms for community participation on larger sociological, economic, political, and developmental issues relevant to the region and their context utilizing their expertise for rationalizing the growth patterns. This can be achieved by engaging with the Community in the development process by organizing a Campus and Neighbourhood Task Force and the areas of concern need to be mutually resolved for effective implementation of developmental plans.

2.4 PPP - Public-Private Partnerships

It has been sufficiently debated and identified that India has to encourage the participation of the private sector and FDI in Higher Education, though the universities have so far been created by the state and the central governments and public spending on higher education has also been enhanced substantially, in view of the demand by 2030 for higher education the private sector is poised for a greater role. The partnership is not only limited to fulfilling the demand and numbers for higher education institutions but also to cater for research collaboration between the institution and the industry, support in developing and enhancing infrastructure, endowments by the alumni, and other venture capital funds. The campus development and campus infrastructure have a great opportunity for public-private partnerships as there is low risk for promoter & concessionaire which can be entered into as viable business models. The integration of the campuses with the city can be facilitated through public-private partnerships, BOT / BOM / DBOT / O&M, etc. initiatives in the areas of urban transport, housing, promotion of IT and ITES sectors in the precincts, computing infrastructure, advanced research centres, alternate energy sources, energy conservation and management, cultural centres, expo marts, human resource outsourcing (Security, Health, Housekeeping, Dietary and laundry services, etc.).The adjoining land holdings with Private Trusts/ Builders and City Development Authorities can be encouraged to participate with development models to facilitate integrated development of Campus precincts which is physically and economically beneficial to the parties involved which could include Techno –Financial and commercial benefits for the development of Public spaces and creation of public realm at interfaces to mutually benefit the campus and the neighbourhood. There is a need for the universities to create opportunities in form of land resources in the interface zones to support the above partnerships and initiatives for long-term asset creation, Economic Resource Generation for the University through efficient and optimum utilization of real estate assets, and proposing land use planning. The model of non-profit private universities with a mechanism for other tax incentives is a viable model for India, this is feasible through greater participation of Indian corporate sectors. The Corporate sector can be motivated to become a major player in the private sector through higher education as they have well established corporate governance structure. The example of BITS, Pilani, BITS, Mesra, and Manipal are good examples. The CSR funding can be incentivized to establish advanced Research Facilities.

2.5 Urban Development Process

In a globalized knowledge economy, India needs to establish 21stCentury knowledge centres which can compete with well-known universities globally which demand careful thought towards the Urban Development process, and therefore Institutional Land use becomes a significant component. The location of universities defines the pattern of its development; by and large, the large contiguous land holdings are acquired at fringes of the cities usually outside the master plan limits which is the most dangerous approach. The identification of adequate land area should be done within the master plan proposals and in case the same is not feasible then the use zones adjoining the campus should get notified to prevent speculative real estate deals and unauthorized acquisition of land resulting in unplanned organic development. It is pertinent to evaluate and pre-empt the trends of transformations and provide a Special Area Status with specified Zoning Regulations to the zone comprising of Campuses and their precincts in the master plans of the Cities with an objective to absorb future growth

requirements of the campuses. And revise land use allocations to desire benefits from resource sharing and to promote knowledge-centric economic development.

The Master plan proposal need to enhance the allocation of Land under Institutional Land use as part of Master Plans to support the growing Knowledge-Based Economy by establishing Institutional Districts within the city in form of Educational Sub-city, Districts, Knowledge Parks, Cyber Parks, Business parks, etc. in conjunction with Socio-Cultural Facilities under Public and semi-public uses. A Balanced Distribution of these districts and the creation of special educational zones by preparation of Local Area Plans need to be considered and development guidelines within the overall fabric of the city along major transport corridors to generate desirable dynamics and synergy between the districts need to be planned. The development plans need to encourage the concepts of Performance Zoning, Mixed Land use, Purchasable FARs, etc. The allocation of uses in the precincts of the campuses needs to be notified as part of an urban agglomeration with redundancy to be built in for future expansion of the campus in the development plan by controlling density patterns and permitting mixed-use in specific zones. The structural changes need to be undertaken by clearing and renewal of the blighted areas with an objective to rehabilitate the affected communities within the same location by reworking the density patterns and identifying their impact on the urban infrastructure. The entire district should create opportunities for investment and the development potential thus created should attract promoters for greater participation in the development process. The University precincts are usually preferred locations that attract investors and therefore there lie a great opportunity to generate a development methodology that is mutually beneficial to both the academic and the precinct community. A desirable mix of uses, affordable housing should be provided and densities to be regulated to a maximum of 300 p/Ha (medium density).

The University infrastructure should conform to zoning and environmental regulations as per Master Plan for all the properties owned by it. The campuses in India are characterized by low rise low-density development, to effectively utilize the real estate asset, the existing Ground Coverage and FAR norm need to be enhanced as discussed in the section above to meet the housing demands on campus and with controlled densification. The increased FAR will result in a change in scale, compact footprint, and homogenous pattern with greater flexibility for future expansion. The variety in urban form thus generated will be an outcome of a mix of building typologies between campus and the precincts resulting in a unique urban character. The campuses and their precincts need to be restructured with efficient land use planning, Urban regeneration, clearing of unauthorized development, and up-gradation of services under the AMRUT by preparation of detailed Local Area Plans and identifying potential sites for campus expansion, housing, and allied public – semi-public facilities in a manner which is beneficial and complimentary to the campus and the neighbourhood. The universities need to be made an integral part of the National Urban Renewal Mission and other National Thrust Area Programs and invest in '**Knowledge Urbanism**'.

2.6 Urban Infrastructure

The Universities need to develop stewardship strategies and provide leadership for socio-economic, cultural, physical, environmental, technological, and overall sustainable growth and development of the region within its influence zone with a long-term development framework. The Urban infrastructure demands restructuring and rationalization of Urban Services, the Vehicular and Pedestrian movement networks by reinforcing the Public Transport System with improved connectivity. A dedicated system of Public Transport in the form of University Specials or Shuttle Services operated either by the University by outsourcing under its aegis or with public-private partnerships needs to be introduced. most universities are located either along the highways or a city level arterial road and therefore could be serviced by the rapid transit system and a transit-oriented development model is a viable option for consideration as it would result in higher FAR is in the precincts attracting larger private investment. The transport demand management strategies should be worked out as per the ground realities and location of universities.

The universities with their intellectual strength can create a sustainable development model for conservation of water, management of waste, balanced open space to built-form ratios, control on hard surfaces, Volumetric control, Urban Aesthetics, Streetscapes, Signage's, Urban Furniture, Alternative Energy sources, etc. through regional stewardship strategies The emphasis under AMRUT/ Smart City Mission to upgrade and restructure water supply/ drainage, sewerage, garbage collection, disposal, communication and electrical distribution systems with an overlay of IT networks need to be explored with coordinated resource management initiatives with the adjoining neighbourhoods. Apart from the

above, the universities can create public awareness through various programs and initiatives for improving environmental quality.

2.7 Urban Ecology and Landscape

The universities with their intellectual and human resource potential should engage in conducting detailed Environmental Impact assessment and periodic monitoring of environmental conditions in the region and pursue research by undertaking projects to assist future planning and by collaborating with the communities, Governmental, and Non-Governmental agencies. The joint effort of all agencies involved will result in the conservation of existing biodiversity, eco patterns to maintain the ecological footprint & ecological balance. A sustainable agenda needs to be drawn for the entire campus district which promotes reuse, recycling (recycling water, garbage, and sewage, using non-toxic materials and passive energy sources, conserving energy, and reusing buildings are all essential strategies for guaranteeing the health of the natural world of the campus) and renewal initiatives through well-defined policies and underlying rules and regulations for implementing the defined agenda which needs to develop as per site conditions. A campus is a district of limited size where ecological initiatives can be coupled with the aesthetics of nature. It is significant to preserve the biodiversity of the region.

The existing landscape both hard and soft along with planting patterns need to be evaluated and reorganized keeping in view the natural landscape, topography, flora, and fauna to achieve coherence between campus and neighbourhood open spaces, street landscape, squares, edges, interface zones, green belts, etc by restructuring the area level open space system and developing a hierarchy which establishes a connect both visually and physically. It is very critical to integrate slopes and conserve the natural drainage patterns. The landscape contributes to the urban quality and richness of a place and provides a unique character and identity which when supplemented with Public Art, Urban Furniture, and other landscape elements as part of Urban Landscape, the image can be considerably enhanced.

3.0 Redevelopment Strategies for Campuses in India

The idea of an ideal university is reflected through the physical environment of the campus wherein parts are integrated into a comprehensive whole qualified by its own identity and image. Normally, a university campus is compared to a city on a small scale as it caters to most of the needs of the university community. Unlike a city, however, in the present context, a university is a Para-commercial centre for knowledge, research, and allied functions which is an ensemble of well structured, compact, and a unified cluster of buildings with intimate pedestrian precincts, well-articulated open spaces, public spaces defined by the movement system, thereby providing unique teaching, learning, and living environment. The campus is usually characterized as a quiet, comfortable oasis to foster academic and research activity set within the existing urban landscape. In this sense, a campus would be more like a grand park in a city well integrated with its surroundings establishing a connection with the adjoining districts to support quality interaction not only physically but socially and culturally too.

3.1 Need for Redevelopment of Brownfield Campuses (existing campuses)

The university needs to be an anchor for the intellectual and knowledge demands of the region and serve the entire region as a cultural centre for the people allowing them to share and participate in its activities. The campuses have a great potential to contribute as an economic generator in a knowledge-based economy and in providing progressive ideas and knowledge. It is research potential when coupled to address the issues and problems of its region can be an ideal synergy between the two, as the academics of the campus are better qualified to contribute towards the resolution of the same given the fact that they have a better understanding and cultural sensitivity. The community in turn will serve as a laboratory and furnish a set of problems to be solved by the university. The emphasis on Urban Resilience of which our campuses are an integral part demand a Strategic Framework that is relevant in time and context.

In short, a university campus should be a place of progressive transition where a student is confronted with the realities of living and working with other people in an environment that provides a wide variety of conditions for the best kind of relationships before stepping into the real world. In the era of globalization, it thus, sets the stage for cross-cultural exchange of ideas and provides an opportunity for the students to prepare themselves to bear their responsibilities before entering the mainstream of life, and making their contribution to society. The universities per se are an agent of change which is intrinsic for growth and development. To achieve excellence as many Universities like- Harvard, Cambridge,

Oxford, Stanford, UC, Berkeley, Princeton, MIT, Cornell, Columbia, and many more Ivy League universities, have consistently pursued the highest academic standards and have constantly set higher targets for themselves for striving towards excellence. A well-articulated academic agenda with a commitment and vision duly supported by quality physical infrastructure creates an environment for the higher achievement of the individuals fulfilling their quest for knowledge. History is in the testimony of the fact that if the university traditions when nurtured in right earnest, global centres of excellence are established which not only serve their, city, region, country but the entire humanity in the world.

The university tradition in India has undergone substantial changes in its systems, structure, and quest for global identity yet we are still far behind the leading universities globally after over a century and a half which certainly demands introspection of our academic and administrative processes and the supporting physical infrastructure which creates the environment for excellence. There lies a great opportunity for India to become a global leader if it manages its human resource potential appropriately and adequately with the current age participation ratings to its advantage. A new paradigm for Campus Planning and Design is required to address issues pertaining to the above in the Indian Context and a century and a half is sufficient to evaluate the efficacy of a planning philosophy particularly in a developing country like India wherein they need to optimally and efficiently utilize the available resources. The entire approach demands the development of strategic Goals and Objectives, a policy framework which is an enabling tool for achieving the established objectives backed up by well-structured initiatives, therefore the philosophy and vision for campus development should be built in the concept of campus plan which should be able to absorb future growth and expansion and serve the purpose of a holistic learning-living environment contributing to the academic achievements of its community and serve the society in a meaningful manner as envisaged through NEP 2020.

3.2 Redevelopment Strategies for Campuses in India in Urban Context - Framework for Campus Development.

The campuses before the independence in India have been developed heterogeneously and consist of several buildings at wrong locations and many of them are also in extremely poor conditions with identifiable structural distress which demands regeneration of the campuses. The studies have identified the following facts and realities which have resulted in the present state of our universities. Fundamentally lack of Vision of Academic Administrators to develop campus infrastructure holistically as a continuous process and adhocism and piecemeal growth in absence of any comprehensive planning and structuring has resulted in this chaos.

The campus services in most campuses have failed are obsolete and inadequate to meet the current requirement. Safety and public health have been grossly compromised particularly Seismic Safety Electrical Safety, Fire Safety, Disaster Mitigation, Waste Management Black and Grey Water Management. All the above if adequately addressed can make the campuses more sustainable which can also bring down the recurring expenditure. The policy makers and campus designers in India must recognize this phenomenon of growth and change and plan campuses to be an integral part of the urban matrix. Further, the inadequacies in campus planning itself have resulted in this discord. Campus Design and Planning in India is still in its infancy with no defined guidelines on the development of physical infrastructure, therefore the IDP addresses this gap through suggestive framework and guidelines for the development of HEI's. The Universities have not kept pace with the utilization and application of emerging technologies into teaching-learning processes and transformation in pedagogy using appropriate digital technologies. The Universities have not been able to connect with the industry adequately to peruse collaborative research.

All the above have led to mediocre campuses plagued by incoherence in campus structure, open spaces, public space design, circulation, architecture, inefficient structures, or incorrect placement of building types on campus resulting in a complete loss of identity and image. The campuses are usually low rise characterized by low density with a gross underutilization of Ground coverage and FAR due to Adhoc and amorphous development in absence of guiding development frameworks. The country continues to make mistakes with respect to the land area requirement with respect to enrolment (area per capita) even though UGC has considered the enrolment norm at a higher level of 30,000 for a residential university. The National Knowledge Commission has strongly recommended effective utilization of real estate assets in view of the central location of universities in the city and its real estate value in the current location. resulting in a complete loss of identity and image. The National Knowledge Commission has strongly recommended effective utilization of real estate assets in view of the central location of universities in the city and its real estate value in the current location.

The fundamental aspects which demand retrospective consideration:

- Convergence of Inter-Ministerial initiatives towards National Missions on Programs using Intellectual Capital of the Universities/Institutes.
- Flexibility to adapt to change (socio-economic, cultural, and technological dimensions).

Criteria		Restructuring, 2005		Projection by 2012	
		Total	Additional	Total	Additional
Enrolment Criteria (inclusive of UG and PG)	Norm (i) 20000 per university	646	309	1072	735
	Norm (ii) 30000 per university	430	93	715	378
College Criteria	Norm (i) 20 colleges per university	585	248	-	-
	Norm (ii) 30 colleges per university	389	52	-	-
Population Criteria	(i) 1 university per 2 lakh population in 18-24 year age	619	282	715	378

Table1: Number of Universities & Colleges Required – An Estimate (Source: UGC Report, Higher education In India - Issues Related to Expansion, Inclusiveness, Quality & Finance, Nov 2008)

- Demand and supply are linked to employment opportunities.
- Freedom for exploration and equal opportunities to all the academics.
- Innovation in teaching methodologies (From tutoring to learning).
- Reorganizing admission and evaluation systems.
- Making research an integral part of the education process and integration of cognate departments to share resources.
- Develop an interdisciplinary approach in teaching and learning processes by establishing research Centres and Centres of Excellence (COE) within them.
- Creation of schools for specialized domains/disciplines with supporting research facilities.
- Parity in Curricula Structure of University with inbuilt flexibility towards required autonomy to support credit transfer regime. The stakeholder can shop for knowledge in the desired field to achieve excellence.

Campus Design and Planning is a continuous process of development involving an audit of the physical infrastructure of the University viz. the academic agenda, enrolment, new disciplines, research, housing, supporting facilities on campus besides engagement with neighbourhoods, communities, and city authorities. A dedicated team of Campus Planners, Academicians, Architects, Engineers and Technologists, Energy Experts, etc are engaged in a well-structured process of campus planning with defined guidelines and master plan to guide the future development of campus structure and form in response the genius of campus design philosophy, campus architecture, engineering services, project delivery. processes, life cycle analysis, and sustainable development approach. The campus design and planning is a specialized area with professionals designated as experts in the discipline having vast experience involved in the process. The architects engaged in the process of designing and construction of buildings are required to follow and respect the laid guidelines for design and delivery. The studies have shown that campus for 30,000 students in an urban context can be accommodated in good 300-350 acres of land is more than sufficient if designed with respect to prescribed norms of 30% ground coverage and an overall FAR ranging from 1.8-2.25 as per the master plans across various cities in India. Dober has suggested that it is prudent to create a new campus or an institution beyond an enrolment of 30,000 students as demands for physical infrastructure multiply significantly beyond this. The study and analysis as per Table 1 and Table 2 undertaken with respect to the size of University campuses has been undertaken with respect to the above Enrolment norm of UGC and Master Plan allocation for various use zones on campus as per Delhi Master Plan 2021 Unified Building Byelaws 2016.

Universities are important contributors to economic growth and development through their interactions with the tertiary sectors and are microcosms within our cities. The Oxford Cambridge Model of locating campuses away from cities as ivory towers have no the present times as within growth of our cities they get subsumed into the city fabric, therefore, it is pertinent to plan and design them as Urban Campuses even though they may be proposed in the peri-urban areas or part of larger defined Urban Agglomeration through Master Plans, it is important that the surrounding land uses are compatible and provides for opportunities to absorb growth which could meet the demands for Housing (Both for staff

and students) Co-Working and Living through a mix of uses, Research Institutions, Corporate Parks, Institutional Uses for Inter and Intra University Collaboration including FDI in Higher Education, etc to reinforce their synergies and mutual co-existence. A new paradigm for campus Development is being proposed through IDP for both Greenfield and Brownfield Campuses which demands the support of Urban Development Processes and Norms to achieve the planned objectives as envisaged. In either case, Land is an important commodity that needs to be adequately and appropriately utilized as the acquisition of the same is not easy. The demand for space will continue to rise even with the advancement in technology the demand does not reduce as new disciplines emerge and each has its own requirement for space for academics, research, and correspondingly Housing. This trend can be experienced in some of the Ivy League Universities in the USA like Harvard, Stanford, UC Berkeley, and many more having a very strong University tradition of campus development as compared to India which is about 164 years old and are undergoing phenomenal transformations in their precincts which are incongruous. Therefore, the Urban development Framework needs to address this phenomenon which can be observed even in campuses like IIT's/IIM's and other Indian Universities which were established post-independence.

The guidelines specified in the Master plan have been evaluated with reference to development priorities and demand for space with respect to academics, research, residential facilities, Campus services and facilities, and open areas, parks, and landscape. The IDP Committee of UGC has suggested modifications to the existing norms to MOHUA as suggested in Table 2 besides the inclusion of the above in URDPFI Guidelines. The Master Plan of Delhi is under revision for 2041 and is one of the most matured Master Plans prepared in the country which has guided several other Master Plan exercises in the country. In view of the above, the IDP Committee carefully reviewed the existing Norms for Development of Universities as stated in Delhi Master Plan 2021 and Guidelines are given in UBBL 2016 and there is an opportunity to address this phenomenon through ground realities for both brownfield and new upcoming greenfield campuses by exploring vertical growth of campuses by modifying the Norms for Ground Coverage and FAR and investing in Sustainable Development through the reduction in carbon footprint, preservation of biodiversity/ natural landscapes, urban ecology and through the application of Green technologies. This will allow and absorb future growth and expansion by optimally utilizing the land resource, more so in Greenfield Campuses which could also be developed through the framework of URDPFI Guidelines to save the potent agricultural land.

We are proposing the following modifications to the Development Controls and also be implemented through URDPFI Guidelines. A fair evaluation through the suggested Norms suggests that 30,000 students can be accommodated within a Campus Area of 350 Acres with 90% residential facilities for students and 85% residential facilities for staff besides the Academic and Research infrastructure with desired redundancy.

Proposed Development Controls for University Campuses for MPD 2041				
ZONE	**% Zonal Area**	**Maximum G.C.**	**Maximum FAR**	**Maximum Ht. (m)**
Academic	45%	30%	**2.4**	45
Residential	25%	30%	**2.25**	37
Sports & Recreation	15%	25%	**1**	24
Park & Landscape	15%	N.A.	N.A.	N.A.
Parking – ECS 1 (to promote public transport)				

Delhi Masterplan 2021 Byelaws-Current				
ZONE	**% Zonal Area**	**G.C.**	**FAR**	**Ht. (M)**
Academic	45%	30%	**2.25**	37
Residential	25%	33.30%	2	N.A.
Sports &Recreation	15%	10%	0.15	27
Park & Landscape	15%	N.A.	N.A.	N.A.

Table 2.

In order to promote Sports amongst youth and the benefits thereof, the Ground Coverage and FAR for Sports and Recreational for Students activities has been increased thought the zonal distribution of land has been retained as proposed in the Master Plan which will result in an average of mid-rise development of 8 -10 floors as per height control defining the campus form having a mix of both low rise and mid-rise

buildings under various uses. The IDP Committee proposes Form-Based Codes for Campuses as mandatory for all campus Development including Geo-tagging and Data of Campuses will be available on the Dashboard of MOE/UGC which can also be utilized by MOHUA for real-time monitoring and to ensure planned growth as per developmental norms which ensures safety and mitigation of disasters.

3.3 Optimum Campus Size

The analysis for a residential university in Table 3 reflects that the entire campus can be efficiently developed and maximize the real estate asset in 350 acres of land by suitably modulating the planning allocation of land and Floor area ratio as specified in the master plans, in order to optimally and efficiently utilize the real estate asset.

The viable Development Potential by modification of Master Plan FAR allocation of Academic Zone (45% of Land Allocation) and increasing FAR to a minimum of 2.40 to provide an increased built-up area for research facilities and integration of cognate departments with an available redundancy of 35.99 sqm (239.94%) for future expansion with an average of 50.99 sqm available per student as against required 15 sqm/student in academic areas. Secondly, retaining residential zone land allocation 25% but reduced Ground Coverage to30% while an increase in FAR to2.25 as against 2 as there is a tremendous shortage of on-campus housing. The land allocation for Sports, Recreation, Campus facilities, and open areas have been retained at 15% but Ground Coverage as recommended has been enhanced to 25% and FAR 1.0 as against 10% Ground Coverage and 0.15 FAR specified respectively to contribute towards better students' facilities and amenities for holistic growth. The balance open area left after the building footprint within each zone contributes towards landscape and appurtenant open spaces.

The result shows that overall, 78% faculty and 87% student on-campus housing is generated considering 45% and 55% of the fair allocation of the total land specified for housing for staff & students in residential zone respectively. The average total ground coverage of campus is about 24.75% of total land area and the overall campus density after densification achieved is 349 P/Ha say 350P/Ha which is moderate density in an urban situation with precinct densities over 500 P/Ha. The Ground Coverage may be targeted between 20-22% to translate into a smaller footprint for a more sustainable campus taking advantage of height, leaving sufficient room to absorb future growth and expansion.

3.3.1 Development of New Campuses – Optimum Campus Size

Minimum Area Requirement for Residential Teaching/Research University - 350 acres

In the present context it is reasonable to consider vertical growth of our campuses to optimally utilize the real estate asset in view of the land value, location, accessibility, the relationship of the campus with the city, and interdependencies as against underutilized low rise low-density development with piecemeal amorphous growth leading to heterogeneous campuses. To translate the ideas as qualified in NEP 2020 the physical manifestation of the same demands more interdisciplinary engagement, sharing of resources, additional space for new disciplines, vocational courses, capacity building in academic and research infrastructure, retrofitting of existing buildings, extensions for more homogenous sustainable development, high-end integration of ICT to support blended learning, up-gradation of Campus services and creation of quality public spaces to improve the quality of life through Comprehensive Master Plans to guide future growth.

Land Allocation as per Master Plan(Table 3a and 3b)

Academic–45%,
Residential-25%,
Sports & Recreational – 15%
Parks & Landscape - 15%

Academic Areas- Ground Coverage -30%, Revised FAR- 2.4 Available redundancy of 239.94% for future expansion.

Housing: The increase in residential zone land allocation to 25%, Ground Coverage - 30% / FAR-2.25revised as per MPD 2021 byelaws. The results show that overall, 78% faculty and 87% students on-campus housing is generated considering45% and 55% of FAR allocation as per land allocation stated above in residential zone respectively between staff and student housing.

Campus Facilities: The land allocation retained at15%(Ground Coverage - 25% / FAR-1.0 revised from MPD 2021 bye-law of 10% and 0.15 FAR resulting in a maximum 4 storey building with 24.99% increase in FAR to accommodate central facilities like- Convention, Healthcare, Commercial, Incubation Centre, Inter-University Collaboration Centers, Research and Outreach centre, Business Hotel, Campus Services, Multilevel Parking, etc which can be shared resource and can to used for revenue generation.

Open Areas: Retained at 15% of Total land to contribute towards Sustainability besides appurtenant areas and interceding spaces as designed public spaces of campus respecting the Natural Landscapes, Ecological Footprint, Biodiversity, and Watershed areas reinforced through appropriate Landscape Design Strategies.

The overall ground coverage has been restricted to 24.75% say 25% to reduce carbon footprint and buildings are proposed up to 10 stories to optimally utilize the structure and control cost of services. Actual on-campus housing requirement for faculty and students averages to 78%and 87% respectively, hence redundancy is available in housing as well. Table2 above shows the improvement in utilization of real estate assets by modulating the byelaws. However, the percentages of staff housing can be reduced to increase the capacities in student housing as per demand. **The IDP recommends a minimum of 25% Staff Housing and 50% Students Housing on campus in Urban Areas –Brownfield Campuses while a minimum of 75% Staff Housing and 90% Student Housing in Greenfield campuses can be modulated as per demand.**

Outcomes and Advantages:

- Optimizing the overall requirement of land.
- Reducing footprint to result in a compact built form with more carbon credits, incrementality, and better opportunity for modulation of campus form and scale to bring efficiency in overall use pattern and built form.
- Sustainable campus development model using green building design methodology and technologies. Development of Eco campuses.
- Generation of desirable open spaces by integration of appurtenant /incidental open spaces.
- Conservation of Natural Landscapes and Campus Landscape Design to compliment Architecture.
- Public spending and investment by the governments can also be judicious to cater to the increasing demand for higher education.
- More universities can be created in different regions to provide equitable access to a larger cross-section of the society keeping in view the age participation rating.

ANALYSIS - REAL ESTATE REQUIREMENT FOR NEW CAMPUSES (UPTO 350 ACRES)							
AS PER BYE LAWS FOR UNIVERSITIES							
PARAMETERS FOR ANALYSIS							
1) UGC norm for Maximum enrolement	**30000**						
2) Analysis is based on Master Plan Provisions of Delhi Master Plan 2021 for Universities							
3) Net assignable area (sqm) is considered at 60% efficiency for usable space & 40 % under services, circulation, & Wall thicknesses etc.							
AREA OF CAMPUS	**350.00**	**Acre**	**or**	**1416399.75**	**SQM**	**OR**	**141.64**	**Hectare**
4) Maximum on campus Housing :-							
Total Staff	4200						
Total Staff & Family Members	21000						
(Considering a family of 5 Members)							
Faculty & Staff Considered	**71.44%**	**15002.03399**		**Say**	**19650**	On Campus	
Total Students	30000						
Student Considered on Campus	**71.44%**	**21431**		**Say**	**18900**	On Campus	
Students Considered	**90.00%**	**27000**					
Total Campus Population		**46650**					
ON CAMPUS DENSITY	**133**	**Persons/Acre**					
	329	**Persons/Hectare**					

DELHI MASTER PLAN 2021 BYE LAWS							
ZONE	**% Zonal Area**	**Maximum G.C.**	**Maximum FAR**	**Maximum Ht. (m)**	**Area (Sqm)**	**Ground Coverage**	**Built-up Area**
Academic	45%	30%	**2.25**	37	637379.886	191213.97	1434104.744
Residential	25%	33%	**2**	N.A.	354099.937	116852.98	708199.87
Sports & Recreation	15%	10%	**0.8**	24	212459.962	21246.00	169967.97
Park & Landscape	15%	N.A.	N.A.	N.A.	212459.962		
					1416399.75	**329312.94**	**2312272.59**

ACADEMIC ZONE							
Max. Ground Coverage (30%)	191213.97	sqm					
Max. Built Up (FAR = 2.25)	1434104.744	sqm					
No. of Floors	7.5						
Area Available Per capita	**47.80**	sqm/Student					
Requirement Per Capita Considered	15	sqm/Student					
AICTE Recommendation for Engg College @ 11.77 Sqm / Student							
Redundancy for Future Expansion	32.80	218.69%					

RESIDENTIAL ZONE							
Max. Ground Coverage (33.3%)	116852.98	sqm					
Max. Built Up (FAR = 2.00)	708199.87	sqm					
No. of Floors	6						
Considering 49.16% of area for Faculty/Staff Housing on Campus		**348151.06**	**sqm**	**3165**	**Staff**	**75.36%**	
(Average = 110 sqm/ Staff)							
Considering 50.84% of area for Students Housing On Campus		**360048.82**	**sqm**	**21431**	**Students**	**71.44%**	
(16.8 sqm/Single Occupamcy per Student)							
The capacity for student housing will be enhanced by double & triple occupancy rooms							

HOUSING REQUIREMENT						
TOTAL (Faculty)	2000	**Faculty Ratio = 1:2:4 (P : AP : L)**				
TOTAL (Non Teaching Staff)	2200	**Non Teaching Ratio = (1 : 1 : 10 : 8)**				
TOTAL STAFF	**4200**	**Teaching : Non Teaching Ratio = 1:1.1**				
Break up of Faculty Hsg	**No. of Units**	**HSG TYPE**	**Area (Sqm)**	**Total Area (Sqm)**		
No. of Professors - Group A (1)	286	T 6	180	51429		
No. of Astt. Prof - Group B (2)	571	T 5	140	79940		
No. of Lecturers - Group C (4)	1143	T 4	110	125730		
Total no. of faculty	**2000**			**257099**		
Break up of Non Teaching Hsg						
Group A = 2%	44	T 5	160	7040		
Group B = 3%	66	T 4	120	7920		
Group C = 35%	774	T 3	90	69750		
Group D = 60%	1315	T 2	70	92050		
Total no. of non-teaching staff	**2200**			**176760**	**433859**	
Average Housing Area per Staff	42	sqm/ Staff				
Total Population of Staff & Family	21000					
(Considering a family of 5)						
(Provision of 50% Staff housing)						

SPORTS, RECREATIONAL & FACILITIES							
Max. Ground Coverage (10%)	21246.00	sqm					
Max. Built Up (FAR = 0.15)	169967.97	sqm					
No. of Floors	8						

OPEN & LANDSCAPE							
Open area	1087086.806	sqm	76.75%	of Site area			
(Site Area - G. C. of Buildings)							
Area under Circulation = 25 % (Roads & Footpaths)	271771.7015	sqm					
Area under Parking = 10 %	108708.6806	sqm					
Net Landscaped Area =	706606.4238	sqm	65.00%	of Open area			
			49.89%	of Site area			

Overall Campus Ground Coverage	**329312.94**	**Sqm**	**23.25%**		**Average land area = 47.2sqm/student**
Overall Campus FAR	**2312272.59**	**Sqm**	**1.63**		**Built-up area = 72.47sqm./student**

Remarks:

The proposed land alocation is excesive in view of the FAR suggested & is grossly deficient in provision of supporting facilities besides does not adequetly address the demand for housing on campus.

Table 3

Redevelopment Strategies for Campus Planning and Design in Indian Urban Context

Table 3A Area Analysis as per Bye-Laws

ANALYSIS - REAL ESTATE REQUIREMENT FOR NEW CAMPUSES (UPTO 350 ACRES)							
PROPOSED AREA ALLOCATION							
PARAMETERS FOR ANALYSIS							
1) UGC norm for Maximum enrolement	**30000**						
2) Analysis is based on Master Plan Provisions of Delhi Master Plan 2021 for Universities							
3) Net assignable area (sqm) is considered at 60% efficiency for usable space & 40 % under services, circulation, & Wall thicknesses etc.							
AREA OF CAMPUS =	**350.00**	**Acre**	**or**	**1416399.747**	**SQM**	**OR**	**141.64 Hectare**
Maximum on campus Housing :-							
Total Staff	4200						
Total Staff & Family Members	21000						
(Considering a family of 5 Members)							
Faculty & Staff Considered	**82.09%**	**17238.22874**		**Say**	**22400**	On Campus	
Total Students	30000						
Student Considered on Campus	**82.68%**	**24803**		**Say**	**28350**	On Campus	
Students Considered	**90.00%**	**27000**					
Total Campus Population		**49400**					
ON CAMPUS DENSITY	**141**	**Persons/Acre**					
	349	**Persons/Hectare**					

PROPOSED BYE LAWS							
ZONE	**% Zonal Area**	**G.C.**	**FAR**	**Ht. (M)**	**Area (Sqm)**	**Ground Coverage**	**Built-up Area**
Academic	45%	30%	**2.4**	45	637379.886	191213.97	1529711.73
Residential	25%	30%	**2.25**	37	354099.937	106229.98	796724.86
Sports & Recreation	15%	25%	**1**	24	212459.962	53114.99	212459.96
Park & Landscape	15%	N.A.	N.A.	N.A.	212459.962		
					1416399.75	**350558.94**	**2538896.55**

ACADEMIC ZONE							
Max. Ground Coverage (30%)	191213.97	sqm					
Max. Built Up (FAR = 2.25)	1529711.73	sqm					
No. of Floors	8						
Area Available Per capita	**50.99**	sqm/Student					
Requirement Per Capita Considered	15	sqm/Student					
AICTE Recommendation for Engg College @ 11.77 Sqm / Student							
Redundancy for Future Expansion	35.99	239.94%					

RESIDENTIAL ZONE							
Max. Ground Coverage (30.00%)	106229.98	sqm					
Max. Built Up (FAR = 2.25)	796724.86	sqm					
No. of Floors	8						
Considering 47.6% of area for Faculty/Staff Housing on Campus		**379241.03**	**sqm**		**3448**	**Staff**	**82%**
(Equated to 110 sqm/ Staff)							
Considering 52.3% of area for Students Housing on Campus		**416687.10**	**sqm**		**24803**	**Students**	**83%**
(16.8 sqm/student)							
The capacity for student housing will be enhanced by double & triple occupancy rooms							

HOUSING REQUIREMENT							
TOTAL (Faculty)	2000	**Faculty Ratio**		**= 1:2:4 (P : AP : L)**			
TOTAL (Non Teaching Staff)	2200	**Non Teaching Ratio = (1 : 1 : 10 : 8)**					
TOTAL STAFF	**4200**	**Teaching : Non Teaching Ratio = 1:1.1**					
Break up of Faculty Hsg	**No. of Units**	**HSG TYPE**		**Area (Sqm)**	**Total Area (Sqm)**		
No. of Professors - Group A (1)	286	T 6		180	51429		
No. of Astt. Prof - Group B (2)	571	T 5		140	79940		
No. of Lecturers - Group C (4)	1143	T 4		110	125730		
Total no. of faculty	**2000**				**257099**		
Break up of Non Teaching Hsg							
Group A = 2%	44	T 5		160	7040		
Group B = 3%	66	T 4		120	7920		
Group C = 35%	774	T 3		90	69750		
Group D = 60%	1315	T 2		70	92050		
Total no. of non-teaching staff	**2200**				**176760**	**433859**	
Average Housing Area per Staff	42	sqm/ Staff					
Total Population of Staff & Family	21000						
(Considering a family of 5)							
(Provision of 50% Staff housing)							

SPORTS, RECREATIONAL & FACILITIES							
Max. Ground Coverage (25%)	53114.99	sqm					
Max. Built Up (FAR = 1)	212459.96	sqm					
No. of Floors	4						

OPEN & LANDSCAPE							
Open area	1065840.81	sqm		75.25%	of Site area		
(Site Area - G. C. of Buildings)							
Area under Circulation = 25 % (Roads & Footpaths)	266460.2024	sqm					
Area under Parking = 10 %	106584.081	sqm					
Net Landscaped Area =	692796.5263	sqm		65.00%	of Open area		
				48.91%	of Site area		

Overall Campus Ground Coverage	**350558.94**	**Sqm**	**24.75%**		**Average land area = 47.2sqm/student**
Overall Campus FAR	**2538896.55**	**Sqm**	**1.79**		**Built-up area = 84.62 sqm./student**

Remarks:

The proposal offers redundancy for expansion & optimises the requirment of space. The uses with in the campus are balanced & can support growth besides creating an inspiring learning enviroment.

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Table 3B Proposed Area Analysis

3.4 Guidelines for Camus Development as per IDP

The IDP proposes the development controls given below in the table which need to be correlated to the existing development controls as per provisions of development controls prescribed through Masterplans of various cities and for Greenfield campuses in accordance with URDPFI guidelines.

1. The IDP suggests that for enrolment of 30000 students the maximum land area shall be 350 to 400 acres for a residential campus with 90% residential facilities for students, 85% residential facilities for staff, sports, and recreational areas along with the academic and research infrastructure.
2. The IDP suggests that for enrolment of 20000 students the maximum land area shall be 300 to 350 acres for a residential campus with 90% residential facilities for students, 85% residential facilities for staff, sports, and recreational areas along with the academic and research infrastructure.
3. The IDP suggests that for enrolment of up to 20000 students the maximum land area shall be 250 to 300 acres for a residential campus with 90% residential facilities for students, 85% residential facilities for staff, sports, and recreational areas along with the academic and research infrastructure.
4. The IDP suggests that the existing brownfield campuses shall engage in capacity building and retrofitting through redevelopment initiatives to optimally and efficiently utilize the real-estate assets of the campus appropriately which shall be governed by the existing development controls as per the Masterplans of the host cities. The redevelopment should consider the interdisciplinary approach with provision for expansion in a phased manner. Such campuses will engage in the preparation of comprehensive masterplans to guide future growth and development in a planned manner, which should lay emphasis on the integration of ICT infrastructure, campus services, and utilities, besides creating shared central facilities as an approach towards the capacity building with emphasis on sustainable development and green architecture with appropriate retrofitting strategies.

Proposed Development Controls for University Campuses				
ZONE	**% Zonal Area**	**Maximum G.C.**	**Maximum FAR**	**Maximum Ht. (m)**
Academic	45%	30%	**2.4**	45
Residential	25%	30%	**2.25**	37
Sports & Recreation	15%	25%	**1**	24
Park & Landscape	15%	N.A.	N.A.	N.A.
Parking – ECS 1 (to promote public transport)				

Note: The Central Government funded and State Govt. funded institutions shall pursue the modifications in the proposed development control with their respective ministry of urban development for necessary modification in the development controls as suggested above.

3.5 Campus Development Approach

The **Strategic Campus Development Framework** needs to be developed as a ***Long Range Development Plan (LRDP)***with a plan period of at least 15 years in the Indian Context with a well-articulated phasing strategy. The space utilization guidelines need to be established using flexible space planning concepts with well-articulated space management strategies through detailed space and campus audits. The strategies for campus development can be specified under the components of efficiency, flexibility, and imageability which contribute towards the creation of a comprehensive whole.

A. Efficiency

The functional efficiency of the campus can be promoted by arranging its activities in a manner that reflects the co-ordination of academic activities between various parts of the campus by identification of academic and research priorities for the development of campus amenities

beginning with Campus Core and percolated to the periphery. The Establishment and dispersal of use areas within the campus and allied properties owned by the University should conform with long-range academic objectives and interdisciplinary interaction. The central part of the campus should be free from the uses which would be better located at the Periphery or interfaces with neighbourhoods such as Continuing Education, Inter-University Interaction Centres, Distance Learning Programs, Socio-Cultural facilities like Auditoriums, Exhibition facilities, Libraries, E-Learning Centres, Sports, and Recreational Facilities, Health care Facilities, Parking, and Services, etc. The creation of a public realm through a pedestrian-friendly environment is a desirable campus configuration. The excess land needs to be conserved for future development which can be achieved by controlling ground coverage, a homogenous pattern of development with compact built form. The surplus land and space resource can be utilized on a leased/ tenured rental model with Research Institutions/ International Universities/Inter-University Collaborations for the mutual benefit of the University to foster academic and research activity. The Campus restructuring through reallocation of uses, realignment of the major circulation systems, there lies a great opportunity to interweave a sense of history thereby providing a rich campus experience and creating a public realm utilizing the richness of existing architectural heritage. The preference needs to be given to pedestrians and cyclists by elimination of through traffic from the campus core. It is desirable to create parking lots and multi-level Parking facilities (to conserve land resources) at the periphery in a manner that the walking distance is controlled, and travel distance is minimized and walkable. The focus must be on improving the quality of life &liveability on campus.

B. Flexibility

The campus structure and pattern of development guide the flexibility for expansion by providing redundancy of over 50% for expansion in an incremental fashion for academic and allied research activities with required adjacencies. The built form guidelines should provide for modular growth with flexibility to provide extensions to blocks with both lateral and vertical connectivity. The Identification of the form should support future expansion with projection for the land requirement in a manner that extensions can be carried out without affecting the operations of the campus. The selection of sites for imminent construction should be identified as per the phasing plan and reservation of sites for long-range construction and expansion need to be a year marked. The Identification and disposition of functions on allied campus properties should be as per Land uses and developmental controls specified by the Master Plan/Zonal Plans of the city with specified height restrictions. The Campus Master Plan should specify guidelines for development in terms of architectural controls, public space design guidelines, campus infrastructure, campus landscape, city interface, edge and envelop control, etc. The campus plan needs to clearly identify new buildings to be constructed, renovated, upgraded, retrofitted with cost modeling, phasing, and scheduling for buildings, campus infrastructure, facilities, parcel development, campus services, landscape, and horticulture. It is paramount that building and campus infrastructural retrofits should be undertaken to address all safety issues to meet the codal-requirements besides investing in Energy Retrofits and Water Conservation Strategies to achieve desired Green Rating. The projects delivery and implementation process need to be developed for monitoring and review of various types of projects during the Master Plan implementation period. A Detailed Area Program for each facility to include Academic, Research, Central facilities, Residential and Recreational should be done and a module can be derived which can result in flexibility for modification and utilization of space in the future. The concept of Land parceling should form the basis for development identifying new additions/expansion up-gradation of existing facilities and supporting infrastructure which also becomes the tool for structuring the campus services. The development should be relevant in time and space using the available technology and coherence in architectural expression reflecting a definite response to the regional character sensitive to the climate, culture, natural landscapes, etc. The campus and buildings shall be designed and developed for Inclusion at all levels and shall be made accessible for people with disabilities "Divyangjan" both external and internal environments besides application of technology to enable them to negotiate the campus and facilities in compliance with guidelines.

C. Imageability

The integration of campus-built environment with precinct fabric is critical to symbolically bring together a social and physical structure of the campus and the precincts. The Campus can be used as visual foci for providing structure to the adjoining sectors and as a generator of urban form. The design controls need to be specified in response to the site conditions, building typologies, facade control (where necessary), colour, materials, envelop controls horizontal and vertical rhythms.

Structuring of open space systems and built form should contribute to providing legibility and richness. The new development within campus should conform with the existing scale in a manner that does not impact the Heritage or Landmark Buildings. The space-space, space-form, and form-form relationship of the campus need to be enhanced through the redevelopment initiative and key zones identified for preservation need to be retained and further reinforced through the campus structure and redevelopment initiatives.

3.6 Campus Revitalization and Living Environment

The campus redevelopment initiative needs to build upon the rich historic character of the Universities in India through complementary and contemporary design initiatives to provide legibility within the campus, good quality of life, and image ability to the campus, its precincts, and the city. The campus redevelopment plan needs to adopt a Sites a Services approach with a concept of land parcelling following a restructuring of the campus. This should form the underlying basis for Future Zoning and cost Modelling. As a policy, it is essential to first create infrastructure and buildings for relocation and rehabilitation before clearing to avoid inconvenience to the academic community and operations of the University. The redevelopment objective should be to create a public realm through restructuring of open spaces, interface development by the disposition of compatible land uses bulk disposition, interfaces, controlling scale, creation of coherent streetscapes in form of boulevards, avenues, or vistas, and sharing of facilities for recreation, sports, cultural, retail, Commercial and other allied activities with the neighbourhood. The campus living environment should support a quality lifestyle that is safe, vibrant, comfortable, and healthy for Students, Faculty, and Staff with adequate recreational and sports facilities generating a sense of pride for the University. The objective for a residential university should be to provide Staff and Students Housing to a minimum of 75 % and 90% respectively on campus with a preference for student housing. The universities can acquire additional land within the city for staff and faculty housing or other outreach and administrative functions which do not require direct campus interaction and disperse their activities which can foster the business relationship through a public-private partnership.

3.7 Campus Planning Principles and Strategies For Greenfield and Brownfield Campuses

The learning from the tradition of Campus Development in India in response to our socio-cultural values, an ethos of ***Guru Shishya Parampara*** which has transcended over centuries need to provide a unique character to our campuses manifested in the physical form and are required to be developed around strong themes which drive the planning process in response to context. The invigorating interactions need to happen beyond the classroom and an enabling environment has to be created around appurtenant spaces, transition spaces, and outdoor spaces which facilitate interactions between students and faculty or between students themselves translating into a lifelong learning experience on the campus. The social and co-working spaces within the campuses should be created and reinforced where possible to transform the learning process from highly structured instructions to unstructured interactions.

The campuses are entities of social, economic, cultural, and physical inclusion having a contemporary character with a global outlook in the 21st century. Some of the dimensions which essentially need to be considered for greenfield campuses also find great relevance for brownfield campuses which can be achieved through redevelopment initiatives. The campuses in India have contributed towards imageability and legibility to their host cities through the historic character of their buildings and many campus precincts are now part of Area Based Development (ABD) Projects in the Smart City Mission. The campuses act as an oasis and act as green lungs within the dense urban fabric of Indian Cities. This phenomenon can be identified as a common thread across the globe that needs to be recognized as an instrument for the integration of campuses within the structure of our cities which synergize with their immediate surroundings to co-exist by complimenting their mutual interdependencies. Some of the strategies are described below which should guide the planning and development of our campuses of the future.

1. **Campus –Vision and Mission:** The purpose and objective need to be qualified by the Vision and Mission of every University giving it a direction for future growth and development. This needs to be reflected in the academic and research endeavours and the manner in which the institution wishes to position itself globally.
2. **Campus -Site and Environs:** The campus development should blend with the natural characteristics of the site in response to topography, geomorphology, and its immediate

context which may or may not be defined at the inception but the scenario for the future should therefore be projected in response to the land uses and structure of the city.

3. **Campus -Natural Landscapes and Biodiversity:** Every Campus has a set of unique natural characteristics defined through its natural landscapes and biodiversity. The intervention demands preservation and conservation of the above and the planning strategy needs to be minimalistic and should reinforce the existing systems through planning and design initiatives.
4. **Campus -Response to Context and Historicity:** The structure and buildings of the campus have to establish a dialogue with precincts that are embedded in the historic character of its immediate context and the city. The vocabulary should further the continuum to reinforce the richness of the response to the context.
5. **Campus –Interface:** The edge condition of the campus will be defined by the dispersal of uses around it and nature of development defined by the zonal development plan, a section of the street defining the edge, and the way they are stitched to make them vibrant and robust. This interface is the most significant aspect of the interaction of the campus with the precinct where most activities will flourish which need to complement each other in terms of use, form, scale, and typology reinforced through public space design strategies.
6. **Campus- Linkages:** The potential linkages to the campus need to be identified from the perspective of ease of access, urban mobility, and the significant connections the campus will establish with the precincts and the city. In many ways, this becomes an important tool to guide the structuring of the campus in response to their hierarchies. By and large, most campuses are serviced by major arterial roads around which urban transport networks are defined. In the case of peri-urban areas, this is the most critical part of scenario planning and in many ways, the campus entries/exits may also orient the networks in the future.
7. **Campus –Zoning:** The zoning of the campus needs to be guided by surrounding uses and dispersal of functions in response to the site, context, linkages, and the interfaces the campus uses will establish with its immediate environment. The concept of core and periphery and the definition of transition zones will establish the campus zoning in a manner that can absorb future growth and expansion of each zone and yet they are interconnected parts of the complete whole.
8. **Campus –Structuring:** The campus structure plan establishes the interrelationship between various functional and conservation zones of the campus stitched through a network of movement with specified hierarchies to include vehicular movement, pedestrian, and bicycle networks besides its connections with urban mobility. The structure plan is an outcome of detailed evaluation and analysis of site, topography, land uses, context, linkages, open space system, urban services, and built-form.
9. **Campus –Mobility**: The system of movement through a network and hierarchies' roads that facilitate vehicular, non-motorized transport, public transport system, cycling, the pedestrian movement which provide access to the campus are critical to the campus. In view of the above, the design of the road section is critical which ensures appropriate widths for each component. The movement networks and the connectivity is important instruments in bringing transformations and points of drop-offs and pickups such as bus stops, ola -uber pickup points, rickshaw stands, metro stations all transform into student-oriented activities and become significant social spaces. Transport Demand management then becomes critical in reinforcing these movement patterns and organization of mobility for various modes. In some cases, the Universities may provide shuttle services between campuses of the University dispersed in the city or may enhance access from urban transit locations. Apart from the above parking demand on campus is yet another critical aspect of planning. The emphasis on the use of public transport contributes to sustainability besides social equity. The campus may be provided with Multilevel Car parks and nodal points and can be developed in PPP Mode wherein it translates into paid parking which acts as a deterrent for use of automobiles and bringing down the infrastructural costs.
10. **Campus –Inclusion:** Thecampuses must be designed as inclusive environments which support people with disabilities-temporary or permanent or medical conditions to enable them to negotiate their path with ease and comfort without any encumbrance. The external and internal environments must be designed and provided with necessary detailing for pavements with tactile tiles, kerb cuts, level management, ramps, warning and information signages, Braille markings elevators, furniture design, displays with sign language, fixture, and fittings, and required application of technology to mainstream the Divyangjan with empathy and compassion besides giving them the confidence that they are at par with the other students. The established guidelines at par with international standards shall be followed.
11. **Campus Typology- Climatic Responsiveness:** The climate is an important determinant of the typology of the campus and is a function of the relationship between the ground coverage

and dispersal of the FAR in terms of the volume besides the Building Use. The built form and the typology should respond to the climatic region wherein the Campus is being developed with appropriate utilization of materials and construction technology to achieve the desired comfort conditions. The varieties of uses also determine the typology besides the mix of uses. The typological approach to campus development is therefore a plausible driver for planning and design.

12. **Campus Form:** The campus form as mentioned earlier is a derivative of Development Controls, the proposed ground Coverage and distribution of FAR on the number of floors. The building used in response to the above is also a generator of campus from the way they are dispersed and mixed. The variation in scale contributes to the campus skyline which also needs to be complementary to the precinct uses to define the edge conditions. A sensitive approach to the above provides desired shade which in turn contributes towards reinforcing activity patterns and pedestrian movement.
13. **Campus Expression- Materiality and Construction Technology, Façade:** The expression and aesthetics is an outcome of the designer's sensitivity towards local context, site, climate and usually gets reflected through the articulation of building elements, materials, and construction techniques adopted. A common thread should bind all the buildings of the campus which may be and therefore, Continuity and coherence become a significant aspect of campus development which should be achieved through typology, expression, and materiality.
14. **Campus Placemaking and Public Space Design:** The public realm and great public spaces of the campus contribute towards the creation of social spaces where interactions happen and translate into the most cherished experiences of campus life. The emphasis on placemaking thus becomes very critical to the campus environment and activity structure. The typology of enclosed, open, or interceding spaces is an outcome of functional disposition of various uses on the campus, their articulation which complements various hierarchies of spaces and the built form that define the space. The designed public spaces enhanced through sensitive and responsive Landscape Design of the campus contribute towards richness achieved through material applications, urban furniture, lighting, planting patterns, grading, views, vistas, etc. through the essence lies in structuring of the campus and its parts.
15. **Campus Controls- Envelop/Volumetric/Facade/Edge:** A well-articulated Master Plan guides the harmonious relationship between various components of the campus yet projects a scenario for the future. In order to foster coordinated growth, appropriate tools are required to be developed which specify the nature and pattern in which future development will be organized such that the old and the new complement each other. In order to achieve the above campus development controls in form of the envelope, volume facade, and material need to be defined and strictly implemented so that the genius of the campus organization is not lost. The Form-based Codes for the campus should be developed both for brownfield and greenfield campuses and should be an integral part of campus design initiative and to be respected by all administrators.
16. **Campus Phasing:** It is an established fact that campuses are developed incrementally which demands appropriate phasing strategy to ensure organized growth and corresponding investment plans to be made which are in line with the vision and mission. This should also become an instrument for the design of facilities and campus infrastructure which is planned for modularity incremental growth and subsequent grant of funds.
17. **Campus Landscape and Open spaces:** The Landscape and Open spaces in any campus complement the built form and contribute towards placemaking on campuses. A well-articulated landscape strategy is required to be developed as an integral instrument of the Comprehensive Master Plan which ensures orderly development in each phase besides putting the available space to effective use during the plan period until developed. Apart from the above the strategy should emphasize on conservation and preservation of Natural Landscapes and add to legibility on campus through intermediate markers, landscape elements, public art, etc.
18. **Campus Safety:** It is of paramount importance that the safety concerns on campus at different levels are duly addressed which may include mitigation from natural disasters, fire safety, universal accessibility, safety during construction and expansion, safety from termites and other pests, surveillance in campus, or crime, etc. The above can be achieved through effective planning strategies in terms of disposition of various uses access, distribution of activity patterns, a network of movement, and integration of appropriate technology to instill confidence within the campus community and develop a safety culture at the level of building and site. The Campus Safety Guidelines should be prepared in detail and displayed

at appropriate locations within and outside the buildings to identify the escape routes and a comprehensive evacuation plan should be drawn by each University.

19. **Campus Utilities and services:** These are the lifelines of any campus and demand efficient integration of networks that support incrementality and investment in a phased manner. The design should be modular to be able to plug in various parts of the campus and the resultant development to the trunk system, which is easily accessible, expandable, and maintainable. The trunk systems can be provided along peripheries in form of service tunnels which will house all MEP services from where branches can be tabbed and duly identified through the Masterplan. Apart from the above, a definite waste management strategy should be in place and appropriate alternative technologies can be identified and deployed for managing the waste on campus. An effort should be made to segregate waste at the source. It is desirable to efficiently utilise the alternative sources of energy or reduce the demand load by such integration. Water management on campus in the present context needs to be deployed through a strong strategic framework in terms of reusing, recycling, and renewing the aquifers. It is desirable that campuses are designed for efficient cooling and ventilation systems to translate into net-zero campuses.

    In the case of brownfield projects, a detailed audit of existing campus services needs to be undertaken and the above need to be augmented and upgraded with new technologies in a phased manner by utilising the existing resource to support future expansion programs and needs of the campus by utilising appropriate retrofitting strategies. In the present times, all campuses have to add an additional layer of the ICT network to support all the uses within the campus and should be connected to the RMS (Resource Management Suite) and BMS (Building Management Systems) being provided at the building and site level.

20. **Campus Sustainability:** The university campuses are a microcosm of a city and they are self-sufficient entities that meet their own needs and are capable of servicing the communities on campus, besides finding appropriate linkages to the communities within the precinct neighbourhoods. The development of campuses in the 21st century must be embedded in sustainable design principles with a well-articulated sustainable policy, strategy, and tactics to ensure compliance. The Sustainable Development Goals should guide the development to achieve social, economic, and environmental sustainability. The sustainable strategies should be brought in response to the context, natural conditions, active and passive strategies, both at building and site level, and a holistic view on the above should be undertaken to reduce the carbon footprint.
21. **Campus Resilience:** The development of campuses should ensure resilience at all levels to mitigate natural disasters, accidents, pandemics, or any other hazards and each university / HEI should have a Campus Resilience strategy to overcome adverse events in the shortest possible time, which is achieved through planning, design, and application of technology to ensure the safety of the campus community. Apart from the above, the campuses should also offer opportunities to service their immediate neighborhoods in events of natural disasters and extend a helping hand to the civic authorities in managing post-disaster rehabilitation. The detailed Campus resilience Guidelines should include all safety issues along with well-articulated protocols should be prepared to efficiently manage any adverse events on campus including demonstrations or social unrest within or outside the campus boundaries. A well-structured Disaster Mitigation Plan should be made available, and the above information should be shared through websites and other mediums of communication with all the users of the campus.

The IDP recommends that in view of the above aspects and dimensions of campus development which involves substantial investment and to keep pace with the academic and research demands, a cohesive group of experts which includes policymakers, administrators, academics, campus design, and planning experts, Architects, Structural and MEP engineers should be constituted under the aegis ofHECI/MOE which evaluates the Campus Planning and Infrastructural Initiatives of all HEI's to ensure that funds are utilized judiciously and provides necessary guidance for holistic growth of our campuses and monitors its development through the application of technology.

4.0 Sustainable development of Universities & Technology integration - Green Initiatives

Universities in the era of globalization have a position to them to be globally competitive and need to be knowledge destinations sought for by the stakeholders in their quest for knowledge through an

inherent holistic model built-in towards achieving excellence in higher education through an innovative academic environment duly supported by physical infrastructure utilizing enabling technologies. An investment in quality physical infrastructure is meant to achieve academic and research excellence as it facilitates quality outcomes. Apart from the above, the integration and utilization of digital technologies as part of teaching-learning processes and the creation of virtual campuses recognizing the transformation from personal computers to palmtops is the way forward. Alongside, there is an absolute need to envision a pioneering model of 'Sustainability' which is ingrained in its vision and ethos. University Campuses should demonstrate that academic and financial sustainability can go hand in hand with environmental sustainability and is centric to all University campus development. This approach should be integral to the Strategic Framework for any 21st century Campus development guidelines and environmental sensitivity should be a way of life, particularly for Universities in developing nations. The University development in India has to be guided by a Long-Range Master Plan which ensures comprehensive and holistic development of our campuses driven by the academic vision.

4.1 Green Initiatives through Strategic Planning

Some of the initiatives in creating a sustainable built environment and eco-conscious campuses with an objective to conserve Energy, Water, and Natural Resources. It is desirable to design near Net Zero Campuses and buildings should be Griha Five Star Rated using appropriate simulation software for detailed scientific analysis for adequate design strategies and subsequent post-occupancy performance evaluation. Some desirable strategies are detailed as under:

- **Protecting the Ecological Footprint by Adopting a Natural Preservation and Conservation Strategy**: trees of various varieties and species existing in the ecosystem are required to be preserved and further replenished to maintain the balance following any human intervention on the sites.
- **Minimizing Carbon Footprint**: Climate responsive Planning by controlling ground coverage/ building footprint leaving more area for percolation and green cover. Adaptive reuse of existing buildings contributes to carbon credits.
- **Preserving Natural Resources and Water Conservation**: Campus development shall be undertaken to preserve natural resources on-site and invest in water conservation measures using appropriate technologies translating into zero discharge campuses.
- **Retaining the Natural topography of the Land:** Development to be responsive to site topography, slopes, gradients, and natural drainage systems in response to hydrology and geology.
- **Environmental Awareness and Sensitivity**: The University communities should be motivated and sensitized towards the protection and conservation of the natural environment and are encouraged to undertake plantation drives and engage in community activities. The plan also promotes the celebration of the environmental week during the monsoons wherein the University community is reminded of their role in conserving the larger environment we live in. The focus should be to develop an environmental strategy that is responsive to SDG.
- **Minimizing Fossil Fuel Consumption through Transport Demand Management Strategies**: Transforming campuses as Pedestrian centric precincts. The structure plans should support pedestrianization and cycling by developing street sections to support universal accessibility. All parking zones and MLCP's should be in the periphery and Shuttle services to provide connectivity to public transport. The internal movements should assist by battery-operated carts for differently-abled. The academic community should be motivated to use public transport thereby reducing the carbon emissions and parking demand on campus.
- **Use of Recycled Materials and Products**: The Planning should focus on the utilization of local and material selection for buildings emphasizes on utilization of building materials and products made from the high percentage of recycled materials. The planning initiative builds a methodology towards the utilization of all construction waste generated from the campus for brownfield developments.
- **Alternative Energy Utilization**: It is critical to utilize alternative sources of energy such as solar and wind energy besides the utilization of biomass. The strategic framework should focus on reducing the demand load by utilization of the above and avoiding substantial investments in captive power and battery banks. The same can also be utilized to preheat water and reduce energy demand for varied applications. Apart from the above where available gas-based turbines can be used to generate captive power dovetailed to heat recovery systems for HVAC applications etc. The passive cooling techniques to be utilized to create

comfortable indoor environmental conditions in built spaces without enhancing carbon footprint. With global warming and increasing demand for indoor air quality, air conditioning will become a necessity; therefore, district cooling systems need to be implemented in conjunction with heat recovery systems. Energy Retrofits are key to efficient management and conservation of energy which should be undertaken for all existing buildings.

- **Optimization and Standardization Strategies**: It is emphasized that development of all campus projects and buildings with flexible planning principles through modular coordination to support incremental growth and phased development in a manner that operations of the campus are not impacted by construction activities. A design paradigm should be developed which is comprehensive in ensuring optimization and standardization at all levels be it the design of spaces, structure, and technology integration with an objective to achieve efficiency through optimization of embodied energy, safety, capital expenditure (CAPEX), operational expenditure(OPEX) and energy management.
- **Technology Adaptation**: The design philosophy should be structured around the principle of creating an enabling system backbone that is tiered, adaptable, scalable, and maintainable through the selection of appropriate technologies which are efficient and sustainable.

5.0 Framework for Space Planning

To ensure coordinated development and incremental growth of Campuses spatial guidelines for various buildings on Campus are provided for implementation which needs to be considered while planning and designing. The objective of these guidelines is to provide a flexible structure to meet the requirements of Teaching and research Universities besides Autonomous Institutions as per land bank and development controls specified. The flexible space planning approach embedded in the principles of modular coordination should be a new paradigm for the design of functional spaces which support incremental growth in an organized manner for efficient and optimally utilizing the resources which will meet future demands. It is envisaged that University buildings are planned for centuries and not a few decades therefore the vision for campus development should be aesthetically pleasing, sustainable, and holistic with emphasis on safety and comfort of users achieved through appropriate Structural Design and MEP Services integration. The components of the buildings should be adaptable, scalable, and maintainable to absorb change and accept emerging technologies at present and other evolving cutting-edge technologies which will transform the educational sector for which the backbone is required to be provided now. The system design should be structured and worked out to plug in new development to the existing infrastructure through Long-Range Developmental Plans for the Universities. The Design Basis Report (DBR) and DPR should incorporate a Comprehensive Strategic Framework with respect to the Life Cycle Cost Analysis to clearly define the return on investment through Cost-Benefit Analysis. It is suggested that Building Automation Systems should be plugged into Resource management Suites (RMS/RAMS) which is integrated into University Information and Management System (UIMS) Platform developed by each University specifically to support Academic and Administrative functions besides periodic performance monitoring of installations, facility management to control operating expenditure and effective utilization of resources.

The **Minimum space Standards for Design of Campus Buildings** have been prepared to meet the requirements of Teaching/ Research Universities and Autonomous Institutions and also for all Institutions offering Professional Degrees under Statutory Bodies to be now designated as PSSB's for compliance to meet the Academic and Research Objectives. The framework provides the required flexibility for transformation and articulation of space which meets the demands and provides an enabling environment for excellence in academics and research. The physical infrastructure should be at par with international standards and should provide an inspiring teaching-learning environment embedded in the principles of equity, access, and sustainability. It is incumbent on every Institution to invest in Strategic Development Framework guided by the Comprehensive Master Plans for each campus. The key principles and drivers for Building Design should meet the functional requirements of the user, comfort conditions, selection of appropriate materials and construction technology, Structural Systems, and Building Services by duly integrating the Information and Communication Technologies. The Green Strategies (Active/ Passive or Hybrid) should be developed both at the building and site level as per specified norms. The detailed Minimum requirements for each space are specified and the facilities to be provided are further qualified in the following sections.

ACADEMIC AREAS			
S.	**Spaces**	**Area**	**Unit**
No	**CLASSROOM**	**Proposed Guidelines**	
1	Classroom (strength as per intake)	1.5	sqm/st
2	Tutorial room (50% of intake)	1.5	sqm/st
3	Lecture hall (flat) - as per intake	1.5	sqm/st + additional 10% for dias and technology integration
4	Lecture hall (stepped) - as per intake	1.5	sqm/st + additional 15%for dias and technology integration
5	Seminar room (120 capacity) - multi-purpose/ joint class	1.5	sqm/st + additional 10%for dias for technology integration
6	Studio (as per intake)	3	sqm/st
7	AV room	50	Sqm
	Laboratories		
8	Lab 1 - General (50% of intake-students split in 2 batches for UG Programs)	3 to 5	sqm/st
9	Lab 2 - Specialised (PG & Research)	4 to 6	sqm/st
10	Lab 3 - Advanced (Research & Post Doc.)	6 to 8	sqm/st
11	Store, technician room	10	Sqm
12	Preparation room - Shared by 2	12	Sqm
13	Workshop	100 to 200	Sqm
14	Construction yard	200	Sqm
15	Museum + Exhibition area	2.5	sqm/exhibit + additional 50% (for stores & technical areas)
	LIBRARY		
1	Issue return Counters- (Self Help-Automation Preferred)/ Foyer	50 to 100	Sqm
2	Stack area (min. distance between stack c to c 1.2m)	10	sqm / 1000 volumes
3	Reading area (20% of student strength distributed in General, Periodical & Reference section)	2.5	sqm/person
4	Self-study carrels	2.5	sqm/person
5	General section	3.9 to 4.5	sqm / 1000 volumes
6	Periodical section	3.9 to 4.5	sqm / 1000 volumes
7	Reference section	4.5 to 4.8	sqm / 1000 volumes
8	Digital Library (10-15 terminals)	1.8	sqm/terminal
9	Binding / store room	18 to 20	Sqm
10	Accession room	25	Sqm
11	Processing room	20	Sqm
	Books/Titles		*Min 500 books/150 titles /600 volumes for each discipline and allied disciplines. Max40% E-Books of the total requirement duly accessed can be provided. For TBL Number of volumes can be added to meet the requirement of 75% students as per intake.*
	Journals/Volumes		*Min 8 for each discipline of which 25% should be International and*

			can also be in E format. Connectivity to NDL/NPTL/DELNET is mandatory
12	General store	12 to 15	Sqm
13	Reprographics room	15	Sqm
14	TBL issue and return	25 to 30	Sqm
15	TBL store	50	Sqm
16	Librarian	15	Sqm
17	Assistant Librarian	10	Sqm
18	Library assistants	6	Sqm
	AMENITIES		
1	Boys' common room	50 to 75	Sqm
2	Girls' common room	50 to 75	Sqm
3	Canteen (200 to 250 people)	2.25	sqm/st (including kitchen-Cooking Areas /stores-Gen, Cold,Vegetables/Preparation Aeas/Catering /Washing etc.)
4	Toilets- Male /Female and Handicapped		as per NBC
5	Housekeeping	12	Sqm
6	Medical Room	50	Sqm as per NABH Guidelines
7	Alumni Centre	360 to 500	Sqm
8	Reprographics & Stationery	36 to40	Sqm
9	First aid & sick room	25	Sqm
	FACULTY AREA (P: Asso. P: Asst. P - 1:2:4)		
1	Assistant Professor	10 to 12	sqm (open office)
2	Associate Professor	12 to 15	sqm (cubicles)
3	Professor	15 to 18	sqm (cubicles)
4	Research Scholar	6 to 8	sqm (open office)
5	Dept. Library	60 to 90	Sqm
6	HOD room	25 to 30	Sqm
7	Dept. Office	30 to 45	Sqm
8	Conference room	30 to 45	Sqm
9	Handicapped toilet	4.5 to 6	Sqm
	Meeting rooms (Faculty & Research scholar)		
10	Category 1- (8-15 Persons)	12 to 15	Sqm
11	Category 2 (15-20 Person)	20 to 30	Sqm
12	Category 3 (30-40 persons)	45 to 60	Sqm
	COMPUTER CENTRE		
1	Computer Centre	1.8	sqm/terminal + 30% (for system analyst, UPS, etc)
2	Lab with teaching format (50% of intake)	1.8	sqm/terminal + 10% (with LCD screens)
3	Server & switch room	1	sqm/terminal
4	Content creation centre	30	Sqm
5	Video recording room	30	sqm (with recording studio)
6	System in charge / Analyst	12	Sqm
7	UPS room	25	Sqm

8	Store	12	Sqm
9	Technician room (1 / 30 terminals)	6	sqm/technician
	ADMINISTRATION *		
1	Director's/VC's room	30-45	Sqm
2	Director's/VC's Secretariat & waiting	30	Sqm
3	Registrar room	20-25	Sqm
4	Registrars Secretariat	20	Sqm
5	Conference room (25 persons)	1.5	sqm/person
6	Administrative office (open office for junior staff & cubicles for Deputy Registrar & above)	Area to be modulated as per staffing pattern	
7	Establishment	50 to 75	Sqm
8	Academics	50 to 75	Sqm
9	Examination & control	75 to 100	Sqm
10	Storage for answer scripts using compactors	250 to 300	Sqm
11	Placement Cell	300	Sqm
12	Finance and accounts	75 to 100	Sqm
13	Stores & purchase	50 to 75	Sqm
14	Central store	100	Sqm
15	Maintenance room	50 to 75	Sqm
16	Security	25	Sqm
17	Central Command room	50	Sqm
18	Housekeeping room	12	Sqm
	SPECIAL REQUIREMENTS		
1	Exhibition space come storage **	100 to 150	
2	Drawing Hall	3	sqm/st
3	Language Laboratory	45	Sqm
4	Design and Innovation lab (also for start-ups) **	250 to 500	Sqm
5	Herbal Garden	Designated space	Open Area as per Master Plan
6	Animal House (Pharmacy)	100	Sqm
7	Departmental Centres for Research & projects	350 to 500	Sqm
8	Campus Health /Wellness Centre- 50 bedded with 10 bed ICU and Accidental and Medical Emergency facilities, Diagnostics, IPD and OPD facilities	50 00-6000	Sqm as per NABH Guidelines
9.	Campus IT Centre / Data centre & Media lab**	1500 to 2000	Sqm
10.	IQAC Cell	500	Sqm
	** Detailed program to be developed by University * Area norms for administrative staff		
	Deputy Registrar (cubicle/room) or equivalent	15	Sqm
	Asst. Registrar (open office) or equivalent	10	Sqm
	UDC or equivalent	3.25	Sqm
	LDC or equivalent	2.25	Sqm

	Technicians	6	Sqm
	Note: *1. Adequate storage (floor mounted & overhead) space to be integrated as part of flexible planning integrated to open office systems. All offices & workstations shall be serviced by IT infrastructures.* *2. Additional toilets (male, female & handicapped) as per NBC norms with respect to occupant load.* *3. Add 35% for Circulation, Wall Thickness, and Facilities to carpet areas prescribed above.*		

Special Areas

1. Drawing Hall
2. Language Laboratory
3. Design and Innovation Labs
4. Animal House
5. IQA Cell
6. Departmental Research & Project Centres
7. Health and Wellness Centre
8. Campus ICT Centre
9. Herbal Garden

5.1 Facility Planning for IOE Centres in addition to above minimum standards

IOE CENTRES FOR EXCELLENCE			
	Spaces	**Area**	**Units**
1	Advanced Research & Management Development Centre	4000 to 5000	sqm
2	Academic Staff College/ QIP Centre (including conferencing, seminar & residential facility)	4000	sqm
3	Industry Institution Collaboration Centre	5000 to 7500	sqm
4	Inter-University Collaboration Centre	7500 to 10000	sqm
5	Centre for Distant Education	5000-7500	sqm
6	Blended learning - MOOCS & Digital recording	1500 to 2000	sqm
7	Experience Centre	1500 to 2000	sqm
8.	Campus ICT and Data Centre including Command Centre	1500-2000	sqm
	Note: *1. Adequate storage (floor mounted & overhead) space to be integrated as part of flexible planning integrated to open office systems. All offices & workstations shall be serviced by IT infrastructures.* *2. Additional toilets (male, female & handicapped) as per NBC norms with respect to occupant load.* *3. Add 35% for Circulation, Wall Thickness, and Facilities to carpet areas prescribed above.*		

5.2 Recreation and Sports Facilities

SPORTS & RECREATIONAL FACILITIES			
	SPACES:	**Area**	
1	Auditorium (1000 capacity). 1.5 sqm/seat + 50% (for stage & backstage)	2750	sqm
2	Pre-function zones	0.5	sqm/person
3	**Students' Activity Centre**	3000	sqm
4	Main Lobby	50	sqm

5	Café (50 persons) - 4	480	sqm
6	Thrift store	45 to 60	sqm
	Student clubs:		
7	Theatre	125	sqm
8	Indian music	125	sqm
9	Western Music	125	sqm
10	Fine Arts	125	sqm
11	Photography	125	sqm
12	Dance	125	sqm
13	Rotary/Lion's club	125	sqm
14	Environmental club	125	sqm
15	IT innovation club	125	sqm
16	OAT (500 persons) - including stage	500	sqm
17	Seminar room (100 persons)	150	sqm
18	Conference room (30 persons)	45	sqm
19	TV come reading room	150	sqm
20	Students' Council office	60	sqm
21	Facility management office	30	sqm
22	Storeroom	20	sqm
	Indoor Sports		
23	Chess	30	sqm
24	Carom	30	sqm
25	Billiards (4 tables)	90	sqm
	Indoor Sports facilities		
1	Table Tennis (4 tables)	150	sqm
2	Badminton (4 courts)	560	sqm
3	Gymnasium	200	sqm
4	Squash (4 courts)	400	sqm
5	Yoga (100)	225	sqm
6	Basketball (2 courts)	450	sqm
7	Volleyball (2 courts)	350	sqm
8	Wrestling (2 courts)	400	sqm
9	Weight lifting (4)	64	sqm
	Ancillary facilities		
1	Entrance lobby	50	sqm
2	Spectators for each facility @ 0.6 sqm/person		
3	Changing rooms (lockers + showers + toilets) @ 2.1sqm/person (*numbers to be modulated as per the sports)		
4	Instructor's room	12	sqm
5	First aid	20	sqm
6	Equipment room (multi-functional)	60	sqm
7	Equipment room (singular)	20	sqm
8	Housekeeping	5	sqm
9	Caretaken room	10	sqm
10	Stores / sport	10 to 15	sqm

	Toilets for players and staff		
11	Male	20	sqm
12	Female	15	sqm
	Note: Above areas are carpet areas add 35% for circulation, wall thickness, and facilities		

Note:
1. Effective areas may be referred from Time Saver Standards &Neuferts Architectural Standards in conjunction with the standards prescribed by respective Federations of different sports in India.
2. The Indoor Sports facilities can also be designed as an Integrated facility for various sports to share the resources, however, the minimum clear height required for each sport is required to be provided as per standards.

	Outdoor Sports facilities		
1	Swimming pool (Olympic size)	50 x 25	m
2	Deck area on all sides	4 to 5	m
3	Changing room (40 each) lockers + shower + toilets	2.1	sqm/person
4	Instructor / coach room	10	sqm
5	Attendant room	6	sqm
6	First aid room	12	sqm
7	Accessory room	20	sqm
8	Teaching / paddling pool	15 x 25	m
9	Spectators (100 to 200)	0.66	sqm/person
10	Treatment plant room (area as per pool area /water capacity)		
11	Lawn tennis (4 courts)	800	sqm
12	Hockey	90 x 60	m
13	Football	118 x85	m
14	Cricket	160 x 142	m
15	Athletic track (8 lanes 800m) + including other sports in the field area	177 x 104	m
16	Kabaddi	13 x 10	m
17	Kho kho	27 x 16	m
18	Basketball (Min 2 courts)	26 x 14	m
19	Volley ball (Min 2 courts)	24 x 15	m
	Ancillary facilities		
1	Entrance lobby	50-100	sqm
2	Spectators for each facility @ 0.6 sqm/person – 100-150 persons- Indoor Sports (Retractable Seating Systems can be used) 500-1500- Outdoor Sports		
3	Changing rooms (lockers + showers + toilets) @ 2.1sqm/person (*numbers to be modulated as per the sports)		
4	Instructor's room	12	sqm
5	First aid	20	sqm
6	Equipment room (multi-functional)	60	sqm
7	Equipment room (singular)	20	sqm
8	Housekeeping (2 rooms)	5	sqm
9	Caretaker's room	10	sqm

10	Stores / Sport	10 to 15	sqm
11	Toilets for players and staff*		
12	Male	20	sqm
13	Female	15	sqm
	**Additional toilets (male, female & handicapped) as per NBC norms with respect to occupant load to support InterVarsity Tournaments* *Above areas are carpet areas add 35% for circulation, wall thickness, and facilities for built-up areas.*		

5.3 Staff and Students Housing

RESIDENTIAL FACILITIES				
STUDENT HOUSING				
Housing area for Students Housing on Campusavergae	16.8 sqm/student			
Single seated room	9	sqm/st		
Double seated room	16	sqm/st		
Triple seated room	24	sqm/st		
Dining Hall	2.25	sqm/st		
Recreational facilities	1	sqm/st		
Administrative areas	0.25	sqm/st		
Warden's office				
Assistant office				
Reception & entrance lobby				
Office superintendent				
Hostel administration office				
Warden's residence	140	sqm		
Asst. warden's residence	110	sqm		
Note: Add 35% for circulation, wall thickness, and facilities				
Note: All supporting staff to be outsourced.				
STAFF HOUSING				
TOTAL (Faculty)	2000	**Faculty Ratio = 1:2:4 (P : AP : L)**		
TOTAL (Non-Teaching Staff)	2200	**Non-Teaching Ratio = (1 : 1.1)**		
TOTAL STAFF	**4200**	**Teaching : Non-Teaching Ratio = 1:1.1 STR: 1:15Average)**		
Break up of Faculty Housing	**No. of Units**	**HSG TYPE**	**Area (Sqm)**	**Total Area (Sqm)**
No. of Professors - Group A (1)	286	T 6	180	51429
No. of Asso. Prof- Group B(2)	571	T 5	140	79940
No. of Asst. Prof- Group B(4)	1143	T 4	110	125730
Total no. of faculty	**2000**			**257099**
Break up of Non-Teaching Housing				
Group A= 2%	44	T 5	160	7040
Group B= 3%	66	T 4	120	7920
Group C= 35%	774	T 3	90	69750

Group D= 60%	1315	T 2	70	92050
Total no. of non-teaching staff	**2200**			**176760**
Total area				**433859**
Note: Add 30% circulation area (common areas) and wall thicknesses. Above unit areas inclusive of wall thickness.				

Note: All buildings to be designed should be compliant to a minimum 5-star GRIHA rating for sustainable strategies at the building & site level. Detailed program to be developed by University as per requirement and planned for incremental growth in a phased manner as per specified Indian & International standards with specific requirements for environmental control, clean environments, safety & sustainability to be addressed adequately. Refer to the table of standards and their subsequent revisions as applicable given for compliance.

	STANDARDS TO BE FOLLOWED
1	National Building Code (NBC 2016) & relevant BIS codes / subsequent revisions thereof
2	UBBL 2016 and subsequent revisions thereof
3	Provisions of Masterplans / ZDPs / LAPs & URDPFI guidelines
4	BEE - ECBC norms (Commercial & Residential buildings)
5	TERIGRIHA norms
6	GRIHA LD norms
7	IGBC / USGBC guidelines
8	Vulnerability Atlas of India
9	Relevant international standards as applicable:
	American standards (ASTM – American Society for Testing & Materials) / BS – British Standards / DIN –DeutschesInstitutfürNormunge.V. (German Institute for Standardization) / EU – European Standards etc.
10	ASHRAE / ISHARE standards and Guidelines including Clean Room Applications
11	Indian Electricity Rules,1956/2020 & Electrical Safety Manual/Safety considerations for equipment generating Electrical and Magnetic Fields.
12	NFPA /UL guidelines - Fire- BS/UL/ DIN
13	Harmonised Guidelines for Universal Accessibility 2021
14	CPWD - DSR / Analysis of Rates / PAR estimates
15	Guidelines of IEEE for IT Infrastructure
16	Health facilities at par with NABH norms
17	AERB Codes and Guidelines
18	IARP, BARC Guidelines for Radiation Protection
19	NDMA Guidelines for Disaster Management including Chemical, Biological, and Nuclear
20	NAPES&PESO Guidelines –From the office of Chief Controller of Explosives
21	NDPS Act and Rules-Guidelines for Stocking and Dispensing Essential Drugs-Research Institutions for Pharmacy and National Forensic Sciences Universities (NFSU)
22	Any other Safety Guidelines Indian and International required for Installation of types of equipment
23	UGC SATAT Guidelines

5.4 Acoustical & Audio Visual Guidelines

Acoustics in places of learning are important but often neglected, 60% of activities in the places of learning involve speech interaction between teachers and students or between students, indicating the importance of good acoustical environments that support clear communication.

Typically learning places that are constructed have often resulted in active, noisy environments. Additionally, sometimes HVAC systems have created distracting background noise. Inappropriate levels of background noise, reverberation, and signal-to-noise ratios can also inhibit reading and

spelling ability, behavior, attention, concentration, and academic performance. Students with reading deficits are more adversely affected by poor acoustic conditions than the average
Hearing-impaired students require a significantly better acoustic environment to adequately hear than the average student. Loud or reverberant classrooms may cause teachers to raise their voices, leading to increased teacher stress and fatigue.
Acoustic problems persist in many buildings because of a lack of awareness, given below details provide minimum requirement guidelines for various places in terms of material selection for sound absorption & Isolation to achieve good acoustical ambience, resulting in better academic performance.

The Scope of IDP s to provide the following:

- To provide a regulatory framework for the acoustic design of Educational Buildings in support of the Building Regulations.
- Providing supporting advice and recommendations during the planning and design stage
- Provide a comprehensive guide for Users, Decision Makers, architects, acousticians, building services engineers, clients, and others involved in the design of Educational Buildings

The constructional standards for acoustics for new Educational Buildings, as given in this document, are required to be achieved under the Building Regulations. This represents a significant strengthening of the regulation of acoustic design to reflect a general recognition, supported by research, that teaching, and learning are acoustically demanding activities.

In particular, there is a consensus that low ambient noise levels are required, The aim is also to design for inclusion by integrating the needs of students with special needs as part of mainstream institutions. Unfortunately, a large number of classrooms currently suffer from poor acoustics. The most serious acoustic problems are due to noise transfer between rooms /excessive reverberation in rooms/ Higher Background noise levels.

Reasons for poor acoustics

- Modern constructions do not always provide adequate sound insulation and may require special attention.
- The acoustics of multi-purpose rooms, such as halls, media centers, classrooms, Student Activity Centers, etc have to be suitable for a variety of activities, for example, music (which requires a long reverberation time) and speech (which requires shorter reverberation times). This requires special care while designing.
- Poor acoustic conditions in the classroom increase the strain on teachers 'voices as most teachers find it difficult to cope with high noise levels. This often leads to voice problems due to prolonged use of the voice and the need to shout to keep control.

There have been several factors preventing good acoustic design and this guideline addresses these issues.

- Building Regulations now include educational buildings in their scope.
- Although the constructional standards for educational buildings are previously quoted, many designers were unaware of the requirements, and the standards were rarely enforced.
- These guidelines have been updated to reflect current research and the relevant requirements.
- The pressure on commercial targets has always reduced acoustics to low on the list of design priorities. The acoustic design will now have a higher priority as it will be subject to building control and directly related to productivity.

Architects and designers have had a difficult time finding information to make design easy and to help them choose the correct target values of appropriate parameters. These Guidelines recommend a structured approach to acoustic design at each stage of the planning and design process. The relevant references to Codes of Practice are given below:

References

- Central Pollution Control Board – the Noise Pollution (Regulation and Control) Rules, 2000
- National Building Code of India 2020

- ISO 3382 – Part 1: Acoustics — Measurement of room acoustic parameters — Part 1: Performance spaces
- ISO 3382 – Part 2: Acoustics — Measurement of room acoustic parameters — Part 2: Reverberation time in ordinary rooms
- ISO 1996-2: Acoustics -- Description, measurement, and assessment of environmental noise — Part 2: Determination of environmental noise levels
- ISO 16283-1: Acoustics — Field measurement of sound insulation in buildings and building elements — Part 1: airborne sound insulation
- ISO 16283-1: Acoustics — Field measurement of sound insulation in buildings and building elements — Part 2: Impact sound insulation
- BS8233:1999 —Sound Insulation and noise reduction for buildings – Code of practice.
- BS EN ISO 717-1:1997 Acoustics —Rating of sound insulation in buildings and building elements – Part 1 Airborne sound insulation.
- BB 93:2003: Standards for the acoustics of school buildings.
- IEC 60268 – Part 16: Objective rating of speech intelligibility by speech transmission index.
- ASTM E – 1130 Objective measurement of speech privacy using Articulation Index.
- ASTM E – 1374 Guide for open office acoustics and applicable standards.
- ANSI S12.60 Guidelines for classroom acoustics.

Approach towards appropriate Acoustical Design

A. Feasibility Study:
- Noise survey to establish external noise levels (Road, Air & Rail Traffic)
- Consideration of the need for external noise barriers using the buildings, fences, screens, and landscape features
- Preliminary calculation of sound insulation provided by building envelope including the effect of ventilation openings

B. Detailed Design:
- Determine appropriate noise levels and reverberation times for the various activities and room types
- Consider the design of music, drama, and other specialist spaces separately from that of normal classrooms as the design criteria are very different.
- Provide the necessary façade sound insulation whilst providing adequate ventilation, particularly in the case of spaces such as classrooms and science laboratories which require high ventilation rates
- Acoustic zoning: plan the positioning of Quiet and Noisy Zones, Sperate them wherever possible by distance, external areas, or neutral 'buffer' spaces such as storerooms or corridors
- Consider sound insulation aspects of room acoustics by using walls, floors, and partitions to achieve adequate sound insulation
- Design the acoustics of the rooms by considering their volume and shape, and the acoustic properties of their surfaces
- Detail the acoustic performance of doors, windows, and ventilation openings
- Submit Design Brief Report

The Objectives of the framework are:
- The overall objective of these guidelines is to provide good acoustic conditions in the educational buildings to facilitate clear communication of speech between teacher and student, and between students.
- To provide suitable indoor ambient noise levels for clear communication of speech for study-related activities.

Glossary

- **Decibels**
  Sound levels are usually measured in decibels (dB) and relate absolute values to a reference value. The decibel scale is logarithmic, and it ascribes equal values to proportional changes in sound pressure, which reflects the response of the human ear to sound.

- **A-weighted levels**
  The sensitivity of the ear is frequency-dependent. Sound level meters are fitted with a weighting network that approximates this response and allows sound levels to be expressed as an overall single-figure value, in dB(A).

- **Time-averaged sound level (LAeq, T)**
  A-weighted equivalent sound pressure level in dB measured over a period

- **Reverberation time, T60**
  Reverberation time, T60, is a metric that describes the length of time taken for a sound to decay by 60 dB from its original level. The reverberation time is proportional to the volume of the room and inversely proportional to the quantity of absorption present

- **Speech Transmission Index (STI)**
  The speech transmission index is a parameter that defines the clarity of the sound inside a space. It is rated between 0 and 1, 0 being worst and 1 being best.

STI value	Quality according to IEC 60268-16	Intelligibility of syllables in %
0.45 – 0.6	fair	48 – 67
0.6 – 0.75	good	67 – 90
0.75 – 1	excellent	90 – 96

- **Noise Reduction Coefficient (NRC)**
  NRC is a laboratory rating of a material's sound absorption quality. Noise Reduction Coefficient and is the amount of sound energy absorbed upon striking a particular surface It is expressed as a percentage and is the average of these frequency levels: 250 Hz, 500 Hz, 1,000 Hz, and 2,000 Hz. NRC is averaged, and then rounded to the nearest 0.05

- **Sound Absorption classes**

  To enable simple comparison between products acoustic materials are classified on a scale from A to E, with A-rated products having the highest-rated sound absorption performance and E being the lowest, coefficient values over a range of standard test frequencies, according to BS EN ISO 354. These are then plotted on a graph to produce an absorption curve.

- **Speech Transmission Index**

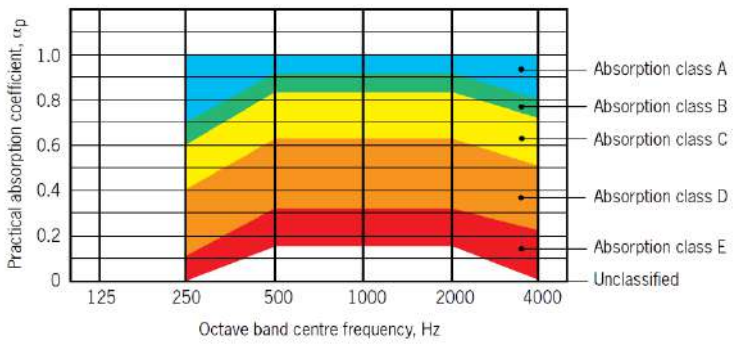
  STI is a numeric representation measure of communication (intelligibility) whose value varies from 0 = bad to 1 = excellent. On the scale, an STI of at least 0.5 is desirable for most applications

- **Weighted Standardized Level Difference (Dnt, w)**
  Single number quantity that characterizes airborne sound insulation between rooms.

- **Weighted standardized impact sound pressure levels L´nT,w**
  Is the weighted, standardized impact sound pressure level of a floor/ceiling assembly The lower the LnTw, the better the acoustic performance.

- **Weighted Sound Reduction Index Rw**
  The rating is used to measure the level of sound-insulating abilities of walls, floors, windows, and doors. (laboratory rated sound reduction index of a single element) It expressed in decibels (dB) and is used for a partition or

is



single component only. The higher the Rw figure, the better the sound isolation that is provided.

Dw/FSTC/R'w	What can be heard
30	Normal speech can be heard but not understood through a wall
35	Loud speech can be understood fairly well, normal speech not heard
40	Loud speech faintly audible but not intelligible
45	The onset of "privacy"
50	Loud speech not audible
55	Very loud sounds such as musical instruments or a stereo can be faintly heard
60	Most sound inaudible
65+	Superior soundproofing; most sounds inaudible

THESE TABLES SHALL BE CLUBBED TOGETHER IN A COMPOSITE TABLE; PLEASE BEAR WITH US.

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
	Classroom (strength as per intake) - Smart Classrooms				
1	30 & 45 Students	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 100" diagonal screen 2. 6000 ANSI Lumens projector of WUXGA resolution 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Additional displays/projectors for Q&A sessions and content display 6. Cameras to capture lecturer and students 7. Boundary layered microphones for lecturer and students with a look-at-me feature for students 8. Whiteboard capture camera 9. Wireless presenter 10. Touch interactive PC for lecturer to annotate 11. Lecture capture and storage devices 12. Encoders/Decoders for AVoIP transmission 13. Touch/Button panel integration for ease of operation. 14. Smart Boards(optional)	
		2. RT 60	<0.8 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement False ceiling Class A sound absorption	0.9 NRC		

	60 & 90 Students	1. Indoor Ambient Noise Level (LAeq) 30mins	30dBA	1. 120" diagonal screen. 2. 6000 ANSI Lumens projector of WUXGA resolution 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Additional displays/projectors for Q&A sessions and content display 6. Cameras to capture lecturer and students 7. Boundary layered microphones for lecturer and students with the look-at-me feature for students 8. Whiteboard capture camera 9. Wireless presenter 10. Touch interactive PC for lecturer to annotate 11. Lecture capture and storage devices 12. Encoders/Decoders for AVoIP transmission 13. Touch/Button panel integration for ease of operation 14. Smart Boards(optional)	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	50		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	55 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards rear of the room	0.9NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
2	Tutorial room (50% of intake)	1. Indoor Ambient Noise Level (LAeq) 30mins	30dBA	1. 100" diagonal screen and appropriate projector of WUXGA resolution to fit the screen 2. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 3. Amplifiers, digital mixer, and DSP for audio control 4. Wireless presenter 5. Smart Boards(optional)	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	50		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		

		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards rear of the room	0.9NRC		
3	Lecture hall (flat) - as per intake- 60/90	1. Indoor Ambient Noise Level (LAeq) 30mins	30dBA	1. 100" diagonal screen 2. 6000 ANSI Lumens projector of WUXGA resolution 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Additional displays/projectors for Q&A sessions and content display 6. Cameras to capture lecturer and students 7. Boundary layered microphones for lecturer and students with the look-at-me feature for students 8. Whiteboard capture camera 9. Wireless presenter 10. Touch interactive PC for lecturer to annotate 11. Lecture capture and storage devices 12. Encoders/Decoders for AVoIP transmission 13. Touch/Button panel integration for ease of operation 14. SmartBoard(optional)	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	50		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	55 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards rear of the room	0.9NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
4	Lecture hall (stepped) - as per intake- 120-150 students	1. Indoor Ambient Noise Level (LAeq) 30mins	30dBA	1. 150" diagonal screen. 2. 6000 ANSI Lumens projector of WUXGA resolution 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer,	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade	45		

		facing Traffic (STC/Rw 45)		and DSP for audio control 5. Additional displays/projectors for Q&A sessions and content display 6. Cameras to capture lecturer and students 7. Boundary layered microphones for lecturer and students with the look-at-me feature for students 8. Whiteboard capture camera 9. Wireless presenter 10. Touch interactive PC for lecturer to annotate 11. Lecture capture and storage devices 12. Encoders/Decoders for AVoIP transmission 13. Touch/Button panel integration for ease of operation. 14. Smart Board(optional)	
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	50		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	55 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling - Class A sound absorption -60% of rear wall & 50% on side walls	0.9NRC		
5	Seminar room (120 capacity) - multi-purpose/ joint class	1. Indoor Ambient Noise Level (LAeq) 30mins	30dBA	15. 150" diagonal screen. 16. 6000 ANSI Lumens projector of WUXGA resolution 17. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 18. Amplifiers, digital mixer, and DSP for audio control 19. Additional displays/projectors for Q&A sessions and content display 20. Cameras to capture lecturer and students 21. Boundary layered microphones for lecturer and students with a look-at-me feature for students 22. Whiteboard capture camera 23. Wireless presenter 24. Touch interactive PC for lecturer to annotate 25. Lecture capture and storage devices 26. Encoders/Decoders for AVoIP transmission 27. Touch/Button panel integration for ease of operation 28. SmartBoard(optional)	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	50		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	55 5(dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2. Wall Panelling -Class A sound absorption -60% of rear wall & 50% on side walls	0.9NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS					
	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
6	Studio (as per intake)-Design/Engg. Streams	1. Indoor Ambient Noise Level (LAeq) 30mins	30dBA	1. 100" diagonal screen 2. 6000 ANSI Lumens projector of WUXGA resolution 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Additional displays/projectors for Q&A sessions and content display 6. Cameras to capture lecturer and students 7. Boundary layered microphones for lecturer and students with a look-at-me feature for students 8. Whiteboard capture camera 9. Touch interactive PC for lecturer to annotate 10. Wireless presenter 11. Lecture capture and storage devices 12. Encoders/Decoders for AVoIP transmission 13. Touch/Button panel integration for ease of operation 14. SmartBoard(optional)	
		2. RT 60	<0.8 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	50		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	55 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2. Wall Panelling -Class A sound absorption -60% of rear wall & 50% on side walls	0.9NRC		
7	Audio Visual room	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Cameras to capture lecturer and/or students 6. Wireless presenter 7. Surround speakers 8. Touch/Button panel integration for ease	
		2. RT 60	<0.8 secs		
		3. STI			
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	55		
		The wall towards the corridor (DnTw)	45		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	0.9 NRC		

		2.Wall Panelling -Class A sound absorption -60% of rear wall & side walls		of operation 9. SmartBoard(optional)	

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
	Laboratories				
8	Lab 1 - General (50% of intake- students split into 2 batches for UG Programs)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Touch/Button panel integration for ease of operation 6. SmartBoard(optional)	
		2. RT 60	<0.8 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	0.9		
9	Lab 2 - Specialised (PG & Research)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Touch/Button panel integration for ease of operation 6. SmartBoard(optional)	
		2. RT 60	<0.8 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	0.9		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
10	Lab 3 - Advanced	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 120" diagonal screen 2. 6000 ANSI lumens	

	(Research & Post Doc.)	2. RT 60	<0.8 secs	WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Touch/Button panel integration for ease of operation 6. SmartBoard(optional)	
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards rear of the room	0.9		
11	Store, technician room	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<2 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
12	Preparation room - Shared by 2	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	< 0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		

		The wall towards corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption	0.7 NRC		
13	Workshop	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Touch/Button panel integration for ease of operation 6. Smart Boards(optional)	
		2. RT 60	<1.5secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw 45)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption	0.70		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
14	Construction yard	1. Indoor Ambient Noise Level (LAeq) 30mins		-	
		2. RT 60			
		3. STI			
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)			
		External Façade facing internal Roads (STC/Rw)			
		The partition between rooms (DnTw)			
		The wall towards the corridor (DnTw)			
		Door (STC/Rw)			
		5. Impact Isolation (LnTw)			
		6. Minimum Requirement 1. False ceiling Class A sound absorption 2. Wall Panelling -Class A sound absorption -60% of rear wall & 30% on sidewalls towards the rear of the room			
15	Museum + Exhibition area	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	1. 120 " LED videowall 2. Multi-drive ceiling mounted speakers for playing AV	
		2. RT 60	<1.2 secs		

		3. STI	>0.5	content and uniform coverage across the room 3. Amplifiers, digital mixer, and DSP for audio control 4. Touch/Button panel integration for ease of operation 5. Smart Boards(optional)	
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption 70% of total area	0.70		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Classroom**	**Acoustical Requirement**	**AV Requirement**		**Remarks**
16	Auditorium (500 capacity-Convention)	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	1. 200" LED Video-wall 2. Secondary displays for good visibility 3. Additional displays on stage for additional content and signage 4. Confidence monitors for stage 5. Displays in green rooms and control room 6. Multi-drive line-array loudspeaker speaker system for uniform audience coverage 7. Ceiling suspended and floor mounted sub-woofers for playing low-frequency content 8. Stage monitor speakers 9. Monitor speakers in the control room 10. Loudspeakers in green rooms 11. Loudspeaker management system and DSP for audio control 12. Graphic equalizer for stage monitor speakers 13. 32 channel or greater digital audio mixer for audio control and effects 14. Vocal, instrument, drum kit, gooseneck,	
		2. RT 60	0.8-1.2 secs		
		3. STI	> 0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	45		
		The partition between rooms (DnTw)	55		
		The wall towards the corridor (DnTw)	45		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling -Main Hall & Stage Class A sound absorption (70%absorption) 2. Wall Panelling – Main Hall and stage -Class A sound absorption -70% of rear wall & 70% on sidewalls of main hall and stage	0.9		

				and dynamic microphones 15. Stage box for multi-audio inputs 16. Stage floor boxes for power, network, audio, and video connectivity 17. Multiple cameras for capturing stage, speaker, and audience for recording and interactive sessions 18. 16 X 16 Matrix switcher for multi-video input 19. Transmitters-receivers for signal transfer 20. Encoders/decoders for data transfer over VoIP 21. Touch/Button panel integration for ease of operation	
Sl. No.	**Library**	**Acoustical Requirement**	**AV Requirement**		**Remarks**
1	Issue return Counters-(Self Help-Automation Preferred)/ Foyer	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 55" displays for showing Information /Signage content	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption -70% of ceiling area	0.70		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS					
	Spaces				
Sl. No.	**Library**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
2	Stack area (min. distance between stack c to c 1.2m)	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			

		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption (70% of ceiling area)	0.5		
3	Reading area (20% of student strength distributed in General, Periodical & Reference section)	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 55" displays for showing Information/Signage content	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Library**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
4	Self-study carrels	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		

		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70		
5	General section	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Library**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
6	Periodical section	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		
7	Reference section	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 55" displays for showing Information/Signage content	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		

		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Library**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
8	Digital Library (10-15 terminals)	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	Pod Stations, Audio Headsets with supporting ICT Facilities for Video content.	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		
9	Binding/store room	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<2.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C	0.5 NRC		

		sound absorption (70% of ceiling area)			

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Library**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
10	Accession room	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		
11	General store	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	
		2. RT 60	<2.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption (70% of ceiling area)	0.50 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS				
ACADEMIC AREAS				
	Spaces			
Sl. No.	**Library**	**Acoustical Requirement**	**AV Requirement**	**Remarks**
	Processing room			

12	Books / Titles	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	1. 55" displays for showing Information/Signage content	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		
	Journals / Volumes	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	1. 55" displays for showing Information/Signage content	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	35		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Library**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
13	Reprographics room	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		

		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		
14	TBL issue and return	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	1. 55" displays for showing Information/Signage content	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Library**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
15	TBL store	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	1. 55" displays for showing Information/Signage content	
		2. RT 60	<2.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	30		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption (70% of ceiling area)	0.50 NRC		

16	Librarian	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Library**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
17	Assistant Librarian	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		
18	Library assistants	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms	40		

		(DnTw)			
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Amenities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Boys' common room	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		
2	Girls' common room	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling	0.70 NRC		

		area)			

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Amenities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
3	Canteen (200 to 250 people)	1. Indoor Ambient Noise Level (LAeq) 30mins	45 dBA	1. 55" displays for showing cable TV/Signage content 2. Multi-drive ceiling mounted speakers for playing AV content and uniform coverage across the room 3. Amplifiers, digital mixer, and DSP for audio control 4. Touch/Button panel integration for ease of operation 5. Encoders/Decoders for data transfer over AVoIP	
		2. RT 60	<1.2 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% Ceiling area)	0.9		
4	Toilets- Male /Female and Handicapped	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	< 1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	35		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	30		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Amenities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
5	Housekeeping	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	< 1.5 secs		
		3. STI	0.5		

		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		The partition between rooms (DnTw)	35		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5		
6	Medical Room	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	-	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption -70% of total area	0.70		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Amenities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
7	Alumni Centre	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	1. 55" displays for showing cable TV/Signage content 2. Multi-drive ceiling mounted speakers for playing AV content and uniform coverage across the room 3. Amplifiers, digital mixer, and DSP for audio control 4. Wireless presenter 5. Touch/Button panel integration for ease of operation 6. Encoders/Decoders for data transfer over AVoIP	Considered that centre is used for multipurpose applications.
		2. RT 60	0.8-1.2 secs		
		3. STI	> 0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	45		
		The partition between rooms (DnTw)	55		
		The wall towards corridor (DnTw)	45		
		Door (STC/Rw)	50		
		5. Impact Isolation (LnTw)	60		

			(dB)	7. Smart Boards(optional)	
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards rear of the room	0.9		
8	Reprographics & Stationery	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% of ceiling area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Amenities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
9	First aid & sick room	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	-	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.70		
Sl. No.	**Faculty Area**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Assistant Professor	1. Indoor Ambient Noise Level (LAeq) 30mins	40	-	

		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% ceiling area)	0.70		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Faculty Area**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
2	Associate Professor	1. Indoor Ambient Noise Level (LAeq) 30mins	40	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% ceiling area)	0.70		
3	Professor	1. Indoor Ambient Noise Level (LAeq) 30mins	40	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement	0.70		

		1.False ceiling Class B sound absorption (70% ceiling area)			

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Faculty Area**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
4	Research Scholar	1. Indoor Ambient Noise Level (LAeq) 30mins	40	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	0.90		
5	Dept. Library	1. Indoor Ambient Noise Level (LAeq) 30mins	40	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	0.90		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Faculty Area**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
6	HOD room	1. Indoor Ambient Noise Level (LAeq) 30mins	40	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing	40		

		internal Roads (STC/Rw)			
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	0.90		
7	Dept. Office	1. Indoor Ambient Noise Level (LAeq) 30mins	40	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	0.90		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Faculty Area**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
8	Conference room (Cap-15/20/30/50)-Video Conferencing Facilities integrated	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	1. 65/75" diagonaldigital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with the chairman and delegate units 9. AV Bridge 10. Smart Boards(optional)	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% of ceiling area) 2.Wall Panelling -Class A sound absorption -60% of wall area (3 walls for	0.9		

		30 & 50 pax and 2 adjacent walls for 15 & 20 Pax rooms)			
9	Handicapped toilet	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	-		
		4. **Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	35		
		The wall towards corridor (DnTw)	30		
		Door (STC/Rw)	-		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Faculty Area**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
	Meeting rooms (Faculty & Research scholar)				
10	Category 1- (8-15 Persons)	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	1. 65/75" diagonaldigital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with the chairman and delegate units 9. AV Bridge 10. Smart Boards(optional)	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class A sound absorption (70% of ceiling area) 2.Wall Panelling -Class A sound absorption -60% of wall area 2 adjacent walls for 8-15 Pax rooms)	0.9		
11	Category 2 (15-20 Person)	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	1. 65/75" diagonaldigital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted	
		2. RT 60	<0.8		
		3. STI	>0.6		

		4.**Airborne sound insulation (DnTw**)		for playing AV content and uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with the chairman and delegate units 9. AV Bridge 10.Smart Boards(optional)	
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class A sound absorption (70% of ceiling area) 2.Wall Panelling -Class A sound absorption -60% of wall area 2 adjacent walls for 15 - 20 Pax rooms)	0.9		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Faculty Area**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
12	Category 3 (30-40 persons)	1. Indoor Ambient Noise Level (LAeq) 30mins	35 BA	1 65/75" diagonaldigital LED-LCD display 2 Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room 3 PTZ USB Camera 4 Table-top/ceiling suspended microphones 5 Matrix switcher 6 Wireless presenter 7 Touch interactive annotative digital board 8 Conferencing system with the chairman and delegate units 9 AV Bridge 10 Smart Boards(optional)	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. alse ceiling Class A sound absorption (70% of ceiling area) 2.Wall Panelling -Class A sound absorption -60% of wall area (3 walls for 30 -40 pax rooms)	0.9		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces

Sl. No.	Computer Centre	Acoustical Requirement		AV Requirement	Remarks
1	Computer Centre	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<0.8		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area)	0.9		
2	Lab with teaching format (50% of intake)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 120" diagonal screen and appropriate projector to fit the screen 2. Multi-drive speakers for playing AV content and uniform coverage across the room 3. Smart Boards(optional)	
		2. RT 60	<0.8		
		3. STI	>0.5		
		4. **Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area)	0.9		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Computer Centre**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
3	Server & switch room	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		

		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7 NRC		
4	Content creation centre	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. -120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area) 2.Wall Panelling -Class A sound absorption -70% of wall area	0.9		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Computer Centre**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
5	Video recording room	1. Indoor Ambient Noise Level (LAeq) 30mins	30	1. Professional Camcorders 2. Video mixer 3. Lapel/handheld microphones 4. Audio mixer 5. Video editing software 6. 55" diagonal LED-LCD confidence monitor display 7. Studio minitor speakers	
		2. RT 60	0.6-1.2 secs		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	45		
		The partition between rooms (DnTw)	55		
		The wall towards the corridor (DnTw)	50		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	55 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound	0.9 NRC		

		absorption (80% area) 2.Wall Panelling -Class A sound absorption -80% of wall area			
6	System in charge / Analyst	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% ceiling area)	0.9		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Computer Centre**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
7	UPS room	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7 NRC		
8	Store	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		

		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	25		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption (70% ceiling area)	0.5 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Computer Centre**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
9	Technician room (1 / 30 terminals)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA		
		2. RT 60	<1.2 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Director's/VC's room	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 55" diagonal screen and appropriate projector to fit the screen /digital LED-LCD display 2. All-in-one USB bar with PTZ camera, microphone, and speakers 3. Wireless presenter 4. SmartBoard(optional) 5. Video Wall	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		

		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement .1. False ceiling Class A sound absorption (70% ceiling area)	0.9		
2	Director's/VC's Secretariat & waiting	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards rear of the room	0.9		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS

	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
3	Registrar room	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 55" diagonal screen and appropriate projector to fit the screen /digital LED-LCD display 2. All-in-one USB bar with PTZ camera, microphone, and speakers 3. Wireless presenter 4. SmartBoard(optional)	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area)	0.9 NRC		
4	Registrars Secretariat	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<0.8		

		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area)	0.9 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
5	Conference room (25 persons)	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	1. 65/75" diagonaldigital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with the chairman and delegate units 9. AV Bridge 10. SmartBoard(optional)	
		2. RT 60	<0.8		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class A sound absorption (70% of ceiling area) 2.Wall Panelling -Class A sound absorption -60% of wall area (3 walls for 25 pax	0.9		
6	Administrative office (open office for junior staff & cubicles for Deputy Registrar & above)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between	40		

		rooms (DnTw)			
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
7	Establishment	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% area)	0.70 NRC		
8	Academics	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class B sound absorption (70% area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
9	Examination & control	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement False ceiling Class B sound absorption (70% area)	0.70 NRC		
10	Storage for answer scripts using compactors	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
11	Placement Cell	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 65/75" diagonaldigital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing	45		

		Traffic (STC/Rw)		room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with chairman and delegate units 9. AV Bridge 10. Smart Board(optional)	
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	30		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class B sound absorption (70% area)	0.70 NRC		
12	Finance and accounts	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class B sound absorption (70% area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
13	Stores & purchase	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	35		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65		

			(dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5 NRC		
14	Central store	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
15	Maintenance room	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class B sound absorption (70% area)	0.70 NRC		
16	Security	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing	45		

		Traffic (STC/Rw)			
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	35		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Administration**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
17	Central Command room	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	Video Wall	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% Area) 2.Wall Panelling -Class A sound absorption -60% of adjacent walls	0.9NRC		
18	Housekeeping room	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		

		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Special Requirements**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Exhibition space come storage **	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 120 " LED videowall 2. Multi-drive ceiling mounted speakers for playing AV content and uniform coverage across the room 3. Amplifiers, digital mixer, and DSP for audio control 4. Touch/Button panel integration for ease of operation 5. Video Wall	
		2. RT 60	<1.2 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	55		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area) 2.Wall Panelling -Class A sound absorption -50% of wall area if hall is used for multipurpose applications	0.9 NRC		
2	Drawing Hall	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS				
ACADEMIC AREAS				
	Spaces			
Sl.	**Special**	**Acoustical Requirement**	**AV Requirement**	**Remarks**

No.	Requirements				
3	Language Laboratory	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7 NRC		
4	Design and Innovation lab (also for start-ups) **	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Touch/Button panel integration for ease of operation 6. Video Wall	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Special Requirements**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
5	Herbal Garden	1. Indoor Ambient Noise Level (LAeq) 30mins		-	
		2. RT 60			
		3. STI			
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)			
		External Façade facing internal Roads (STC/Rw)			
		The partition between rooms (DnTw)			
		The wall towards the corridor (DnTw)			

		Door (STC/Rw)			
		5. Impact Isolation (LnTw)			
		6. Minimum Requirement 1. False ceiling Class A sound absorption 2. Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards the rear of the room			
6	Animal House (Pharmacy)	1. Indoor Ambient Noise Level (LAeq) 30mins		-	
		2. RT 60			
		3. STI			
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)			
		External Façade facing internal Roads (STC/Rw)			
		The partition between rooms (DnTw)			
		The wall towards the corridor (DnTw)			
		Door (STC/Rw)			
		5. Impact Isolation (LnTw)			
		6. Minimum Requirement 1. False ceiling Class A sound absorption 2. Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards the rear of the room			

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

ACADEMIC AREAS					
	Spaces				
Sl. No.	**Special Requirements**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
7	Departmental Centres for Research & projects	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60		

			(dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7 NRC		
8	Campus Health /Wellness Centre- 50 bedded with 10 bed ICU and Accidental and Medical Emergency facilities, Diagnostics, IPD and OPD facilities	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% Area)	0.9 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Special Requirements**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
9	Campus IT Centre / Data centre & Media lab**	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7NRC		
10	IQAC Cell	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			

		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Special Requirements**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
11	Deputy Registrar (cubicle/room) or equivalent	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70%area)	0.9 NRC		
12	Asst. Registrar (open office) or equivalent	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B	0.70 NRC		

		sound absorption (70% Area)			

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Special Requirements**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
13	UDC or equivalent	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.70 NRC		
14	LDC or equivalent	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
ACADEMIC AREAS					
	Spaces				
Sl. No.	**Special Requirements**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
15	Technicians	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0		

			secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.70 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

IOE CENTRES FOR EXCELLENCE

Sl. No.	Spaces	Acoustical Requirement		AV Requirement	Remarks
1	Advanced Research & Management Development Centre	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 55" diagonal touch interactive digital LED display 2. Smart Board 3. Video Wall	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area)	0.9 NRC		
2	Academic Staff College/ QIP Centre (including conferencing, seminar & residential facility)	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 65/75" diagonaldigital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class A	0.9 NRC		

		sound absorption 2. Wall Panelling -Class A sound absorption -50% of wall area if the hall accommodates 25 and more people		6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with the chairman and delegate units 9. AV Bridge 10. Video Wall	

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
IOE CENTRES FOR EXCELLENCE					
Sl. No.	**Spaces**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
3	Industry Institution Collaboration Centre	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Video Wall 6. Smart Board (Optional)	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% area)	0.70 NRC		
4	Inter-University Collaboration Centre	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 65/75" diagonaldigital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 11.False ceiling Class B sound absorption (70% area)	0.70 NRC		

				8. Conferencing system with the chairman and delegate units 9. AV Bridge 10. Smart Board (Optional) 11. Video Wall (Optional)	

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
IOE CENTRES FOR EXCELLENCE					
Sl. No.	**Spaces**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
5	Centre for Distant Education	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. Camera 6. Video Wall (Optional)	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1. False ceiling Class B sound absorption (70% area)	0.70 NRC		
6	Blended learning - MOOCS & Digital recording	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 120" diagonal screen 2. 6000 ANSI lumens WUXGA resolution projector 3. Multi-drive front wall-mounted speakers for playing AV content and uniform coverage across the room 4. Amplifiers, digital mixer, and DSP for audio control 5. PTZ camera 6. Lecture recording system with storage 7. Video wall (optional)	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area)	0.9 NRC		

				8. Teleprompters	

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
IOE CENTRES FOR EXCELLENCE					
Sl. No.	**Spaces**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
7	Experience Centre	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 75" diagonal touch interactive digital LED display 2. PTZ cameras 3. Multi-drive loudspeakers 4. Wireless presenter 5. Encoders/Decoders for AVoIP data transmission 6. Smart Board 7. Video Wall	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	45		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area) 2.Wall Panelling -Class A 50 % wall area	0.9 NRC		
8	Campus ICT and Data Centre including Command Centre	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	Video Wall	
		2. RT 60	<0.8 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area) 2.Wall Panelling -Class A sound absorption -60% of on Adjacent walls	0.9NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Spaces**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Auditorium (1000 capacity-Performing).	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 200" LED Video-wall 2. Secondary displays for good visibility 3. Additional displays	
		2. RT 60	0.8-1.2 secs		

	1.5 sqm/seat + 50% (for stage & backstage)	3. STI	>0.6	on stage for additional content and signage 4. Confidence monitors for stage 5. Displays in green rooms and control room 6. Multi-drive Line-array loudspeaker speaker system for uniform audience coverage 7. Ceiling suspended and floor mounted sub-woofers for playing low-frequency content 8. Stage monitor speakers 9. Monitor speakers in the control room 10. Loudspeakers in green rooms 11. Loudspeaker management system and DSP for audio control 12. Graphic equalizer for stage monitor speakers 13. 32 channel or greater digital audio mixer for audio control and effects 14. Vocal, instrument, drum kit, goose neck, and dynamic microphones 15. Stage box for multi-audio inputs 16. Stage floor boxes for power, network, audio, and video connectivity 17. Multiple cameras for capturing stage, speaker, and audience for recording and interactive sessions 18. 16 X 16 Matrix switcher for multi-video input 19. Transmitters-receivers for signal transfer 20. Encoders/decoders for data transfer over AVoIP 21. Video wall	
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	55		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling -Main Hall & Stage Class A sound absorption (70% Area) +reflective & Diffusive area 2.Wall Panelling – Main Hall & Stage Class A sound absorption -60% wall area + reflective + diffusive area	0.9 NRC		

				(Optional)	
2	Pre-function zones	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 85" digital display- Video Displays for Information and Content 2. Multi-drive ceiling mounted speakers for playing AV content and uniform coverage across the room 3. Amplifiers, digital mixer, and DSP for audio control 4. Touch/Button panel integration for ease of operation 5. Video Wall (Optional)	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	50		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% area)	0.9 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	Students' Activity Centre	Acoustical Requirement		AV Requirement	Remarks
3	Main Lobby	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	1. 85" digital display- Video Displays for Information and Content 2. Multi-drive ceiling mounted speakers for playing AV content and uniform coverage across the room	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	50		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7 NRC		
4	Café (50 persons) - 4	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	1. 55" displays for showing cable TV/Signage content- Video Displays for Information and Content 2. Multi-drive ceiling mounted speakers for playing AV content and	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between	50		

		rooms (DnTw)		uniform coverage across the room 3. Amplifiers, digital mixer, and DSP for audio control 4. Touch/Button panel integration for ease of operation 5. Encoders/Decoders for data transfer over AVoIP	
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	Students' Activity Centre	Acoustical Requirement		AV Requirement	Remarks
5	Thrift store	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	1. 55" displays for showing cable TV/Signage content-Video Displays for Information and Content 2. Multi-drive ceiling mounted speakers for playing AV content and uniform coverage across the room 3. Amplifiers, digital mixer, and DSP for audio control 4. Touch/Button panel integration for ease of operation 5. Encoders/Decoders for data transfer over AVoIP	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	40		
		The wall towards the corridor (DnTw)	35		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption (70% ceiling Area)	0.5 NRC		

Sl. No.	Student clubs	Acoustical Requirement		AV Requirement	Remarks
1. 6	2. Theatre	1. Indoor Ambient Noise Level (LAeq) 30mins	3. 35dB A	1. 200" projection screen 2. 15000 ANSI Lumens WUXGA resolution projector 3. Confidence monitors for stage 4. Displays in green rooms and control room 5. Multi-drive Line-array loudspeaker speaker system for uniform audience coverage 6. Ceiling suspended and floor mounted sub-woofers for playing low-frequency content 7. Stage monitor speakers 8. Monitor speakers in the control room 9. Loudspeakers in green rooms 10. Loudspeaker management system and DSP for audio control 11. Graphic equaliser for stage monitor speakers 12. 32 channel or greater digital audio mixer for audio control and effects 13. Vocal, instrument, drum kit, goose neck, and dynamic microphones 14. Stage box for multi-audio inputs 15. Stage floor boxes for power, network, audio, and video connectivity 16. Multiple cameras for capturing stage, speaker, and audience for recording and interactive sessions 17. 16 X 16 Matrix switcher for multi-video input 18. Transmitters-receivers for signal transfer 19. Encoders/decoders	4.
		2. RT 60	5. 0.8-1.2 secs		
		3. STI	6. >0.6		
		4.**Airborne sound insulation (DnTw**)	7.		
		8. External Façade facing Traffic (STC/Rw)	9. 45		
		10. External Façade facing internal Roads (STC/Rw)	11. 40		
		12. The partition between rooms (DnTw)	13. 55		
		14. The wall towards the corridor (DnTw)	15. 40		
		16. Door (STC/Rw)	17. 45		
		18. 5. Impact Isolation (LnTw)	19. 60 (dB)		
		6. Minimum Requirement 20. 1.False ceiling - Main Hall & Stage Class A sound absorption (70% Area) +reflective & Diffusive area 21. 2.Wall Panelling – Main Hall & Stage Class A sound absorption -60% wall area +	22. 0.9 NRC		

		reflective + diffusive area		for data transfer over AVoIP	

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Student clubs**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
7	Indian music	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	1. 120" projection screen 2. 6000 ANSI Lumens WUXGA resolution projector 5. Multi-drive Line-array loudspeaker speaker system for uniform audience coverage 6. Ceiling suspended and floor mounted sub-woofers for playing low-frequency content 10. Loudspeaker management system and DSP for audio control 11. Graphic equaliser for stage monitor speakers 12. 32 channel or greater digital audio mixer for audio control and effects 13. Vocal, instrument, drum kit, goose neck, and dynamic microphones 14. Stage box for multi-audio inputs 15. Stage floor boxes for power, network, audio, and video connectivity 17. 16 X 16 Matrix switcher for multi-video input 18. Transmitters-receivers for signal transfer 19. Encoders/decoders for data transfer over AVoIP	
		2. RT 60	0.8-1.2 secs		
		3. STI	>0.6		
		4. **Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		The partition between rooms (DnTw)	55		
		The wall towards the corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling -Main Hall & Stage Class A sound absorption (70% Area) + reflective & Diffusive area 2.Wall Panelling – Main Hall & Stage Class A sound absorption -60% wall area + reflective + diffusive area	0.9 NRC		
8	Western Music	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-1. 120" projection screen 2. 6000 ANSI Lumens WUXGA resolution projector 3. Confidence monitors for stage 5. Multi-drive Line-array loudspeaker	
		2. RT 60	0.8-1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		

		External Façade facing internal Roads (STC/Rw)	40	speaker system for uniform audience coverage 6. Ceiling suspenced and floor mounted sub-woofers for playing low frequency content 10. Loudspeaker management system and DSP for audio control 11. Graphic equaliser for stahe monitor speakers 12. 32 channel or greater digital audio mixer for audio control and effects 13. Vocal, instrument, drum kit, goose neck and dynamic microphones 14. Stage box for multi-audio inputs 15. Stage floor boxes for power, network, audio and vido connectivity 17. 16 X 16 Matrix switcher for multi video input 18. Transmitters-recievers for signal transfer 19. Encoders/decoders for data transfer over AVoIP	
		Partition between rooms (DnTw)	55		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling -Main Hall & Stage Class A sound absorption (70% Area) +reflective & Diffusive area 2.Wall Panelling – Main Hall & Stage Class A sound absorption -60% wall area + reflective + diffusive area	0.9 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	Student clubs	Acoustical Requirement		AV Requirement	Remarks
9	Fine Arts	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	45		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70%	0.9 NRC		

		ceiling area)			
10	Photography	1. Indoor Ambient Noise Level (LAeq) 30mins	35dBA	-	
		2. RT 60	<0.8		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	45		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% ceiling area)	0.9 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	Student clubs	Acoustical Requirement		AV Requirement	Remarks
11	Dance	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.2 secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% ceiling area)	0.9 NRC		
12	Rotary/Lion's club	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor	40		

		(DnTw)			
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Student clubs**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
13	Environmental club	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
14	IT innovation club	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Student clubs**	**Acoustical Requirement**	**AV Requirement**		**Remarks**
15	OAT (500 persons) - including stage	1. Ambient Noise Level (LAeq) 30mins	NA	1. 200" projection sceen 2. 15000 ANSI Lumens WUXGA	
		2. RT 60	NA		
		3. STI	NA		

		4.**Airborne sound insulation (DnTw**)	NA	resolution projector 3. Confidence monitors for stage 4. Displays in green rooms and control room 5. Multi-drive Line-array loudspeaker speaker system for uniform audience coverage 6. Ceiling suspenced and floor mounted sub-woofers for playing low frequency content 7. Stage monitor speakers 8. Monitor speakers in control room 9. Loudspeakers in green rooms 10. Loudspeaker management system and DSP for audio control 11. Graphic equaliser for stahe monitor speakers 12. 32 channel or greater digital audio mixer for audio control and effects 13. Vocal, instrument, drum kit, goose neck and dynamic microphones 14. Stage box for multi-audio inputs 15. Stage floor boxes for power, network, audio and vido connectivity 16. Multiple cameras for capturing stage, speaker and audience for recording and interactive sessions 17. 16 X 16 Matrix switcher for multi video input 18. Transmitters-recievers for signal transfer 19. Encoders/decoders for data transfer over AVoIP	
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
			NA		
16	Seminar room (100 persons)	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	1. 85" diagonal digital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and	
		2. RT 60	<1.0 secs		
		3. STI	>0.5		
		4.**Airborne sound**			

		insulation (DnTw)		uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with chairman and delegate units 9. AV Bridge 10. Video Wall (optional)	
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	45		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement False ceiling Class A sound absorption (70% of ceiling area) 2.Wall Panelling -Class A sound absorption -60% of wall area (3 walls)	0.9 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	Student clubs	Acoustical Requirement		AV Requirement	Remarks
17	Conference room (30 persons)	1. Indoor Ambient Noise Level (LAeq) 30mins	35 dBA	1. 65" diagonal digital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with chairman and delegate units 9. AV Bridge 10. Smart Board	
		2. RT 60	<0.8		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	45		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class A sound absorption (70% of ceiling area) 2.Wall Panelling -Class A sound absorption -60% of wall area (3 walls)	0.9 NRC		
18	TV come reading room	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	65" diagonal digital display with speakers	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		

		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Student clubs**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
19	Students' Council office	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
20	Facility management office	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Student clubs**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
21	Store room	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		

		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	35		
		Door (STC/Rw)	35		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption (70% ceiling Area)	0.5 NRC		
Sl. No.	**Indoor Sports**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
22	Chess	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Indoor Sports**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
23	Carom	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement	0.7		

		1.False ceiling Class B sound absorption (70% Ceiling area)	NRC		
24	Billiards (4 tables)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	**Indoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Table Tennis (4 tables)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
2	Badminton (4 courts)	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	Applicable for Indoor Courts only since This place may be used as Multipurpose Hall -hence wall panelling is considered
		2. RT 60	0.8-1.2 secs		
		3. STI	> 0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	45		
		Partition between rooms	55		

		(DnTw)			
		Wall towards corridor (DnTw)	45		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling -Main Hall & Stage Class A sound absorption (70%absorption) 2.Wall Panelling – Main Hall and stage -Class A sound absorption -70% of rear wall & 70% on side walls of main hall and stage	0.9 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Indoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
3	Gymnasium	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 65/75" diagonal digital LED-LCD display with Cable TV connection 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room	
		2. RT 60	<1.5 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
4	Squash (4 courts)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Indoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
5	Yoga (100)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	1. 65" diagonal digital LED-LCD display 2. Multi-drive speakers wall/ceiling mounted for playing AV content and uniform coverage across the room 3. PTZ USB Camera 4. Table-top/ceiling suspended microphones 5. Matrix switcher 6. Wireless presenter 7. Touch interactive annotative digital board 8. Conferencing system with chairman and delegate units 9. AV Bridge 10. Video wall (optional)	
		2. RT 60	<1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area) 2. Wall panelling Class B (40% Area)	0.7 NRC		
6	Basketball (2 courts)	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	Applicable for Indoor Courts only since This place may be used as Multipurpose Hall -hence wall panelling is considered
		2. RT 60	0.8-1.2 secs		
		3. STI	> 0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	45		
		Partition between rooms (DnTw)	55		
		Wall towards corridor (DnTw)	45		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling -Main Hall & Stage Class A sound absorption (70%absorption) 2.Wall Panelling – Main Hall and stage -Class A sound absorption -70% of rear wall & 70% on side walls of main hall and stage	0.9 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Indoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
7	Volley ball (2 courts)	1. Indoor Ambient Noise Level (LAeq) 30mins	40 dBA	-	Applicable for Indoor Courts only since This place may be used as Multi purpose Hall -hence wall panelling is considered
		2. RT 60	0.8-1.2 secs		
		3. STI	> 0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	45		
		Partition between rooms (DnTw)	55		
		Wall towards corridor (DnTw)	45		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling -Main Hall & Stage Class A sound absorption (70%absorption) 2.Wall Panelling – Main Hall and stage -Class A sound absorption -70% of rear wall & 70% on side walls of main hall and stage	0.9 NRC		
8	Wrestling (2 courts)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS				
SPORTS & RECREATIONAL FACILITIES				
Sl. No.	**Indoor Sports facilities**	**Acoustical Requirement**	**AV Requirement**	**Remarks**

9	Weight lifting (4)	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	50		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

Sl. No.	**Ancillary facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Entrance lobby	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	1. 85" digital display 2. Multi-drive ceiling mounted speakers for playing AV content and uniform coverage across the room	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	-		
		Wall towards corridor (DnTw)	-		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Ancillary facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
2	Spectators for each facility @ 0.6 sqm/person – 100-150 persons- Indoor Sports (Retractable Seating Systems can be used) 500-1500- Outdoor Sports	1. Indoor Ambient Noise Level (LAeq) 30mins		-	
		2. RT 60			
		3. STI			
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)			
		External Façade facing internal Roads (STC/Rw)			
		Partition between rooms (DnTw)			
		Wall towards corridor (DnTw)			
		Door (STC/Rw)			

		5. Impact Isolation (LnTw)			
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -Class A sound absorption -60% of rear wall & 30% on side walls towards rear of the room			
3	Changing rooms (lockers + showers + toilets) @ 2.1sqm/person (*numbers to be modulated as per the sports)	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	35		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	Ancillary facilities	Acoustical Requirement		AV Requirement	Remarks
4	Instructor's room	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
5	First aid	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<0.8secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		

		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Ancillary facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
6	Equipment room (multi-functional)	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<0.8secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
7	Equipment room (singular)	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<0.8secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Ancillary facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
8	Housekeeping (2 rooms)	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	

		2. RT 60	< 1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	35		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	30		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5 NRC		
9	Caretaker's room	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	< 1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	35		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	30		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Ancillary facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
10	Stores / sport	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	< 1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	35		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement	0.5		

		1.False ceiling Class C sound absorption	NRC		
Sl. No.	**Toilets for players & staff**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
11	Male	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	35		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	**Toilets for players & staff**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
12	Female	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	35		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5		
Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Swimming pool (Olympic size)	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.Airborne sound insulation (DnTw)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing	NA		

		internal Roads (STC/Rw)			
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	NA		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
2	Deck area on all sides	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption	NA		
3	Changing room (40 each) lockers + shower + toilets	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	35		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound	0.5		

		absorption			

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
4	Instructor / coach room	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.2 secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
5	First aid room	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<0.8secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
6	Accessory room	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		

		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	35		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5		
7	Teaching / paddling pool	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<0.8secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	Outdoor Sports facilities	Acoustical Requirement		AV Requirement	Remarks
8	Spectators (100 to 200)	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		
9	Treatment plant room (area as per pool area	1. Indoor Ambient Noise Level (LAeq) 30mins	50dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation**			

	/water capacity)	**(DnTw**)			
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	45		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class C sound absorption	0.5		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
10	Lawn tennis (4 courts)	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		
11	Hockey	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
12	Football	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms	NA		

		(DnTw)			
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		
13	Cricket	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

SPORTS & RECREATIONAL FACILITIES

Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
14	Athletic track (8 lanes 800m) + including other sports in the field area	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		
15	Kabaddi	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		

		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
16	Kho kho	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		
17	Basketball (Min 2 courts)	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling -	NA		

RIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
SPORTS & RECREATIONAL FACILITIES					
Sl. No.	**Outdoor Sports facilities**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
18	Volleyball (Min 2 courts)	1. Indoor Ambient Noise Level (LAeq) 30mins	NA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)	NA		
		External Façade facing Traffic (STC/Rw)	NA		
		External Façade facing internal Roads (STC/Rw)	NA		
		Partition between rooms (DnTw)	NA		
		Wall towards corridor (DnTw)	NA		
		Door (STC/Rw)	NA		
		5. Impact Isolation (LnTw)	NA		
		6. Minimum Requirement 1.False ceiling Class A sound absorption 2.Wall Panelling –	NA		

Note: PA System in all buildings to be integrated with Fire Detection System and Speakers to be integrated in every space as per requirements of NBC. Optinally this may be connected to DVD/CD Player to support Channel Music if required in some specified Buildings such as SAC/Auditoriums/Sports and Recreational Centres , Dining Halls ,Exhibition Areas /Experience Centres etc.

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
RESIDENTIAL FACILITIES					
Sl. No.	**Student Housing**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
1	Single seated room	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<0.8secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
2	Double seated room	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<0.8secs		
		3. STI	>0.6		
		4.**Airborne sound insulation**			

		(DnTw)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
RESIDENTIAL FACILITIES					
Sl. No.	**Student Housing**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
3	Triple seated room	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<0.8secs		
		3. STI	>0.6		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	45		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
4	Dining Hall	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	1. 55" diagonal LED-LCD display 2. Ceiling speakers	
		2. RT 60	<1.0 Secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw)**			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	45		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
RESIDENTIAL FACILITIES					
Sl. No.	**Student Housing**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
5	Recreational facilities	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<1.0 Secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	45		
		Wall towards corridor (DnTw)	40		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
6	Administrative areas	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 Secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
RESIDENTIAL FACILITIES					
Sl. No.	**Student Housing**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
7	Warden's office	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 Secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		

		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
8	Assistant office	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 Secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS

RESIDENTIAL FACILITIES

Sl. No.	Student Housing	Acoustical Requirement		AV Requirement	Remarks
9	Reception & entrance lobby	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	<1.5 secs		
		3. STI	0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	-		
		Wall towards corridor (DnTw)	-		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
10	Office superintendent	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	

		2. RT 60	<1.0 Secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
RESIDENTIAL FACILITIES					
Sl. No.	**Student Housing**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
11	Hostel administration office	1. Indoor Ambient Noise Level (LAeq) 30mins	40dBA	-	
		2. RT 60	<1.0 Secs		
		3. STI	>0.5		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	65 (dB)		
		6. Minimum Requirement 1.False ceiling Class B sound absorption (70% Ceiling area)	0.7 NRC		
12	Warden's residence	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		

		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling 2.Wall Panelling -	NA		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
RESIDENTIAL FACILITIES					
Sl. No.	**Student Housing**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
13	Asst. warden's residence	1. Indoor Ambient Noise Level (LAeq) 30mins	45dBA	-	
		2. RT 60	NA		
		3. STI	NA		
		4.**Airborne sound insulation (DnTw**)			
		External Façade facing Traffic (STC/Rw)	45		
		External Façade facing internal Roads (STC/Rw)	40		
		Partition between rooms (DnTw)	40		
		Wall towards corridor (DnTw)	30		
		Door (STC/Rw)	40		
		5. Impact Isolation (LnTw)	60 (dB)		
		6. Minimum Requirement 1.False ceiling 2.Wall Panelling -	NA		

PRIORITY OF ACOUSTICAL REQUIREMENTS FOR VARIOUS SPACES IN EDUCATIONAL BUILDINGS					
RESIDENTIAL FACILITIES					
Sl. No.	**Staff Housing**	**Acoustical Requirement**		**AV Requirement**	**Remarks**
	Break up of Faculty Housing	**No. of Units**	**HSG TYPE**		
1	No. of Professors - Group A (1)	286	T 6		
2	No. of Asso. Prof-Group B(2)	571	T 5		
3	No. of Asst. Prof-Group B(4)	1143	T 4		
	Break up of Non-Faculty Housing	**No. of Units**	**HSG TYPE**		
1	Group A= 2%	44	T 5		
2	Group B= 3%	66	T 4		
3	Group C= 35%	774	T 3		
4	Group D= 60%	1315	T 2		

Note: Illuminations levels should be provided in internal and external environments by factoring in daylighting to achieve desired levels as per recommendations of the National Building Code. Detailed lighting design to be carried out and system design should ensure the provision of Building Automation Systems (BAS)/ Building Management Systems (BMS) for energy conservation.

6.0 Indian Universities as Centers of Excellence in 21st Century

A new paradigm for Campus Planning and Design is required to address issues pertaining to the above in the Indian Context and a century and a half is sufficient to evaluate the efficacy of planning philosophy, particularly in a developing country like India wherein the resources are limited and the need is to optimally and efficiently utilize them as huge sums of public money is spent on higher

education and its physical infrastructure. The entire approach demands the development of strategic Goals and Objectives, a policy framework that is an enabling tool for achieving the established objectives by well-structured Initiatives which support the academic and research objectives.

By and large, campus planning in India has always been looked into as planning for a definite entity but not in the larger urban context and the natural settings. The campus design should enhance and contribute towards the open space structure and place-making structure in the district. The disposition of functions at interfaces of the university and the neighborhood such as Art Galleries, Museums, Convention Centers, Market Places, Health Care Facilities, Public Libraries, Career Development Centers, etc should be planned in mutual interest. The campus development cannot be completed in one single phase due to the requirement of incremental growth and resource constraints, therefore, the infrastructure also has to be developed accordingly over a period of time to balance growth, continuity, and change. The campus should have the flexibility to adapt to changes that will impact future generations and to accommodate events that are yet to be unfolded which eventually results in ina major campus design challenge. In case of scarcity of space in the existing campuses, staff housing can, however, be developed on other properties in the city acquired by the university, partnership with private developers can also be explored. This will also boost the reality sector in the country. Most Universities in the United States provide minimal housing for the faculty and most of them reside within the precincts of the University.

A coherent campus development demands a consistent rationale of design approach to meet the academic objectives to absorb future growth and expansion and appropriate response to urban context, socio-economic, climatic and site conditions, structure of the district, natural settings, the hierarchy of spaces, movement, typology, campus form, scale, continuity in architectural expression, material usage and creation of public realm. The integration of technology and automation should be an essential ingredient of Campus Design Philosophy utilizing the available technologies in communication systems, information technology, audio visual aids, computing capabilities, and green technologies. The diversity of issues that confront campus design and planning make the entire exercise very complex and elaborate which demands deeper insight and understanding of issues that guide the planning process in the Indian context. It is extremely important that the contextual demands are well addressed at the planning stage and are inbuilt in the campus development program at each stage of its incremental growth. The success of any plan lies in clearly identifying issues that fall within the domain of physical planning and establishing a connection with all other allied domains which include the administrative and academic infrastructure, communities within and outside the campus, residential quality and quantity, Socio-cultural and economic impacts, environmental responsibility, safety and security and overall a good quality of life which are mutually beneficial to the city and campus at the same time. Since the existing universities are located in prime locations in the city, and their real estate values are very high, therefore, the current assets should be adequately and appropriately utilized in the long-term interest of the universities.

The physical infrastructure has to keep pace with the fast-changing educational environment in the country; therefore, the campuses should conduct an audit of their existing infrastructure to ascertain the development potential of their available real estate assets within a specified time frame. A great opportunity is available in the University campuses to absorb growth if the conditions of physical facilities are objectively evaluated and detailed development plans are prepared with a long-term vision addressing the current and future demands. In the present context, the Eco campuses should be created with well-defined sustainable strategies built-in the campus development philosophy and process. The reforms in higher education and correspondingly a new approach towards Campus Planning and Design of our universities will make them globally competitive and will be able to sustain a knowledge-based economy in the future.

An environment for industry institution interaction should be created and can be used as a resource for revenue generation by the universities as there exist great opportunities for universities to generate alternative resources to meet recurring expenditure for the upkeep of campus by creating spaces for global outreach in form of advanced research centers for collaborative and interdisciplinary research, interuniversity interface centers for distance education, international libraries, etc through partnerships with the industry and alumni endowments. Apart from the above, the universities in urban centers should foster a healthy relationship with their neighbourhood communities for integrated development for their districts through periodic reviews and by identifying areas of mutual interest. The universities should develop Stewardship strategies for the comprehensive development of the region through its intellectual capital to facilitate industrial and agricultural growth, socio-cultural, economic, commercial, and environmental regeneration. The social model of development is the most suitable

system in the Indian context which should be nursed through social engineering strategies. There is an absolute need to rejuvenate the relationship of the universities with host cities which act as a laboratory for the academic community practically for all disciplines on account of their diversity and complexities. Moreover, adequate backup of legislation is required to implement redevelopment programs for the expansion and up-gradation of existing Universities which have now attained a national status and have the potential to become global universities which can be achieved by providing autonomy and reducing overregulation by multiple authorities. A holistic approach towards campus development demands the engagement of a dedicated group of experts comprising of a team of representatives from the Academic Community, Administrator, Technical and Financial Experts, Campus Designers and Planners, Architects, Engineers, etc., who should be involved in the preparation of campus development framework to guide the future physical development every university should have a comprehensive master plan which should be reviewed and be monitored periodically, the further grant of funds needs to be annexed with the prerequisite of having a developmental plan within a specified time frame in order to support the knowledge economy and ensure effective utilization of funds with respect to the priorities identified using appropriate technologies with emphasis on sustainability, energy conservation, and management. The Universities need to be nodal centers for all National Missions such as Smart City, HRIDAY, AMRUT, PMAY, PMRY, Make in India, Stand-up India, Digital India, Skill India, Women Empowerment, PMYY, Namami Ganga Program, etc wherein the intellectual capital of the Universities can be utilized as a resource with skilled and trained manpower besides the available infrastructure. The GOI funds can be provided to upgrade the existing infrastructure which will be a win-win situation as the GOI utilizes the human resource and facilities while the University upgrades to world-class infrastructure. This can transform Universities as hubs for knowledge and information generation, processing/analytics, and dissemination.

Future-ready Technology & Green Education Infrastructure Using Centralised AV/ IT/ BMS/ Communication Management

One of the many challenges facing India today is preparing our societies and governments for globalization and the information and communication revolution which is also green. Policy-makers, business executives, academics, and ordinary citizens are increasingly concerned with the need to make their societies competitive in the emergent information economy and extremely high pressure on energy resources. It is significant to recognize the global trends in educational systems which are oriented towards blended learning and online teaching as important dimensions of the teaching-learning process besides interactive teaching. ICT technologies play a very important role in the access, acquisition, creation, and dissemination of knowledge besides developing a repository to support research and research-oriented learning. It has become an essential tool for quick and effective communication besides providing phenomenal information to all stakeholders.

As mentioned above there are SIX key issues critical for creating tomorrow's education infrastructure –

a. ***Incorporating information and communication technologies in classrooms***
b. ***Making campuses safe***
c. ***Ensuring easy and efficient administration of the infrastructure***
d. ***Infrastructure so created should be cost-effective and should give a return on investment***
e. ***Conserving energy – electricity, water, gas, etc.***
f. ***Technology Selection which adaptable, scalable, maintainable, and overcomes quick obsolescence***
g. ***The campus is future-ready and imbibes future technologies easily without changes to existing infrastructure.***

This IDP should address the above SIX issues and develop possible strategies and forth right solutions. India is facing many challenges now and the future growth of India is dependent upon creating an education infrastructure that is future-ready and capable of meeting or overcoming today's and tomorrow's challenges –

1) Challenge of globalization is resulting in the continuous seeking of information. In this era of the Information age, are our schools, colleges, universities need to have an informed position on the current and future information requirements? Enabling information and communication technologies (ICTs) is essential to overcome the challenge of the information age. With ICTs future generation of who graduates must be able to make India leap forth to higher levels of social, economic, and political development.

2) Challenge of providing electricity and other critical natural resources like water are critical for running these campuses. Using green technologies will ease the pressure on energy requirements. It is expected that policy and decision-makers, planners, researchers, development practitioners, opinion-makers, and others will invest in green information, communication, and sustainable technologies.

Globalization, technological change, and pressure to preserve the natural environment have created a new global economy that is powered by technology, fuelled by information, driven by knowledge and preservation of energy resources. The emergence of this new global economy has serious implications for the nature and purpose of educational institutions. As the half-life of information continues to shrink and access to information continues to grow exponentially, schools/colleges/universities cannot remain mere venues for the transmission of a prescribed set of information from teacher to student over a fixed period of time. Rather, schools must promote "learning to learn", i.e., the acquisition of knowledge and skills that make possible continuous learning over the lifetime. The illiterate of the 21st century," according to futurist Alvin Toffler, "will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn".

Information and communication technologies (ICTs)—which include audio and video equipment, as well as newer digital technologies such as computers and the internet—have been touted as potentially powerful enabling tools for educational change and reform. When used appropriately, different ICTs are said to help expand access to education, strengthen the relevance of education to the increasingly digital workplace, and raise educational quality by, among others, helping make teaching and learning into an engaging, active process connected to real life.

However, the experience of introducing different ICTs in the classroom and other educational settings all over the world over the past few years suggests that the full realization of the potential educational benefits of ICTs is not automatic. The effective integration of ICTs into the educational system is a complex, multifaceted process that involves not just technology. Given enough initial capital, getting the technology is the easiest part. The most difficult part is the institutional readiness, teacher competencies, administrative hassles, and long-term financing, among others.

The IDP aims to provide Stakeholders with a clear understanding of the various trends, issues, and solutions associated with the creation of future-ready education infrastructure. It provides examples, case studies, lessons learned, and best practices that will help planners and decision-makers in addressing pertinent issues and crafting policies and strategies appropriate for the future-ready and green education infrastructure.

Intent

The IDP intends and attempts to enhance and reform education through ICTs and automation which demand clear objectives, guidelines, and time-bound targets, the mobilization of required resources, and the commitment at all levels to see the initiative through. The intent is specified as under:

- To help policymakers to define a framework for the appropriate and effective use of ICTs in their educational systems;
- To help policymakers to identify and fulfill the needs of administrators, educators, and students in order to create tomorrow's automated infrastructure for education.
- To standardize ICT infrastructure to ensure compatibility and to promote the application of Digital Technologies for effective monitoring, access, and exchange of information.
- To ensure the safety of data through effective security protocols and inbuilt system architecture for authentication and creation of Disaster Recovery Sites at all levels- National, State, and University.
- To apply the principle of ***Light but Tight*** through the application of Technology forDataand Information Exchange.
- To incorporate the latest technologies that make today's education infrastructure that is:
    - Future-ready (can absorb future technologies without a whole overhaul of basic infrastructure),

- Green (self-sustaining and preserves natural resources and energy), and
- Maintenance of the infrastructure is cheaper, easy, has minimal support staff, is effective and efficient, minimizes cost (initial and recurring), and is free from quick obsolescence.

Information & Communication Technologies(ICT) In HEI

ICTs stand for information and communication technologies and are defined, for the purposes of this primer, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony.

In recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings. But ICTs are more than just these technologies; older technologies such as the telephone, radio, and television, although now given less attention, have a longer and richer history as instructional tools. For instance, radio and television have for over forty years been used for open and distance learning, although print remains the cheapest, most accessible, and therefore most dominant delivery mechanism in both developed and developing countries. The use of computers and the Internet is still in its infancy in India. Moreover, different technologies are typically used in combination rather than as the sole delivery mechanism. The ICTs have the potential for increasing access to and improving the relevance and quality of education. It thus represents a potentially equalizing strategy for haves and haves not.

ICTs greatly facilitate the acquisition and absorption of knowledge, offering, to a developing country like ours, unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for the business class as well students. One of the greatest hardships endured by the students, and the educators, is their sense of isolation. The new communications technologies promise to reduce that sense of isolation and to open access to knowledge in ways unimaginable not long ago.

However, the reality of the Digital Divide—The gap between those who have access to and the control of technology and those who do not—means that the introduction and integration of ICTs at different levels and in various types of education will be the most challenging undertaking. Failure to meet the challenge would mean a further widening of the knowledge gap and the deepening of existing economic and social inequalities.

ICTs in Education Infrastructure

TheICTs contribute to global access to education seamlessly through the application of available technologies which assist academics in the acquisition, dissemination, and creation of knowledge besides making information available instantly and rationalizing the academic, research, and administrative processes. Some of the significant aspects are identified as under:

- **Anytime-Anywhere**: One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to be in one physical location. Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners (i.e., synchronous learning).

- **Access to remote learning resources**: Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and a variety of media can now be accessed from

anywhere at any time of the day and by an unlimited number of people. This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons—mentors, experts, researchers, professionals, business leaders, and peers—all over the world.

ICTs and Skill Development for Employability

One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generation of students for a workplace where ICTs, particularly computers, the Internet, and related technologies, are becoming more and more ubiquitous. Technological literacy, or the ability to use ICTs effectively and efficiently, is thus seen as representing a competitive edge in an increasingly globalizing job market. Technological literacy, however, is not the only skill jobs in the new global economy will require. The "21st Century Skills" includes digital age literacy (consisting of functional literacy, visual literacy, scientific literacy, technological literacy, information literacy, cultural literacy, and global awareness), inventive thinking, higher-order thinking and sound reasoning, effective communication, and high productivity.

The potential of ICTs to promote the acquisition of these skills is tied to its use as a tool for raising educational quality, including promoting the shift to a learner-centered environment.

Enhancement in Quality of education through ICT Application

Improving the quality of education and training is a critical issue, particularly at a time of educational expansion. ICTs can enhance the quality of education in several ways: by increasing learner motivation and engagement, facilitating the acquisition of basic skills, and by enhancing teacher training.

Motivating to learn. ICTs such as videos, television, and multimedia computer software that combine text, sound, and colourful, moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Multimedia content, both audio & visual content, along with networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real-world events.

Facilitating the acquisition of basic skills. The transmission of basic skills and concepts that are the foundation of higher-order thinking skills and creativity can be facilitated by ICTs through drill and practice.

Enhancing teacher training. ICTs have also been used to improve access to and the quality of teacher training. At Indira Gandhi National Open University, satellite-based one-way video- and two-way audio-conferencing were held in 1996, supplemented by print materials and recorded video, to train 910 primary school teachers and facilitators from 20 district training institutes in Karnataka State. The teachers interacted with remote lecturers by telephone and fax. Now, the growth in technology has outpaced its inclusion in the education infrastructure.

Challenges of IT Integration

The IDP will help to understand how to take the right path to plan and execute the above three challenges and how these three challenges are being faced by various stakeholders in the education system.

Planning For Right ICT Integration: Not Just ICTs, But Integrated ICTs And A Green Campus Which Is Future Ready.

A. Policymakers& Planners

Education policymakers and planners must first of all be clear about what educational outcomes (as discussed above) are being targeted and ensure the following:

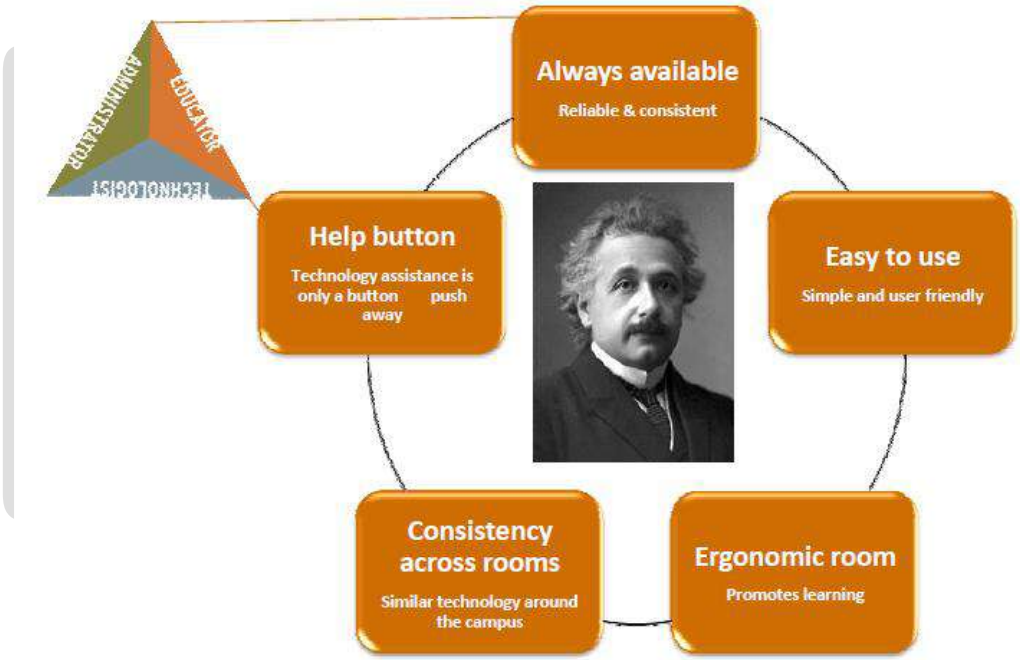
- the technology being incorporated is future-ready or not
- the technology easy to sustain and maintain
- application of green energies saving valuable energy resources

These broad goals should guide the choice of technologies to be used and their modalities of use. Although valuable lessons may be learned from best practices around the world, there is no one formula for determining the optimal level of ICT integration in the educational system. Significant challenges that policymakers and planners, educators, education administrators, and other stakeholders need to consider mainly three aspects that include:

1) Planning for the right ICTs for the education campuses being planned,
2) Capacity building and obsolescence, and
3) Costs (both initial and recurring).

B. Educators

Today's educators are challenged like never before to make students learn more in less time. To aid in the retention and understanding of increasingly complex topics, a multitude of media is being utilized. A single and simple solution that brings all of the necessary media components together in an easy-to-understand and utilize is the need of the hour. The technology incorporated in educational institutes should be meant to simplify the educator's life, not further complicate it. The technology integration should be such that the educators focus on teaching.

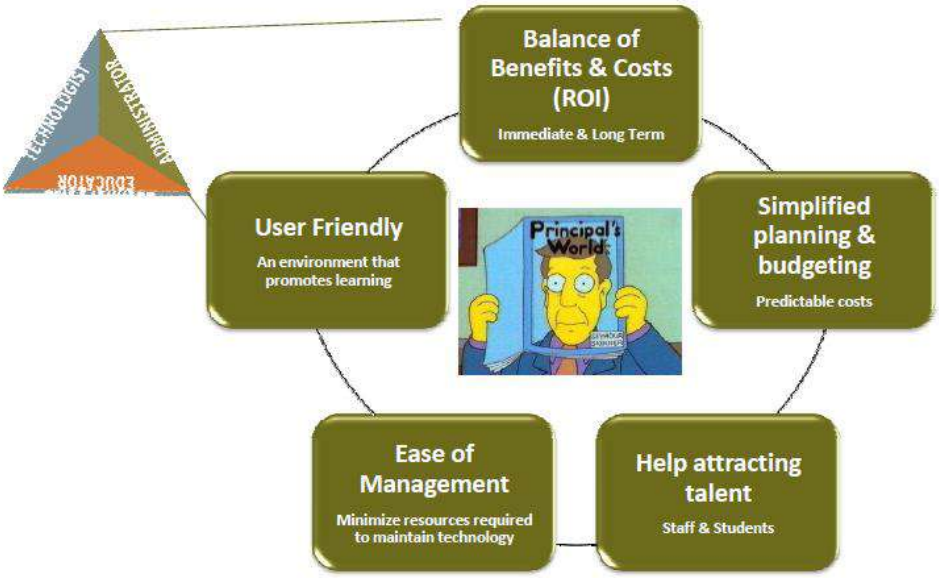


State of the Art ICT Infrastructure for Educators

C. Administrators

Four important questions in the mind of administrators need to be answered in order to make a correct choice for creating ICT based campuses:

1. Should my campus be safe?
2. Should my campus be green and save natural resources?
3. Should my campus be connected to the outside world?
4. Should my campus be automated?



State of the Art ICT infrastructure for Administrators

Policy Framework for Campus Level ICT Infrastructure

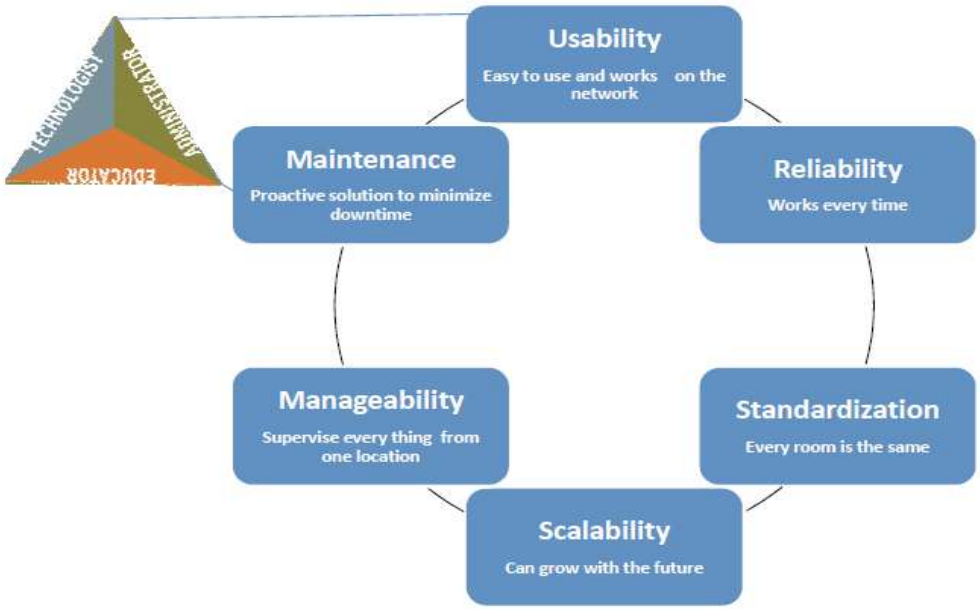
With advancements in ICT Technologies and their application in Higher Education, it is imperative to provide a robust ICT Infrastructure in all Campuses to facilitate communication and access to information. In view of the above, it is increasingly important to provide for a dedicated Campus Information and Communication Technology Centre (CICTC) to house the Data Centre, Broadcasting /Simulcast, Media Lab for Audio and Video Content Management, Central Command Room for Real-Time Monitoring, Security Monitoring, Management of UIMS and RMS Networks, Structured and Wi-Fi Networks, Intranet, and Internet, etc. The policy framework suggests adaptation of**5+3 years *of technology serviceability*** which may be extended to **5+5 Years Maximum** or the active side in order to recover the cost of investment. The passive side at the end-user level shall be designed to support the system for good 20-25 years.

1. The National Knowledge Network (NKN) Fibre will be provided through authorized Internet Service Provider (ISP) namely-BSNL/PGCIL/RailTel etc. at the gate of the campus duly terminated at multiplexer outside with min 1 STM are in 155Mbps. The system design for the campus shall be developed using network architecture as per the scale after university with the provision of future scaling off facility as per requirement. The system shall be designed for a Structured Internal Architecture with High Availability Network Architecture and Modular Architecture will be developed for expansion as per the requirement to support interoperable devices which are maintainable. The MPLS (Multi-Level Switching Packet) connectivity shall be provided to ensure that all devices on the network are supported by MPLS, and the services are available to the end-user using the shortest path first protocol. The OSPF protocol shall be ready from day one and the system shall be designed with high availability of network designed for redundancy of 99.9%. The Software Defined Network (SBN) enable devices shall be application-based which can be remotely controlled for monitoring and management and shall be made available from day one. The Core Devices in Data Centre and distribution shall be in high availability mode provided with a firewall. The technology shall support next-generation network from day one which shall use IPV6 (Internet Protocol version 6), the Network Monitoring System (NMS) shall ensure real-time monitoring and it should be noted that no device should be the end of the sale, end of support, or end of life when network is being

State of the Art ICT Infrastructure for Technologists

The routers in the Wi-Fi shall be provided with Broad Gateway Protocol (BGP) from day one and it is desirable to provide IPBX on the campus which should act as an extension to the interuniversity communication-NPLS cloud. Apart from the above, the technology selected should be enabled for satellite up linking and streaming devices should be added and kept ready for future applications. The Campus shall be designed using a ***Three-Tier Architecture*** namely- ***Core, Distribution, and Access*** to be connected through fiber network G.657A1 compliant which should be flexible and bend sensitive. A Minimum of 100 gig Fibre optic Main Incoming Network (Min 48 cores) from one or more than one service provider to ensure that the system is supported 24x7 and is possible to switch in case of any snag with load balancing feature to take advantage of bandwidth of spectrum and speed. The load balancing feature will be integrated into a Firewall including a web application Firewall to block any malicious content further the distribution network will be supported by Min 40 gigs internal fiber-optic network (Min 24 cores) connecting various buildings to CICTC. The switches within buildings shall be networked in loops of internal Networks having a capacity of 10 gigs on copper followed by star local networks using Fibre Optic or Cat 6A cables on each floor supported by switches and hubs. The CICTC shall be provided with a customized SCADA platform to support multiple SAP applications, RMS (Resource Management Suits), etc using appropriate NMS Software for real-time monitoring. The backbone of the system shall be designed as ***FutureReady*** to adapt to emerging technologies including Artificial Intelligence and shall establish protocols for Data Security, operations, and management of services. It will be desirable to establish a Data Recovery Site (DRS) on Campus located in any building. The CICTC and DRS shall be designed for Disaster Resistance and all safety protocols as per codes with controlled access besides Cyber Security Protocols with Fire walls provided to mitigate cyber-attacks for the safety of valuable data.

2. Apart from the above, every University shall establish its own ***Dash Board*** which shall be connected to the respective state Directorate of Higher Education Dashboard which in turn will be connected to the AISHE Portal of UGC/MOE. The Universities will obtain ***Cloud Space*** from the UGC/MOE-approved Government agencies such as NIC or a body created under MOE on a chargeable basis as specified by UGC and revision of rates from time to time for the space taken to store Data/Information. This will ensure easy access, secure data, enhance mobility of students/faculty/staff, Credit Transfer, support Academic Bank of Credit



(ABC) and also act as a Disaster Recovery Site besides creating a centralized infrastructure to ensure credibility of the system and policy framework.

3. The Universities through their Dashboards create a repository of information of every Student, Staff, and Faculty which shall be ***connected through the Unique ID (UID) generated through***

AISHE Portal and University ID provided by the Parent University where the above students are enrolled, faculty and staff employed. A ***dual mechanism of authentication*** will be provided wherein the parent university will provide Data/Information to the Host University/Institution wherein Student is desirous of pursuing a course will be duly accepted by the Host Institution and on completion, of course, the Host Institution will provide Scores to the Parent University within 60 days of completion of a semester, the same will be authenticated by them to complete the loop and the scores obtained shall be retained in the Digi Locker. The Guidelines for maintenance of records by each University will be guided by the UGC policy defined in ABC Document, NSQF, and NHEQF Framework of UGC.

4. IPD suggests ***Geo-Tagging*** of all Universities using GIS Applications. In this pursuit, every University shall get itself Geo Tagged and renew its information on an Annual Basis not later than 30th June every year from any Government Body like- NATMO, IIRS, NHRC, NESAC, etc as per provisions suggested by DST-GOI. This shall be connected through the Dashboard and used as a standard tool for real-time monitoring of physical infrastructure, utilization of resources, grants provided for physical infrastructure development. Apart from the above, this information will provide all information on Ground Coverage, FAR provided, and Heights of buildings beside the relationship between open and built, and all detailed information will be correlated to the self-disclosure information provided by the Universities of their Campus Master Plans/ Building Plans along with other Academic and Administrative information on prescribed proforma. The information thus provided will also be utilized by the Accreditation Bodies while information of each space will be provided as data and through Video Content for review by the expert team. The application of technology will enhance quality and productivity by reducing the time and costs involved at all levels.

5. The campus shall be serviced by both structured Network and Wi-Fi duly supported by min 802.11 AC (Wi-Fi 5) preferable up-gradation to AX-Wi Fi 6to enable staff and students to seamlessly access information and to further support co-working even in external environments with inbuilt AI features which can support Firewall also. The system designers can also opt for Xi Fi if they deem it appropriate for system integration, design, and development.

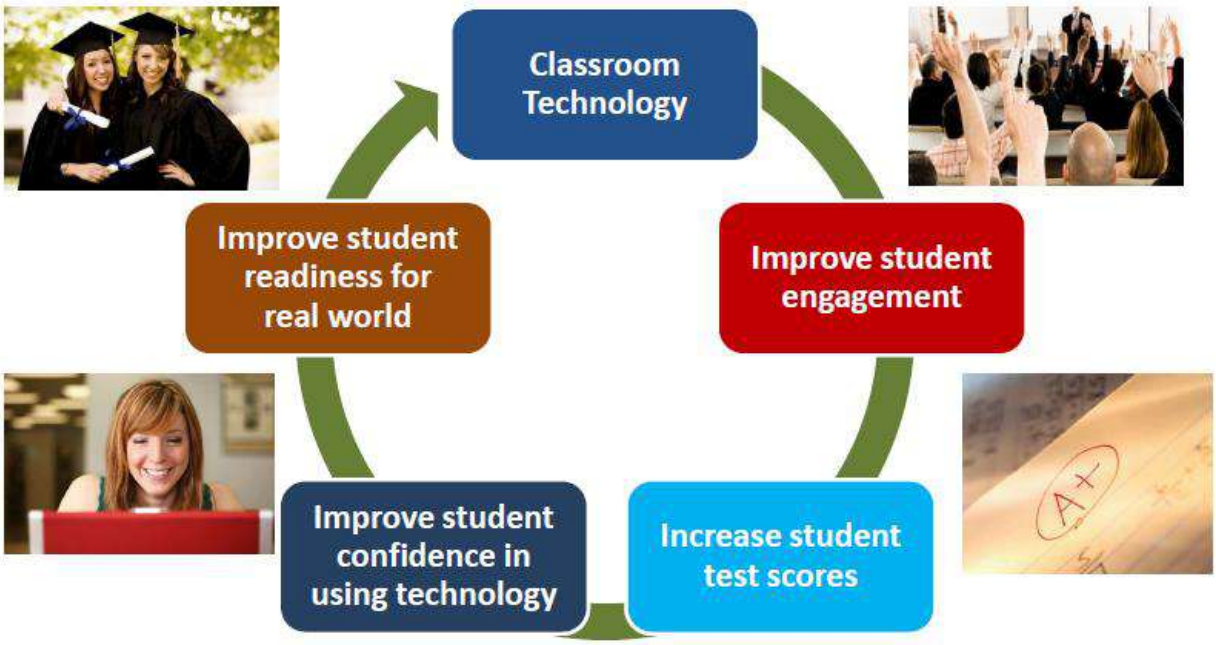
6. The Data Centres shall be designed for expansion and incremental growth with all safety measures for access, Natural disaster mitigation, environmental and pest control. This shall be provided in a separate building and shall also be utilized for any ICT support as may be required for various Missions of Govt. Of India or collaborative interface with Universities and Industry. The Universities shall create a backbone to absorb future growth and expansion and become a significant partner in the expansion of National Missions to fulfill the needs of a developing nation.

Solution driven Technology Application

The need is to have a solution that simplifies the Implementation, Maintenance, and Use of technology to create Effective Environments for learning and managing educational infrastructure efficiently to meet the demands of the users. Various aspects of the solution would be –

Delivering solutions for facility users and operators which:

- Facilitate productivity and collaboration
- Maximize efficiency and profitability
- Provide simplified management and control



Gone are the ways of the past technology has brought in the new methods

Are policy makers, educators, administrators overwhelmed by technology?

Finding the way to make it simpler. And, balance the needs of ….

a) Administrators of education institutes;
b) Educators; and
c) Technologists.

In summary, the attributes of the state of art ICT Infrastructure which contributes towards effective and efficient educational delivery should be -

- Easy to use and access
- Reduces energy costs
- Secure and safe
- Proven ROI
- Remote technical support
- Scalable and Adaptable
- Consistent across all rooms and campuses as per application.
- Follows standard international protocols and standardization
- Provides immediate technical assistance
- Minimum Downtime

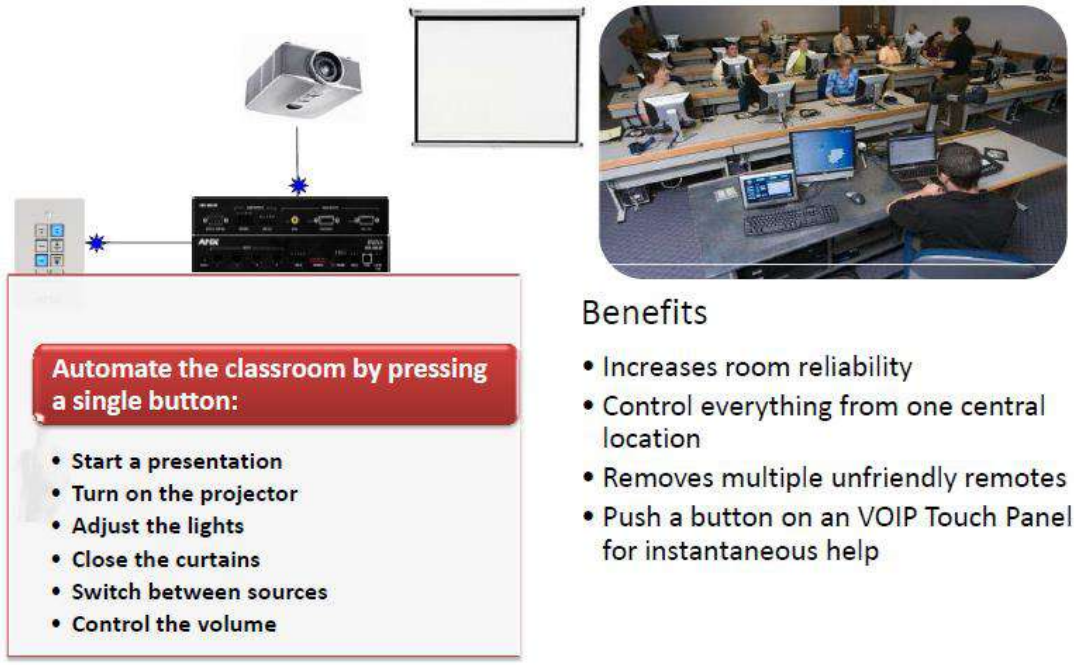
Infrastructure Solutions for HEI's

There are 4 aspects of state of art education campus and each aspect has the following key features –

Classroom Automation

With the touch of a series of intuitive buttons on a VOIP Touch Panel, the modern technology-enriched classroom comes alive, successfully engaging every student. At first, educators may be apprehensive of using integrated multimedia for a lesson plan. It requires many different pieces of information to come together and numerous technologies that all work differently. In most of today's classrooms and auditoriums, multimedia presentations and other interactive lessons fall back on traditional methods: a cart of electronic equipment, audio and video selections checked out from the library, presentations manually loaded into a computer, and stacks of paper handouts.

The Automation provides cue an audio/video selection, and seamlessly transition to a PowerPoint presentation. Meanwhile, simultaneously operate the lights, blinds and access a Website or LAN with relevant information. The 'integrated functions' are user-friendly and can be managed by the operator.



However, all this can be achieved through a simple-to-navigate user interface. The easy-to-understand, effortless-to-use Touch Panels are so well designed that a single educator without any prior training or technology experience can take control in a matter of minutes. In educational settings already equipped with classroom automation, faculty members will share a high amount of enthusiasm because students remain engaged by interactive lessons, which results in greater overall retention. Systems integration through central control systems is fast, effective, and reliable. Whether for a single auditorium, classroom, or campus that stretches to the globe with multiple locations, today's technology can effectively network all of your multimedia and facility operation equipment into a time-saving, cost-cutting solution.

From kindergarten to university post-graduate levels of education, as well as corporate training, the need is to have a perfect solution that meets the needs of all stakeholders. Educational institutions are increasingly embracing technology in the classroom as a means for improving academic achievement. Various digital technologies have provided solutions for higher education over the years from projectors, televisions, computers, smart boards, and online video/web-conferencing. Unfortunately, these classroom technologies rarely complement each other, and the level of

complexity to schedule and use the multitude of available devices make it difficult for even the most motivated educators to integrate technology into their lesson plans. The Education Solutions are designed around the educator who without any prior training or technology experience can take control in a matter of minutes. After all, technology is meant to simplify the educator's life, not further complicate it. The technology integration lets the educators focus on teaching.

Safe Campuses

The campuses need to be safe environments and disseminating information to each and every child in the University is a must nowadays in case of any emergency. Distributing information through Digital Signage and data flow management helps to overcome the problem of reaching out to the whole campus and each user at once.

Key Attributes Of Safe Campus

News about emergency situations in education campuses has made the issue of safety and security for staff, faculty, and students a key consideration for educational institutions. The safety of students on campus is paramount and today's technology can aid university administrators to achieve this goal simply and more effectively.

A safe and secure communication solution is a fundamental part of campus security.

- **Digital Signage** provides a powerful way to distribute important information immediately to students, faculty, staff, and visitors on displays throughout the campus including weather, breaking news, emergency messages, and evacuation instructions.
- **Smart Poles and Emergency Communication:** installation of Smart Poles in the serviced by emergency backup consisting of a panic switch with audio and one-way video communication with the control room for seeking assistance in cases of emergency. These will be distinctly painted Red with standardized signage and design.
- **Equipment Monitoring** provides a powerful way to deter theft of fixed assets, such as displays and projectors equipment, trigger system events, and/or notify administrators when equipment is moved from its intended location.
- **Security Footage Archive** provides a long-term method to store video footage from IP security cameras with easy-to-use searching capabilities for investigation of surveillance.
- **Room/Central Control** provides control of lights thermostats and electronic equipment along with motion sensors and automated lighting based on the occupancy of a room.
- **Integrated Security Solution:** The command centre shall be provided with a war room and an integrating software platform connected to BMS/BAS of all buildings, facilities, and utilities on campus to monitor CCTV, Fire Alarm, Intrusion Alarm, Access Control, Real-time feed from BMS for all equipment/installations and Parking Management designed to provide instant alerts to key people responsible within the system.

SMART SECURITY FOR EDUCATION INSTITUTES- TECHNOLOGY IMPERATIVES
ACIDS SYSTEM- (Access Control and Intrusion Detection System) SYSTEM-

Access to campus

The campus shall have a **Visitor Information Centre (VIC)** with a Reception Lounge wherein all the required information can be sourced without entering the campus besides all Visitor's verification shall be done at the VIC to ensure that only the employees, students, and authorized visitors have access to the building. With many convenient features, ACIDS**(Access Control and Intrusion Detection System)**makes it easy to provide security and control for even the most challenging sites.

Student Faculty and Staff Photo ID/ Visitor Cards(Limited Access)

All students and employees should be provided with RFID Graphic IDs and separate Visitor cards for temporary access should be provided by adding a camera and a printer at the VIC and Identity be verified and authenticated from the Office where the visitor is expected.

Visual Verification

- As people use cards or transmitters Access control software can pull up a picture on the file of a person assigned to that card.
- Added security to address stolen card issues.
- Training of personnel to recognize students and staff visually.

Email/ Text Message Notification

Incaseindivual's card is not working, or a door is left propped open, the information should be provided instantly with the help of a cell phone, tablet, or computer.

Access to the Building

In order to access a building, the process should be a simple experience for authorized people, administration, staff, students, and visitors can be covered using the following:
• Proximity key tags (fobs) and cards
• Adhesive proximity labels for cell phones
• In addition, use of code keypads, fingerprint/Face readers.

High-Security Mode During an Increased Threat Level

The technology supports high-security mode which includes Locking Down a single door, a group of doors, or all doors site-wide, allowing only specialized personnel with High-Security Mode enabled on their card to go in and out. High security mode can be enabled at the door, via a panic button, or through Software.

Video Integration

The system also supports video integration through Pop up live video automatically, for example – someone's card is not working, verify their identity, and then open the door. Automate event review – history reports are linked to recorded video. Video pop up on alarm from any intrusion alarm sensor like motion sensor, beam detector, glass break detectors connected to ACIDS system.

Video history trail

As an additional feature, the system logs every event. Every event (door opening, door open too long, etc.) can generate a video pop-up or a single click playback of the event when integrated with the Video management system.

Event-driven video integration

Linking door, Intrusion activity to specific cameras
• Use your CCTV system as a doorbell
• Automate event playback

CONTROL ACCESS TO CLASSROOMS AND OFFICES

Once on-site, security issues can arise almost anywhere. To address them proactively, it is important to set up appropriate access and monitoring policies and ensure easy access to reporting and playback for speedy investigations.

Control at the Door

Delivery, a special event, cleaning or remodeling of a common area, changes to lock/unlock and lock out functions are normally controlled from a computer, requiring management to be on site. ACIDS system allows this control at the door and by specifically designated people using proximity and biometric reader.

Proximity or Biometric reader operations:

- 2-Swipe – present your card or finger twice in a row and lock-unlock doors as needed for deliveries and special events for example. Need to lock the gym before it is scheduled to lock automatically? – Double swipe!

- 4-Swipe - present your card or finger 4 times in a row and lock residents out of an area with wet floors or unsafe conditions. Another 4-swipe and everything goes back to the normal mode of operation

- 3, 5-swipe – automate anything: unlock all elevator floors, turn on/off lights or equipment, and an uncounted number of other options are at your command

With a proximity reader with a built-in keypad simply swipe your valid card or enter your security PIN, followed by an action code – depending on which code is being used, a specific command will be issued. All operations are covered by 1,2,3,4,5-swipe functions.

Different levels of access to different users

Not every user needs to have access to every area of your facility. Set up access levels to allow only the users when they need to be there through different settings as under:
• Set who is allowed to go where and when
• Create an audit trail
• Link it to video recording for easy incident investigations

Web-Based Management

The administration can have direct control via a Web browser (Safari, IE, Firefox, Chrome, and many others) by creating limited accounts for site management using:
• Add / delete cards
• Change access and unlocking schedules
• Produce reports
• Override doors remotely

Event Log

Maintenance of Event Log to generate flexible history reports make it easy.

Multi-site Systems with Both Central and Local Management.

while managing multiple sites and reducing local on-site presence, a fallback option is added for customer service and additional security. The properties can be combined and connected to the ACIDS command centre or can be made an accessible tool for central security office staff. The options include:

• Global access and management from the main office.
• Local management access restricted to people and equipment on designated site only.
• Access to high-end features even at small sites: software package is shared, reducing initial costs.

Provision of Additional Parking Controls

- Counting of available parking spots, "Full" sign operation.
- Allow only a limited number of parking uses.

Visitor Management Services (VMS)

The VMS allows pre-registered visitors, or walk-in registration facility also available to track who visited where at what time and the visitor can be registered for one entry or more number of days depending on the type of job.

Asset Tracking: All on-campus assets are given an ID and allotted to a person/component/equipment/furniture/capital items etc. Periodical stock-taking is done with a Facility to add, transfer assets or Discard assets.

Time and attendance for staff, tutors, students: Schedule for all classes and other activities are already listed. Then based on access control or attendance verification attendance is marked for all types of users differently. Various reports can be taken out from the system. This system can also be used for performance management. For staff, this can also be converted to pay-roll management.

Smart card: One Smart card can be used for students for multiple operations which is highly secured and can store all details electronically. This card can be used at multiple facilities.

- Canteen
- Fees and other monitory transactions.
- Sports facilities.
- Library book issue etc.
- Hostel facilities.
- Medical facilities, etc.

Perimeter security: Depending on the type of institute and location of the institute perimeter intrusion detection should be planned to avoid any intrusion from outside, avoid terrorist attacks, etc.

Emergency Communication Console: these emergency units can be installed at all common locations from where any person can press buttons for help like Inquiry, Security, Medical Emergencies. For Example, when any emergency button is pressed there is a POP up of location from where the button is pressed with CCTV live view of the area. Simultaneously video call starts with a security control room. This unit is installed with a hooter and flasher to attract nearby people's attention. This unit is a part of ACIDS system. The call to the security control room is recorded for forensic purposes. This unit is also integrated with CCTV to avoid any mishandling.

Speakers: Speakers are to be installed at common locations. The manual announcement can be made from the security control room. All announcements are to be recorded for forensic purposes.

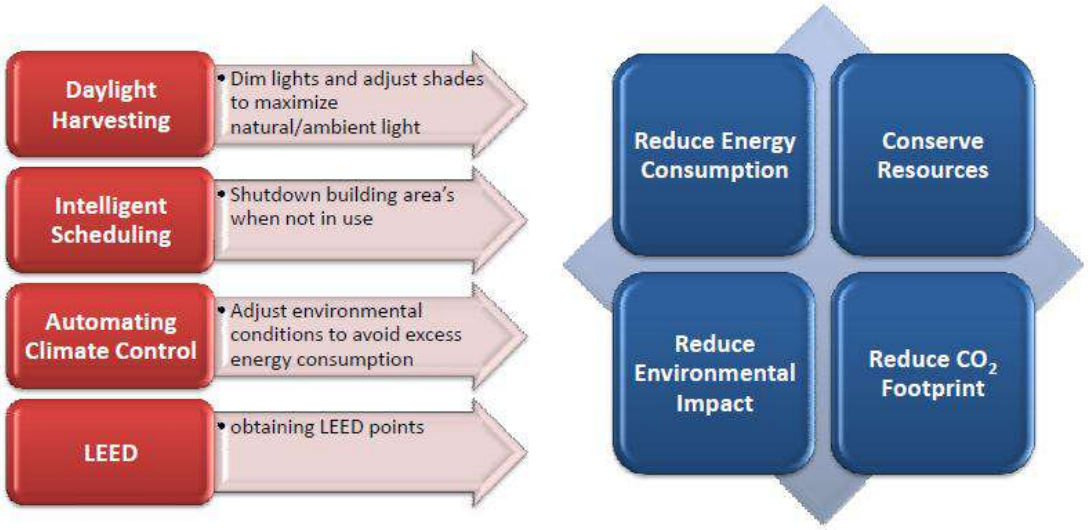
Mapping.

The control of doors and monitor alarms can be directly accessed from the maps which are Touch screen compatible.

Control and command centre application – Every institution should have a security control room and command centre from where all security, Disaster management, and other central activities can be controlled and managed. This room is also responsible to connect with all outside government facilities like Police, Fire, Hospital, Disaster management, etc.

Return On Investment And Saving Of Energy & Natural Resources

The application of Green Technologies is paramount in the 21st Century. Education institutions spend a significant portion of their annual operating budgets on utility services, diverting funds from valuable programmatic and community-building activities. Higher-education institutions are feeling pressure to reduce maintenance and operations budgets caused by difficult economic conditions and rising costs – especially energy. Colleges and universities spend close to $2 billion each year on energy. The situation is expected to escalate as total world consumption of marketed energy is increasing exponentially.



ICT Integration for Sustainability on Campus

Energy management solution is integral for campuses to create a green and sustainable environment.

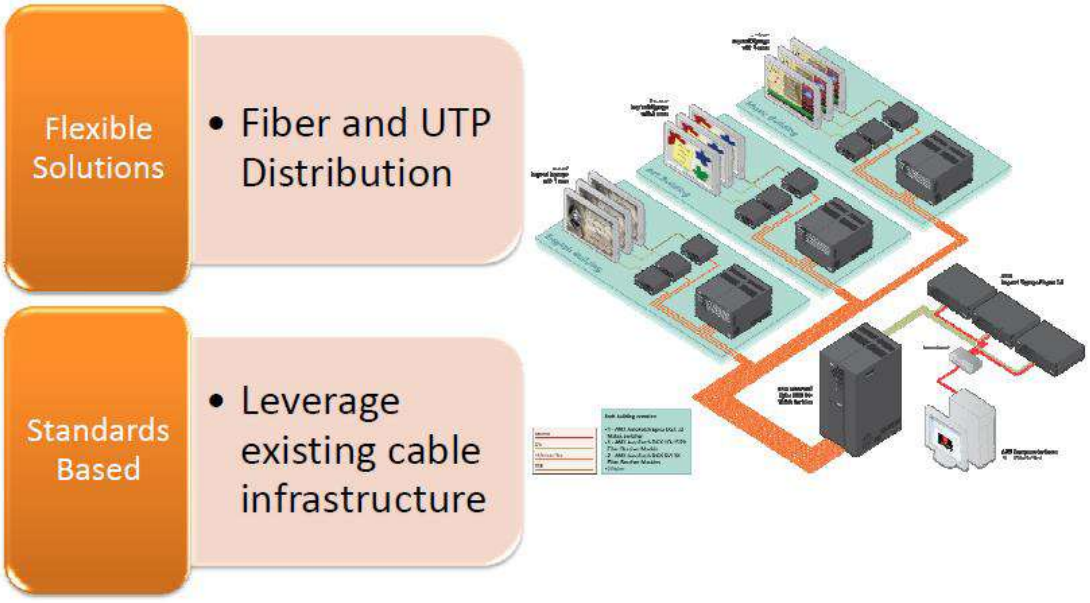
• **Room/Central Control** provides control of lights, thermostats, and electronic equipment along with motion sensors and automated lighting based on the occupancy of a room. Daylight Harvesting provides sustainable architecture and building controls that reduce the use of artificial lighting with motorized shades when natural daylight is available, in order to reduce energy consumption.

• **Equipment Monitoring** provides reporting capabilities that create instant web-based and customized reports such as lamp hours, system and device usage, and source usage.

• **Power Distribution** monitors the energy consumption of each connected component and restricts power to any or all devices when not in use and is flexible and can reduce wasteful standby power usage.

Connected Classroom / Campuses

Connected campuses provide universities with powerful ways to distribute information to students, faculty, staff, and visitors throughout the campus. Academic institutions gain the control and efficiency of centralizing the information delivered to students and staff. If there is a need to distribute video and information throughout campus from a central location, solutions are available that can connect information throughout campus, a building, a classroom, cafeteria, gymnasium, and stadium. By using the AV enabled networks, digital information displays with real-time monitoring and information dissemination



ICT Attributes For A Connected Campus

Control and efficiency of centralized information are key to being a connected campus which can be achieved through the following:

• **Digital Signage** provides a powerful way to distribute important information immediately to students, faculty, staff, and visitors on displays throughout the campus including weather, schedules, menus, breaking news, emergency messages, and evacuation.

• **Comprehensive video content management system** provides broadcast capabilities as well as classroom capture, central storage, and management of content with the opportunity to simulcast live lectures to additional classrooms or campuses, and an opportunity of creating a campus channel that broadcasts school content throughout campus all with user-friendly interface.

• **Security Footage Archive** provides a simple user interface to activate quick changes to messaging and playlist for digital signage and to control and distribute the content stored.

Need for Automation

21st century, automated classrooms are not only a return on investment but also essential in implementing effective learning environments which provide easy-to-use solutions for the educator that do not require any prior training or technology experience is key. After all, technology is meant to simplify the educator's life, not further complicate it. Equipment should work similarly from room to room – even if it was installed at different times, and it should be configured correctly when a faculty arrives to avoid fumbling. Digital solutions simplify the use of technology by faculty and staff so they can focus on sharing ideas.

Attributes of automated Campus
The Control and efficiency of centralized information are key to being a connected campus.

• **Automated Room/Campus** provides unified control of lights, shades, screens, microphones, projectors, DVD players, cameras, and computers through touch pads, the faculty can make a call to technical support – so they can fix a problem, immediately and remotely.

• **Classroom/Campus Monitoring** provides broadcast capabilities as well as classroom capture, central storage, and management of content with the opportunity to simulcast live lectures to additional classrooms or campuses, and an opportunity of creating a campus channel that broadcasts school content throughout campus all with user-friendly interface.

Sustainable & Effective & Efficient Management Of Campus

There are common maintenance situations on campuses such as:

- Technical difficulties which can easily distract audiences.
- Educators may not be familiar with the technology.
- IT maintenance personnel are often dispersed.
- Service response times are long, actual service lead times are still longer.

The solution to these above common maintenance issues is to have a BAS and Campus Management System or University Information and Management Systems (UIMS) which becomes an integrating platform for information sharing and real-time monitoring.

Key Attributes Of Centrally Managed Building and Campus:

Technology Overview For Classroom & Campus Automation

i. Class Room Automation - Improving Communication by Simplifying Use

Classroom automation solutions simplify the use of technology by faculty, students, and administrative staff so they can focus on sharing ideas - Not on using the equipment. Touch panels like iPad and wall keypads are simple and intuitive to use and can control everything from lights and projectors to DVD players, shades, screens, microphones, cameras, computers and they can even be used to seek technical support to fix a problem, immediately and remotely.

The automation hardware and software solutions help to ensure that rooms are not just easy to control, but up and running when they are needed and shut down when not needed. Other benefits include:

Classrooms That Enable Learning

Solutions for lecture halls are designed around the educator who without any prior training or technology experience needs to take control in a matter of seconds. After all, technology is meant to simplify the educator's life, not further complicate it. Equipment should work the same from room to room – even if it was installed at different times, and it should be configured correctly when a professor arrives, allowing the educators to focus on teaching.

ii. Building & Campus Management

Campus automation solution ensures that disparate systems can be integrated to work together. The RMA application (as discussed earlier) is the glue that connects them. RMS is enterprise software that allows schools to monitor, manage and schedule all equipment across rooms and buildings. Using RMA improves equipment uptime, increases IT/AV staff productivity, and reduces energy consumption.

In the current scenario with no automation on campus – the admin staff is struggling with technology and running around the campus in the morning turning on lights and fans, turning on the air-conditioners in every room and setting the temperature, drawing or withdrawing the curtains, turning on the PA system and again in the evening to shut down everything. The security concerns for your campus are always paramount to ensure that the security team is alert 24x7even if security cameras are in place. The dependency on hooters, sirens, and alarm bells to notify everyone in the building in case of any emergency evacuation or if someone forgets to press the alarm bell or alarm bell is not working. The energy and water demand on campus is very high and they need to be adequately conserved.

The 'campus open mode' button on a touch panel manages the operations in all rooms all the lights, air-conditioners with temperature selection option from the panel itself, curtains close/open, sound systems, will turn on and your school is ready to be occupied. The biggest benefit is the simplicity of automated control systems which can also be integrated and configured to Mobile Phones for operators and control systems can be integrated into any device. Any smart device in the present times all can be brought into one control system. The networking technology has now reached a level where you can manage your entire office building, each device, and the content flowing through that device can be managed and scheduled. The devices can be lights, air-conditioners, window treatment, audio and video equipment like TV, DVD players, projectors, security camera, telephone, EPABX, even electrical equipment like geysers, even door access control, etc can be managed.

iii. Digital Signage

Digital Signage solutions provide powerful ways to distribute information to students, faculty, staff, and visitors on displays throughout the campus. Pre-defined templates for education make it easy to deliver customized messages on events, schedules, scores, menus, weather, emergencies, and more. Different content can be sent to each location or it can be shared across multiple displays.

Content can either be centrally or remotely edited and scheduled - then distributed across the campus. Displays and other related equipment can be controlled by the central control system as well. Some digital signage solutions provide flexibility for sophisticated installations with completely custom content or even have interactive digital signage capabilities. Different content can be sent to each location or it can be shared across multiple displays, and it can either be centrally edited and scheduled or can be controlled by a variety of people spread out around the campus or the world. A mix of the 2 approaches often makes sense with some content scheduled and controlled centrally and some customized by various departments. The actual content can include text, images, sophisticated animation, and video content.

UTP Distribution – when displays are spread across a building - Usually schools will distribute digital signage to more than one location in a building in order to make them cost-effective. Several digital signage players may be used across campus in order to show different content on different screens. For example, the content displayed in the Science school may be different than the content displayed in the cafeteria.

iv. Video Content Management - Classroom Capture, Video On Demand, Broadcasting Live Video and Creating a Campus TV Network

If there is a need to distribute video throughout campus from a central location, video content management solutions provide broadcast or video on demand capabilities as well as the classroom capture, storage, and management of the content. Great applications include simulcasting of a professor's live lecture to additional classrooms or campuses, centrally storing and playing archived videos on-demand, broadcasting of TV or Satellite channels, or creating a campus channel that broadcasts school content to displays throughout a campus. Distribution is via an IP network, so videos can be shown on TV displays, computer screens, or projected.

Video On-Demand and Central Video Content Storage
Students and professors can access archived lectures and videos quickly and easily by searching the metadata associated with a video and playing the video On-Demand directly from their PC whenever and wherever they want. A central video library can be created to store all existing and new content in a common video format so that it is simply and quickly useable for teachers and lecturers to access. Each video asset can be given unique index numbers with metadata descriptions and thumbnails so that teachers, lecturers, and students can search easily for the required content. This solution means that old video content that may have not have been used in the past because it sat on shelves in VHS cassette, CD or DVD format can now be centrally stored and quickly and simply accessed by all.

Classroom Capture
Using the record capabilities a professor can record their lecture and store it on a central server for future viewing. Professors can add a title and a video image thumbnail with descriptive text for each lecture to help users search for the content they need. From the Touch Panel, professors can manually start and stop the recording at the beginning and end of every class. Alternatively, the

professor can set the capture schedule for the entire semester once using RMA and it will automatically start and stop at predefined times and locations.

Broadcasting Live Events
Capture and distribute live lectures to additional classrooms, campuses, or directly to students' PCs. Whether it is graduation, a message from the President of the University or a keynote speaker on the campus, or broadcast the live video content in real-time in a variety of video formats (Flash, WMV, MPEG2, and MPEG4) and can help manage the rights to access the content.

Campus TV Channels
Broadcast live TV or pre-recorded videos across the campus to displays installed in lobbies, cafeterias, dorm rooms, and student centers. Schedule up to four weeks' worth of content via the drag and drop scheduling interface and automatically create a programming guide that provides users with the dates and times of programs, along with a short description.

Benefits of the solution

• **Complete Video Management** – The networked video solution can be configured for various applications, including content recording, real-time campus-wide playback, time-delayed broadcasts, high-capacity storage, and robust archive search capabilities.
• **Web-based Interface** – Management of the content is done through a browser easy-to-use. One or more administrators can have control of the video content, whether that is how it is captured, played back, or stored. The software also uses a drag-and-drop approach for creating scheduled playback for a rolling 4-week period.
• **Video Search Support** – Allows administrators to add titles, thumbnail images, and metadata to each video file which can include a description of the content, and keywords. Then administrators or viewers can easily search by title, thumbnail image, or metadata at a later date to find a particular video.
• **Video Playback Flexibility** – Can playback content in a variety of formats on LCD and Plasma displays. It can also playback on any computer via a video window within a web page or directly through a standard video application such as Windows Media Player.
• **Scalable and Integrated** – An integrated solution that can grow as needs change. It is designed to be compatible with central control systems such that it has capabilities for centralized management of remote displays.
• **Minimize Network Bandwidth Impact –** Supports multicasting which can provide one video stream to multiple viewers, using less network bandwidth than Unicast streams.

v. Building and Campus Management
Reduce Costs While Increasing Service Levels and Uptime, Manage Campus Technology with Limited Resources

Today's educators are challenged like never before to make students learn more in less time. To aid in the retention and understanding of increasingly complex topics, a multitude of media is being utilized. As technology continues to proliferate and campus size continues to grow, Universities are looking for a cost-effective way to manage these assets with limited resources from a central location. Central control systems are capable of integrating, controlling, managing, and scheduling all disparate systems in such a way that they are integrated to work together. The RMA helps Universities to manage their technology across the campus. RMA software applications are designed for IT Staff, school administrators, and educators to help manage, monitor, and schedule all equipment across rooms and buildings. Using RMA improves equipment uptime, increases IT/AV staff productivity, and reduces energy consumption. The other benefits include:

Equipment Monitoring and Proactive Maintenance

RMA constantly monitors equipment in the system and real-time reports any disturbances in functionality by paging or generating an email to the appropriate member(s) of support staff. Administrators and technicians may also view system status in real-time from any location using a browser-based console. The location of equipment can be tracked using RFID – helping to avoid theft and ensuring mobile equipment is where it needs to be.

Room Scheduling and Configuration
RMA combines scheduling and equipment configuration capabilities to make room preparation in an instant. Campus administrators can check a room's daily, weekly or monthly availability, reserve a room and schedule a projector to be up and running as students arrive.

Instant, Web-Based Reports
Track room usage, device location, lamp hour usage, help requests, power usage, etc through instant, web-based reports to help you manage usage and preventive maintenance.

Improve Security
Keep equipment secure by receiving instant alerts through RMA when equipment is unplugged or removed. Additionally, feel secure knowing that the administrative functions of RMA are protected from unauthorized users

Reduce Energy Consumption
RMA can help reduce energy usage through its ability to manage a large number of devices in a large number of rooms and take action based on either scheduled events or predefined thresholds. Schedule equipment to turn off at the end of the day or after 30-minute timeouts.
Common Platform To Manage All Technology - Resource / Asset Management Applications (RMA)/ Resource Management Suites (RMS) Are Available To Remotely Monitor, Manage And Maintain, Schedule Rooms & Equipment.

The RMA/PMS can monitor virtually any parameter of any device besides providing inventory management and utilization of non-connected devices. Scheduling of any event can be organised and can be managed with any other event.

RMA/RMS can provide a common platform for all types of equipment in the building or campus - virtually any equipment through which electricity flows. RMA provides not just monitoring services, but also as an installation and debugging tool.

The RMA architecture is that it can scale from one room to 1000 with secure isolation so you can support multiple smaller clients on one server or scale to a worldwide deployment for a multi-national campus or a multi-city campus.

Key features of Resource/asset management applications are –

- **Calendaring and Scheduling Support**
  - Scheduled Room Automation
  - Create an Appointment from any Touch Panel or PC.
  - Integrates with Outlook / Exchange, Lotus Notes, GroupWise, and more!
  - Standalone Scheduling System
- **Powerful room search by:**
  - Room Name
  - Location
  - Seats
  - Prestige
  - Equipment
  - Date/Time
- **Schedule activities and messages:**
  - Schedule:
  - Equipment Automation
  - Messaging displayed
  - Images displayed

Benefits Of RMA/RMS To Administrator

- Ease of Use
- Increase classroom uptime
- Reduce maintenance
- Minimize Disruption in the classroom
- Improve purchase decisions of equipment
- Improve equipment life cycle management
- More efficient scheduling of staff
- Resulting in faster turnaround and increased uptime
- Reduced repairs & maintenance because of advanced notification of failures
- Remote Monitoring Provides Confirmation of
  - The functionality of all equipment after powering up from building or campus-wide power failures
  - Network or power failure immediately in any room

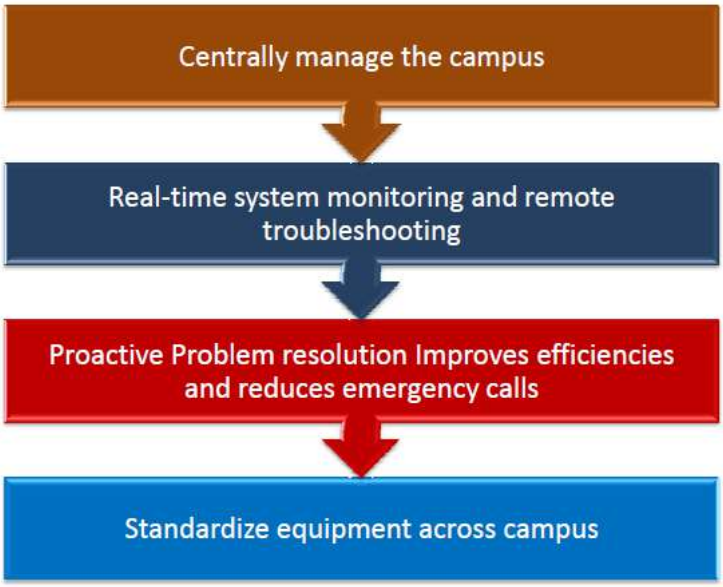
- Reduce energy usage by centrally scheduling the rooms / individual equipment to turn off when not required.
- Enhance security.
- Cost reduction year on year.

Benefits Of RMS/RMA To Educators

- Educators can focus on Teaching
- Fewer problems, but when they come up they are quickly resolved
- Help can be provided immediately and remotely
- Simplifies distance learning and On-Demand Courses

Benefits Of RMS/RMA To Technologists

- Centrally manage the campus
- Real-time System monitoring and remote troubleshooting
- Proactive problem resolution
- Standardised equipment across campus



CASE STUDY

Building and Campus Management: The University of Minnesota Success with Classroom Manager

The University of Minnesota has struggled with issues related to managing and securing technology assets. Solving these problems was one of the primary objectives of a $7 million program to bring advanced data projection capabilities to 300 classrooms. As a part of this project, The University of Minnesota analysed the costs of classrooms with and without control systems.

Problems Before Implementation

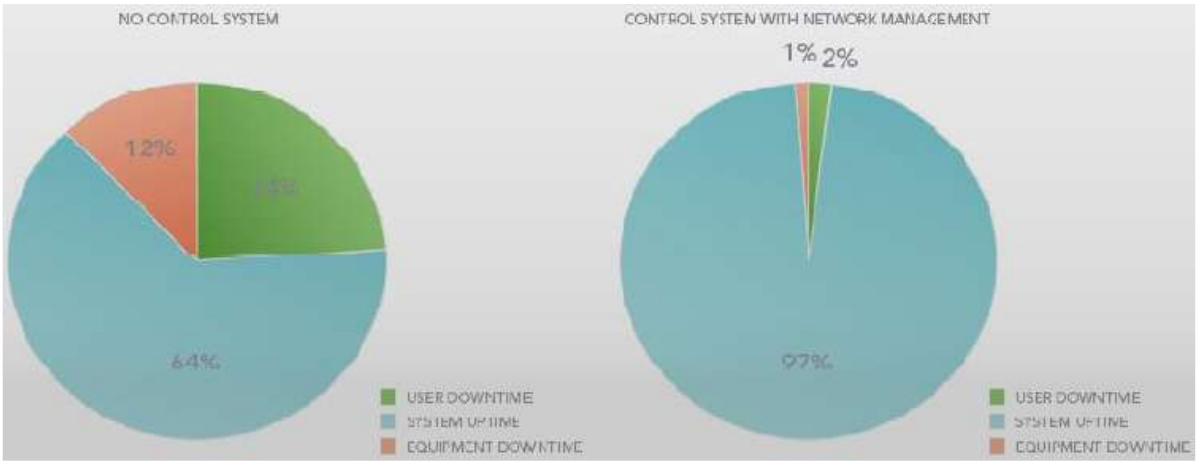
Minnesota had been paying students to go to each classroom weekly to test the equipment in the room and was looking for something more cost-effective and timely. As a result of not having continuous monitoring, the University was having significant problems with classroom uptime because many of the malfunctions were not being reported on time. Classroom uptime in selected test rooms without control systems was a mere 64% with equipment downtime at 12% and user downtime - faculty misusing or not understanding how to use the technology - at 24%.

Solution Implemented

The University of Minnesota upgraded 300 classrooms in over 60 buildings with a central Control System. Controllers were used to control the classroom equipment while RMA (Resource management Application) software was used to monitor the equipment in these rooms and provide instant alerts when equipment malfunctioned.

Results

Adding the control system with RMA improved technology system uptime to 97% and decreased user technology and equipment downtime to 3%. The system administrators now know immediately when equipment such as computers, DVD players, and document cameras are malfunctioning. These instant notifications allow to reduce equipment theft and immediately troubleshoot equipment malfunctioning problems.



RMA improved the productivity of the AV / IT admin staff and allows them to complete services when it is not an emergency. This is possible because they can easily monitor equipment such as projector lamp hours and are notified when a bulb needs changing - before it dies. The initial investment per room for a Campus-wide technology management system paid for itself in 3.5 years. The University also realized significant energy savings and bulb life savings as a result of RMA. Annual projector lamp replacement was reduced by 40% by shutting down the projectors at 4 PM when campus shuts down and also by introducing a 2-hour timeout.

Room downtime was reduced from 36% to 3%

By adding control and room management the University was able to increase room uptime to 97% while at the same time reducing annual costs.
Source AMX Technologies

Brownfield - Redevelopment of Campuses

Case study 1: Jamia Hamdard University, New Delhi- Redevelopment

Neev Architects Interiors & Urban Design Consultants, 2015–2030 Masterplan

Jamia Hamdard was conceived as a seat of higher learning in Unani Medicine, Islamic Studies, Biosciences, Pharmacy, Nursing, and other areas of knowledge by its founder as a means of fulfilling the objects of the Wakf. With its humble beginning, Jamia Hamdard now Deemed to be a University under MHRD-Government of India consists of eight faculties namely-Islamic Studies and Social sciences, Medicine –Unani, Management and Information Technology, Nursing, Pharmacy, Science, Hamdard Institute of Medical Sciences and Research, and Engineering and Inter disciplinary Sciences. over the period of last ten years, Jamia Hamdard has emerged as an outstanding institution of higher learning with distinct and focused academic programmes. The graduate programme in Information Technology and Computer Applications and Post-graduate programmes in Information Technology, Computer Applications, Business Management, Physiotherapy and Occupational Therapy have been started in the last few years. Undergraduate programmes in Physiotherapy and Occupational Therapy are being introduced from this year. Jamia Hamdard offers postgraduate and doctoral programmes in several disciplines for which advanced facilities are available.

TheJamia Hamdard University a Comprhensive Redevelopment Plan in 2021 to translate into a long range development plan for the campus.

SCOPE OF CMP

01. The CMP will be driven by academic priorities and support the goals and aspirations of the University as it guides the campus's physical development over the next 15 years.

02. The scope of the master plan will be broad addressing all facets of the physical campus, including the way Jamia Hamdard uses its land, the arrangement and scale of buildings, and the nature and function of the landscape.

03. The transportation network and various utility systems will be important considerations.

04. The CMP will set the context for physical changes on campus to realize the University's research, teaching, administrative, residential and recreational priorities. CMP will respond to the unique natural setting of the campus and the character of its surrounding neighbourhoods.

05. The CMP's focus will be the next 15 years (Three Five Year Plans), it may recommend initiatives that will require implementation over a longer time period

LOCATION AND CONNECTIVITY

The site is located in the Tughlakabad institutional area, Tughlakabad. It is easily accessible both by road and metro. It is situated right on Mehrauli - Badarpur road and usually experiences less traffic. It is the largest full authorized colony of Asia. Around 1.5 million lived there. There is only one government school for around 5lakhs people, and water supply is provided mainly by the government. There is only private hospital.SangamVihar is part of South Delhi Lok Sabha constituency along with nine other Vidhan Sabha segments, namely, Bijwasan, Ambedkar Nagar, Chhatarpur, Deoli, Kalkaji, Tughlakabad, Palam, Badarpur and Mehrauli**.** a

CAMPUS EVOLUTION

Jamia Hamdard began with the establishment of a small Unani clinic in the year 1906 by Hakeem Hafiz Abdul Majeed.

His illustrious son, Hakeem Abdul Hameed the founder of Jamia Hamdard, carried forward the philosophy and objectives of Hamdard in independent India.

In 1964, Hamdard National Foundation was created with a view to receive and disburse the profits earned by Hamdard (Wakf) Laboratories.

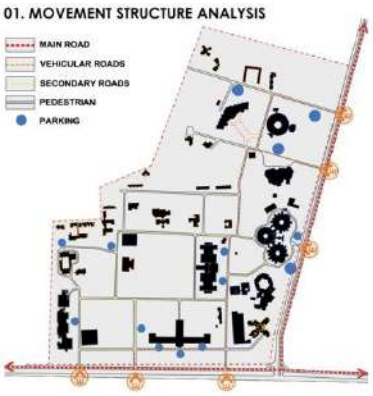
Hamdard National Foundation was to take up charitable causes in the areas of education, medical relief and the advancement of knowledge.

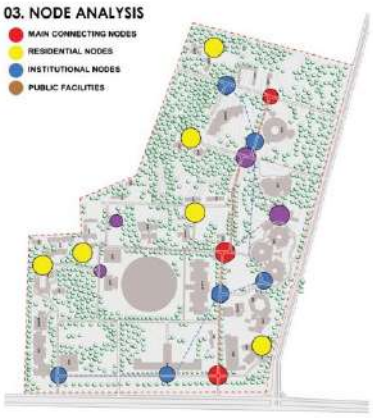
EXISTING CONDITION & OPPORTUNITIES

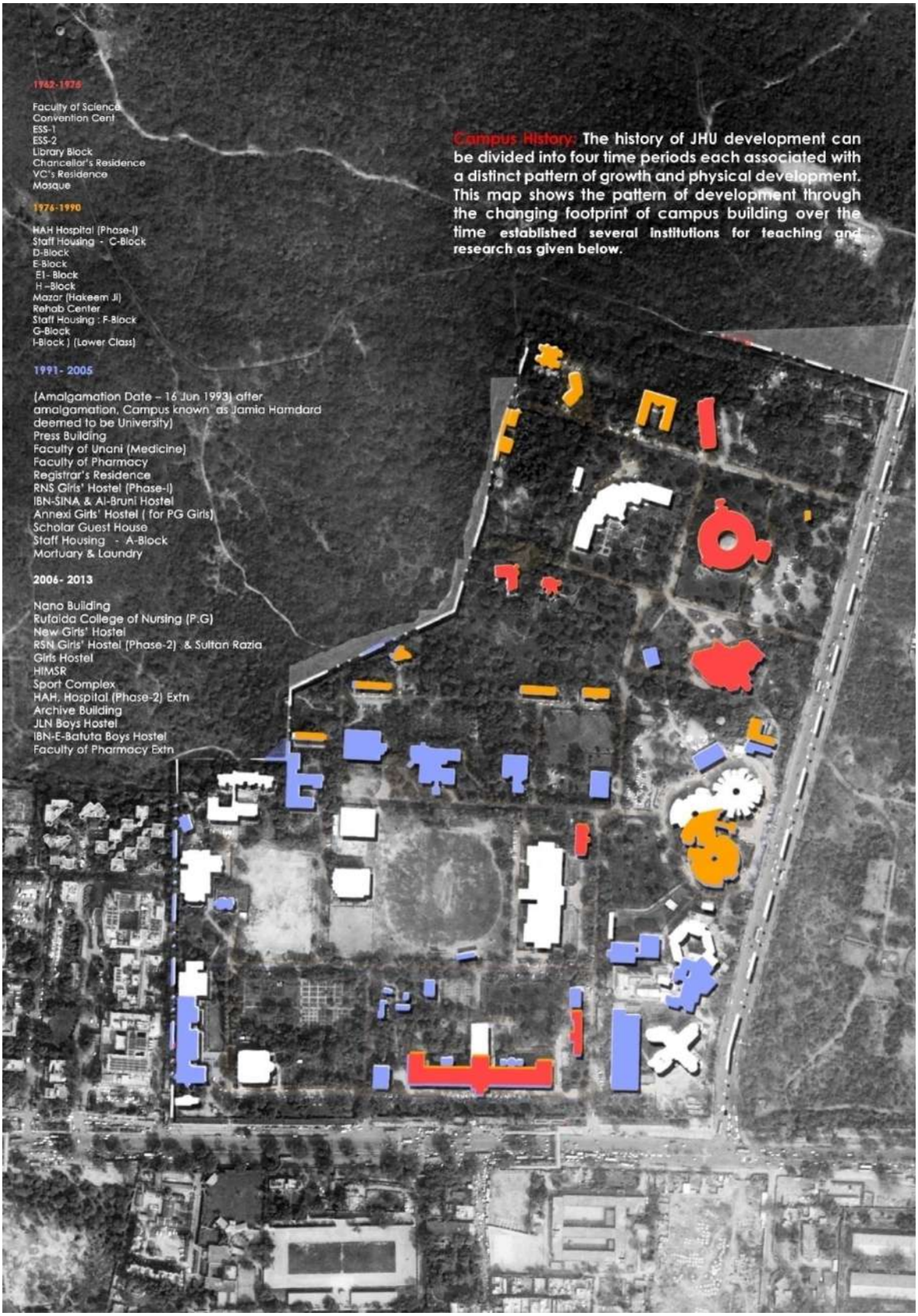
SITE SLOPE & DRAINAGE: The Northern end of the site is the termination of Aravali range and it slopes towards the southern side with rocky strata covering approximately 40% of the site while the balance area is flat. The variation in the topography provides opportunities in generating interesting campus form. The site has distinct valley in the middle of the northern edge with slopes towards the southern sides. There is a gradual slope in north-south direction. The ridges comprise of "Kikar" trees as part of the adjoining Urban forest.

EXTENT OF UNIVERSITY LAND: The University has an area of 91.6 acre single contiguous piece of which is abutting the Jahaapanah forest and Batra Hospital on west and Tuglakabad fort on east. The ITBP center is to the south of the campus and are major institutional campuses in the vicinity of this campus premises.

The entire bulk disposition of the site is extremely unbalanced which is a consequence of adhoc developments and have no definite campus planning strategy. The buildings are loosely placed without any relationship to the adjoining buildings having amorphous appurtenant land.







MOVEMENT STRUCTURE: The University is well connected with road infrastructure with the city of Delhi. Within the campus premises also it has developed road infrastructure , which connects various functional building blocks of the University. The road network follows the grid iron pattern superimposed on the landform which is higher towards the northern

side and sloping towards the south with a level difference of 15m. At present there is no particular direction of flow of traffic which causes confusion within the movement system of the campus.

VOLUMETRIC CONDITION: Predominantly the buildings are G+3 /G+4 storey structures. The campus has potential for vertical expansion which preferably should be done away from the periphery to create variations in the built form. The campus has variation in scale and presents diverse architectural vocabulary without any continuity in expression and material application.

PRELIMINARY ANALYSIS

The primary analysis following audit of campus translated into indetification of following issues:

1) Variety of user group and their needs to be addressed.

2) Campus transformation with respect to existing Urban Context and future proposals,

3) Underutilized public transport facilities,

4) Neglected parcels of land,

5) Campus Mixed Uses are more and adhoc developments are complicated and incongrous,

6) Use Components of Zones, its functionality, Scale and the image is bot balanced,

7) Existing Data on available infrastructure is not collated and documented,

8) ACCESSIBILITY, PERMEABILITY and ROBUSTNESS of the edge condition along with the IMAGIBILITY of the campus has to be enhanced,

9) Comprehensive integration of campus services not undertaken,

10) Partial Water Management Initiative,

11) No comprehensive Waste management plan.

12) Gross Energy Mismanagement,

13) Sustainability Initiatives Minimal

SWOT ANALYSIS

STRENGTH: The preliminary S.W.O.T analysis reflects that there is tremendous potential for development with respect to growth and emerging activities public places, parking areas, integration of significant development its landscape to public art, urban furniture, and signage transforming the public spaces. As a potential of transforming into a significant cosmopolitan campus.

WEAKNESS: There are multiple roads which terminate in the corridor with lack of public facilities and infrastructure along the site. The edges are not well defined and the street are not coherent. The development control need to be worked out to maintained scale and degree of enclosure along the corridor.

OPPORTUNITY: Space along the corridor has potential of an urban space that can provide an integral area of social activities and can provide public places, parking etc. for the city. Addition of green buffer can enhance the area character and provide a healthy environment along the corridor. Designed urban fabric can provide a vigorous city growth and development in future. To be added layer of metro creates immense potential to the corridor.

THREATS: The incompetent hierarchy of spaces and non-uniformity of road edge led to chaos and unevenness to the city fabric. Multiple roads, unorganized urban services and lack of green buffer all defined a week urban space of that does not support any urban activity of such sort. The total transport scenario will be disturbed while introducing metro. Coexistence of metro with the Car-Culture is a threat to be taken care of.

VISION FOR COMPREHENSIVE MASTER PLAN (CMP)

Jamia Hamdard needs an effective master plan and more inclusive planning processes. JHU's wealth of outstanding academic facilities – an excellent starting point for the Master Plan – there is also widespread and growing focus on its future. The importance of a comprehensive vision and consistent guidelines to guide future development decisions is widely recognized. There is a general belief that new models for how Jamia Hamdard uses and cares for its land and how it plans and finances development. The inherent need for capacity building and up gradation of existing facilities has to be addressed with priority. Efficient and optimum utilization of land and built resources through energy conservation, water and waste management implementation of state of the art information technologies and non-conventional energy sources leading to a Sustainable Campus. Jamia Hamdard needs to position the University to both lead and respond to the tectonic social and environmental shifts occurring in the world. As a result, a strong emphasis on "Knowledge Urbanism" will be established.

"A comprehensive master plan is seen as critical to guiding growth and change and helping ensure Jamia Hamdard remains one

of the world's great universities and most beautiful campuses."

FIVE KEY ELEMENTS

The CMP team advocates planning practices that establish a balance between economic, environmental and social priorities, improving environments for the benefit of all people and ecosystems.

Planning for sustainability involves more than simply green buildings or efficient systems. Sustainability begins at the community, campus or regional scale with formative questions, which then lead to detailed decisions regarding on-ground sustainable measures.

Process | Movement | Public Realm | Land Management | Infrastructure

KEYTHEME 01
Promote Unique Natural Features

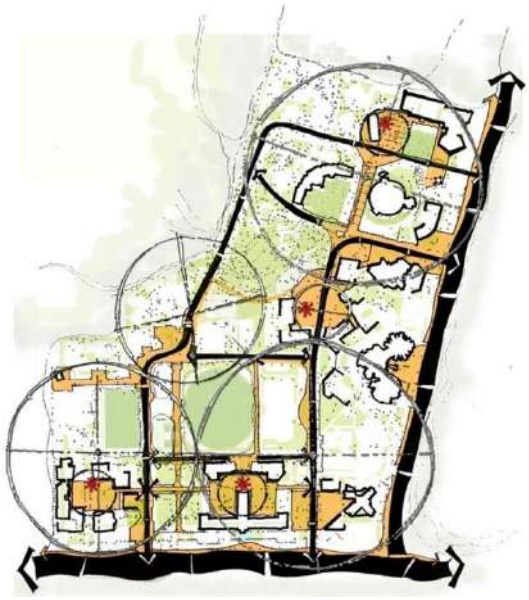
Open space structure plan has retained the green character with 15% of the campus open areas. Also an attempt has been made to visually and physically connect these spaces to generate variety of experiences for the user each having a specified treatment of hard and soft landscape. Various pocket level green zones have been connected with larger network of greens in the campus which maintain the continuity of natural greens in the campus. Natural water feature within the campus which will act as reservoir for rainwater hence adding to preservation of natural system in the campus.

Recommendations:

a) Preserve natural features and memorable open spaces,
b) Compose new spaces that respect the topography, native ecology, and view-sheds,
c) Ensure that new architecture creates meaningful and appropriately scaled exterior spaces,
d) Maintain a natural, informal landscape character across campus, balanced with the preservation of existing classical and romantic landscapes,
e) Sustainably manage physical and natural resources.

KEYTHEME 02
Commit to a Walkable Campus

One of the most powerful ideas of the Campus Structure Plan is to contract, or compress the campus closer to the core. Simply stated, it aims to develop a long-range strategy to relocate from the perimeter and repopulate the central core of the campus.



Recommendations:

a) Create a compact, walk-able campus,
b) Use class change times and walking distances as a determinant for facility placement,
c) Strengthen pedestrian connections and enhance the pedestrian experience,
d) Use structured parking in lieu of surface lots to preserve land resources.

KEYTHEME 03
Preserve & Reinvigorate Campus History

The Campus Structure Plan recommends the conversion of certain facilities in the historic core. Strategic framework related to

academic/ research/ cultural/ social precinct will emphasize their importance through a re-engaged learning environment: repurposing buildings, the renovation and construction of new academic buildings.

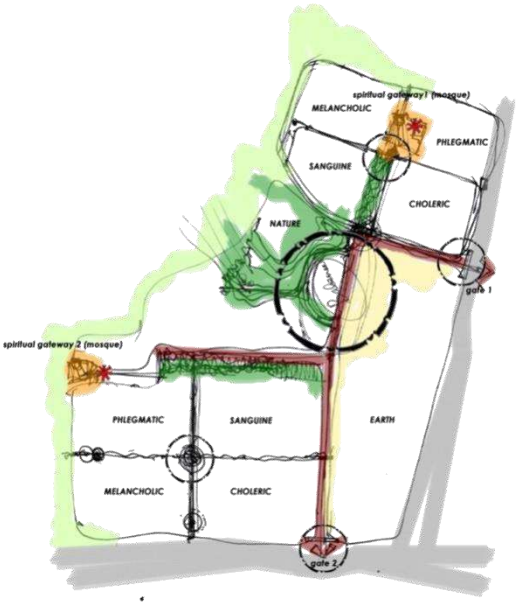
Recommendations:

a) Respect the character of the historic core.
b) Selectively re-introduce academic and residential functions into the core.
c) Preserve and renovate historic buildings.
d) Repurpose historic buildings with programs compatible with their size.
e) Program and energize underutilized campus spaces and landscapes.
f) Increase places for un-programmed, social interaction within buildings and in the external campus environment.

KEYTHEME 04
Create Diverse Neighbourhood

For any institute, the 'YOUTH' is always considered to be the pre-dominant user group. Thus, to make them more associated with the 'place', campus environment should address diversity. While giving proposal for concerned Jamia Hamdard University Masterplan, this idea of diversity was inspired from the '4 temperament theory' which is actually in relation with 'Unani Medicine', historically considered to be the prime focus of this institute itself.

The Greek physician Hippocrates (c. 460 – c. 370BC) incorporated the four temperaments into his medical theories as part of the ancient medical concept of humourism, that four bodily fluids affect human personality traits and behaviours.



Unani medicine is based on the concept of the four humours: Phlegm (Balgham), Blood (Dam), Yellow bile (Ṣafrā') and Black bile (Saudā'). Essentially, this theory holds that the human body is filled with four basic substances, called humours, which are in balance when a person is healthy.

Based on these ideas of 'human emotions', the campus has been divided into two metaphorical 'pure zones' & two 'impure zones', spatially with reference to the historical 'Charbagh concept'.
Conceptually, each 'Impure Zone' was further divided into four zones with reference to '4 temperament theory'.

In CMP the overall area are given the equal priority and the zoning is formulated based on the similar building function. Most of the existing building were proposed for demolition because of its unsuitable zoning . The function of the campus building are well organised so that one activity does not disturb the other activities within the campus premises. The green area is maintained and the natural landscape is being preserved in the new master plan. The ambience created by the landscape and vegetation within this campus premises have been properly thought to merge the nature with building. The natural landform is preserved to maintained the drainage system.

PROPOSED MASTERPLAN FEATURES

1. The new Master Plan attempts to bring the similar uses together and create character districts. The institutional and residential zones are segregated which provides distinct identity to uses through scale and architectural expression. The

building blocks are placed at the periphery of the site so the central part can have larger open space to cater the required function of recreational and open space system of university.

2. The figure ground is dense at the periphery and central area is kept loose to provide openness and conserve the natural landscape. These areas are developed as green area, playground and left for vegetation growth.
3. The new Master Plan attempts to retain the existing typology. The tall buildings are placed at the periphery to maintain the human scale within the premises. The stack effect is being proposed to avoid the feeling of narrow street while walking along the street of this campus.
4. A system of separate entry and exit has been developed to maintain the flow of traffic in the university, for the safety of users within university. The various entry point provides access to various level of services in the university. The residential area has been given privacy by providing check point, to maintain the flow of traffic into those areas.
5. he Master Plan proposal has retained the green character of the campuses with 15% of the campus open areas have been developed as designed green open spaces. The hierarchy of open spaces has been created in a manner to develop large public spaces and small courtyard spaces within the buildings. The structure plan has attempted to visually and physically connect these spaces to generate variety of experiences for the user each having a specified treatment of hard and soft landscape. The streets constitute a very significant part of this network which have been developed as boulevard streets with appropriate selection of trees and their species.

CAMPUS REDEVELOPMENT

The new Master Plan attempts bring the similar uses together and create a character district . The institutional and residential zones are segregated which provides distinct identity to uses through scale and architectural expression.. The building blocks are placed at the periphery of the site so the central part

can have larger open space to cater the required function of recreational and open space system of university.

The campus redevelopment plan was prepared by restructuring the existing campus through appropriate renewal initiatives. The structure plan defined the hierarchy of movement, open spaces and creation of public realm in the campuses through design and development of legible public spaces.

The campus has large amounts of land cluttered with temporary dilapidated and inefficient single storey buildings. The clearance of these building generated substantial space for redevelopment. The figure ground plan has been proposed with respect to the area program for the campuses to meet the future and current needs of the university. The entire land was subdivided into smaller parcels with specified landuse disposition.

The development parcels were created after identifying the potential of development for each landuse and by restructuring of open and built up spaces. The building zones have been defined by regulating the circulation pattern and each parcel has been completely developed which integrates itself with the larger whole of the campuses.

The development calculations assume:

- The building ground coverage is assumed to be an average of 30%. In some cases the building coverage may be higher or lower.
- The floor area ratio is assumed to be 1 which means the average height is 3 floors. In some cases FAR will be greater and less in others.
- The calculations are based on the figure ground plan which includes a number of buildings in the current building program which are existing, some for which the envelopes have been developed but not yet built. It also includes all the new proposed development after clearing of old dilapidated and inefficient structures.

The parcels have been created in a manner which will support phased construction specified through the master plan implementation strategies through the phasing and scheduling after creation of basic infrastructure of campuses to include all campus services, roads, pathways, parking areas and landscape. The table illustrates the campus and development parcel codes.

CIRCULATION & PARKING

A good campus plan involves walking as preferred means of transport, special attention has been given to physically and visually connect the buildings.

Moving in and around the campus, should be easy, comfortable and safe for pedestrians as well as motorized and the non-motorized transport in the campus. Safe and efficient mobility helps in maintaining a vibrant academic setting .

A system of separate entry and exits has been developed to maintain the flow of traffic in the university while accommodating all modes of transport, for the safety of users within the university as well efficient connectivity among all major areas of campus.

Different types of mobility systems include pedestrian circulation, vehicular circulation, non-motorized transport circulation as well as parking facilities. For efficient and safer mobility in the campus it is important to achieve the following goals:-
- enhancing road and pedestrian networks in the campus,
- clarifying and sustaining major vehicular routes across the campus and segregating the both in an intelligent way.

The various entry point provides access to multiple levels of services in the university. The residential areas have been given privacy by providing check points, to maintain the flow of traffic into those areas.

ARCHITECTURAL TYPOLOGY

The physical character of the space and buildings depicts the typology of campus planning process. Before the redevelopment of Masterplan, the typology of campus planning process was diversified and there was lack of coherence in the overall planning of campus. Most of the typology of spaces are introvert as the activities was within the buildings and the external planning of spaces was not the part of building itself. The architectural typology of campus was unique as it was designed by different architects which depict the historical journey of campus planning.

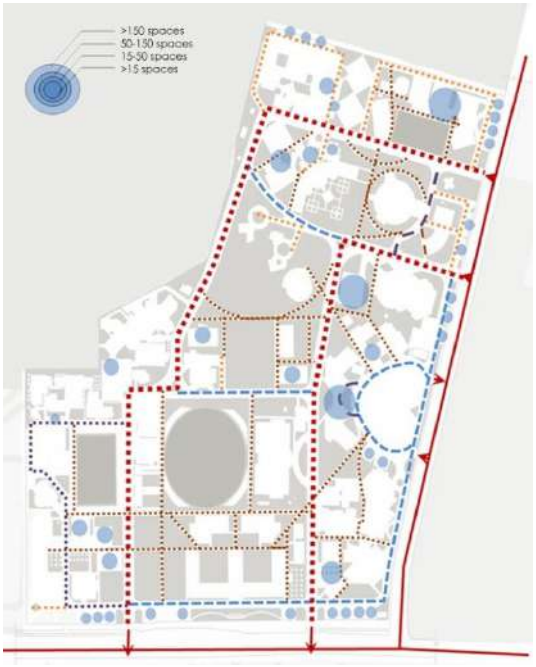
The present Masterplan tries to bring uniformity in space planning process and the design of building itself. Through the external space that has been provided outside the building offers various activities to the users and it is the integral part of building design as well. The spaces outside and inside the building are integral part of the planning process. The most of the building are provided with courtyard or front yard where activities can take place immediately outside the building for the users. The linear block of are provided for academic zone to run classes parallely with abundance of natural light and ventilation.

The present design of building tries to bring uniformity in campus design and ties the spaces that have remained unplanned. Various form of building has been supported with scale of open spaces immediately to that block to celebrate its architectural character and create building related activities along it. The typology depicts the modern architectural character at the same time respect the existing character of the campus.

Individual buildings have been designed considering:

1. Intent of building
2. Location Based on Building Use
3. Location of Entry and Exit
4. Spatial Structure
5. Structure and Economy
6. Width of building
7. Orientation
8. Basement and stilt
9. Flexible Space Design
10. Daylighitng and Porosity
11. Height and scale of buildings
12. Selection of Materials
13. Building Skin
14. Hospital functions –Public access
15. Universal Accessibility

Each new building shall be oriented and designed to take advantage of solar angles and wind direction to reduce energy consumption. The design shall include consideration of shading options on south and west exposures to reduce heat gain in summer but admit natural light in winter. Shading options shall include landscape element, such as deciduous trees, as well as architectural elements.










Campus edges and entrances should create a positive first image of both the campus and its synergy with the interface around it. New buildings at the core of campus perimeter should be sited and designed to accommodate a more coherent and unifying landscape treatment.

Buildings shall be set back to accommodate a formal, urban, but generous landscape treatment along both frontages. The Landscape Master Plan shall define a palette of planting and paving materials and typical details for these setbacks.

Places of Interaction: Buildings facing places of interaction shall be scaled to admit sunlight to the place and impart a comfortable human scale. Spatial sites may present relationships that require lower heights along the build to line.

Each building shall be a coherent architectural composition, and shall employ a single unifying vocabulary of forms, details and materials on all buildings facades.

CREATING 'PLACES FOR PEOPLE'

"The nature of the buildings and streets of the cities where we live affects our behaviour, affects the way we feel about ourselves and importantly how we get along with others." - C.M. Deasy FAIA

For any good campus, it is always desirable to have a series of places, making its experience more meaningful to people. Any campus design should focus on creating an educative environment holistically for students. Henceforth it is more important to design the outdoor spaces more carefully instead of giving priorities to indoor space design only.

Proposal for Jamia Hamdard University also addresses this necessary idea of providing 'places' for 'people' quite efficiently by means of its diverse ambience as well as flexibility of acknowledging its users of different age groups as the core idea revolves around the practical context of giving importance to not only the students' psychology but also understanding the need of faculties/staffs/residing communities parallely.

Among all these designed 'places', this segment will describe six most important precincts of the campus. Henceforth, this will give a clear idea on how these 'places' different from each other conceptually as well as physically by means of its core philosophy, physical articulation, scale & style (appearance based on its vegetation typology, surface material, urban furniture, building fenestration and so on)

All these places have been categorized into three groups which are: a) Image Centres b) Quads c) Social Needs.

MEMORIAL OF LATE JANAB HAKEEM ABDUL HAMEED:

The memorial for Hakeem is a tribute to the vision of this great philanthropist whose belief was in grained in the fact that education is a key to growth and development of any society. A man with simplistic life style was tall in stature and was a pure soul. The creation of the memorial for Hakeem Sahab finds its inspiration from his values and life style which comprises of square vertical tower inscribed within geometry of peripheral wall with 4 entrances. The square is a pure geometry which symbolizes the Hakeem Sahab character and vertical tower symbolizes his stature. This singular use of material in natural form further enhances the above characteristics. The memorial has been envisaged as landmark in the campus and has been located on the highest point in the campus terminating into visual foci on the

main spine and it binds together the entire space around it. This landmark has been supported by lighting which will also contribute to the legibility in the campus.

LANDSCAPE CONCEPT

The physical character of any campus is primarily defined by its landscapes. Places of higher education, marking the turning point in an individual's life, need to reflect the character of the learning they imparts. They need to be places individuals can look up to and epitomize in their lives.
The Jamia Hamdard Campus even today seems to have been carved out by clearing the ridge woodlands as and when academic facilities were added . Most of the site is still in its naturalized woodland state. But growing demands on the campus require greater infrastructural and academic needs, needing a complete overhaul in keeping with the times.

The concepts that would reflect the ideals of the Jamia Hamdard University in shaping the landscape of its open spaces may be enlisted as under:

- Grandeur of scale
- A sense of place as an institute of higher learning setting it apart from its noisy neighbourhood and yet contemporary in its approach.
- Landscapes designed on principles of sustainability and value for the existing natural resources.

VISION FOR GRANDEUR OF SCALE

The existing campus is a 90acre site abutting the Jahanpanah forest, and consisting of large tracts of subtropical woodlands, characteristic of the Delhi Ridge type ecosystem. The buildings for the institutions and accommodation have, to date, been added without a clear layout. The entrances lack character and emphasis. The roads are narrow, directions are unclear, and the scales associated with such places of higher learning are absent. Symbolically people read such spaces as having limited vision and limited courses for higher education.

Grand entrances leading to wide tree lined avenues and large landscaped open spaces are envisaged, for giving the campus an

impression of vastness and grandeur. Landscape spaces would incorporate plazas, squares and courtyard connected with pedestrian pathways.

A SENSE OF PLACE

The university campus sits today tied to the dense urban settings of South Delhi. The site however has changed little with the changing scenario outside. The landscape would on one hand attempt to weave the public places of the campus with the fabric of the city, at the same time careful planning would ensure the continuation of the original character of the site as a retreat for the scholars.

LANDSCAPE SUSTAINABILTY

The landscape programme would aim at creating a richer, more ecologically responsive landscape by adopting techniques such as rainwater harvesting, preserving existing trees, maintaining naturalized areas, preserving topsoil and climate responsive site planning. The idea is to preserve the essential character of the site while accommodating more academic facilities.

VISION FOR THE PROJECTS

1. Support the educational mission, values and purpose of- college develop an program in general conformance with the campus material palm.
2. Incorporate visionary think up with regard to sustainability, accessibility, security, maintainability, and information-technology
3. Develop fiscally responsible plan.

PLANTING STRATEGY

Trees and plants serve as symbols have substance and perform functions. Plants need to be cultivated and cared for because of the functions they performs. Plants materials are among the most complex components that a designer uses-complex because they are living, growing things, changing with each season. Plant gives people contact with the nature, establish a relationship with primitive needs and soften the unyielding surfaces of urban construction with the green of leaves, texture, and shadow. Trees are used to address the design needs of a project by directing pedestrian or vehicular moment, framing vistas, screening objectionable views, and defining and shaping exterior space. A proper planning and care of plant material is a matter not merely of bio-aesthetic sense but of immense practical utility. The planting design deals with the creation of visually stimulating and functional with the aid of planting material.

The selection of these plant materials depends upon its need, appearances in all stages of growth, appearance in all season, hardiness, cultural requirements and the degree of maintenance needed. Also their compatibility of form, texture and color in the surrounding structure and site compositions are also important considerations. Plants used for back drop, screening, shade or space definitions are selected for strengths and cleanliness of form, richness of textures and suitability of color. Plants selected for their sculptural qualities for ornamental twigging, foliage, flowers and fruits, and to be strategically placed for optimum display.

CONCEPT

The overall idea for the landscape is to give one single identification to the campus, In present condition the all the building block are have own identification from different architects so now landscape is the beautiful medium to stitch the overall campus in single unit with the help of planting, circulation, focal points/ plazas & some water features. Integration of open spaces by adopting ISLAMIC CHARACTER as a theme for landscape design to the counter built mass.

- The first is a holistic approach to landscape understanding, integrating abiotic, biotic and Cultural landscape components.
- The second is a dynamic approach in which landscape is investigated along two continuums: a spatial one, i.e. movement between a larger scale and a local one; and a temporal one representing the evolutionary historical development of the Landscape.
- The third is ecological landscape design's responsiveness to the constraints and Opportunities of context whether natural, cultural or a combination of both. Responsiveness also dictates an anticipatory approach that considers the impact of the design on existing Ecosystems and resources.
- Finally, ecological landscape design is intuitive, encompassing not only the rationality of the outer world but also the neglected 'intangible relationships' of the inner world. This intuitive approach embraces a new definition of creativity that departs from the formal, i.e. object-centered, appearance-oriented aesthetics to a phenomenological participatory aesthetics where the emphasis is on the totality of human experience of the object.
- Integration of internal and external space along with the climate responsive campus planning , stressing the exchange

between spaces since campus does not only fulfil the knowledge imparting function, but also cultivate living environment for all around development. Clarity in circulation system is very important factor for campus design.

- Different zones are created in these potential open spaces based on the activity pattern and functional requirements offering variety of experiences along the journey by providing appropriate visual focus.
- Informal seating space that would be conducive to bringing learning out of the classroom and outside as well as provide many different possibilities for play, entertainment and rest, allows people from various disciplines to interact and share knowledge during breaks and lunch time.

SUSTAINABLE LANDSCAPE

Modifying microclimate through energy efficient enviro scaping. Use of native and naturalized plant species, Planting trees for the purpose of providing shade, which reduces cooling costs, Water body, Reducing the heat island effect with pervious paving. High albedo paving, shade, and minimizing paved areas, Site lighting with high efficiency fixtures with LED lamps & solar panels, Rain water harvesting, Rain garden/swale.

CAMPUS INFRASTRUCTURE

ELECTRICAL SYSTEM

Policy:

- In order to conserve the electrical energy , The university needs to adopt the following measures as a part of their policies:
- Annual Power / Energy audit needs to be conducted every year to know the power quality of the prevailing network and to identify the energy consumption pattern.
    - Solar PV On-grid system checks and maintenance on regular basis.
- To maintain suitable inventory for LED light fixtures and occupancy sensors.

a. Regular checks and maintenance of complete power and extra low voltage network.
b. For all residential units LT meters shall be allotted to residents for each quarter/ flat/ residence/ Hostel, wherein individuals shall be responsible and payee for their own electrical energy consumption.
c. Although system components will be automatic upto minimum required level in terms of its operation and functioning however to attend a fault and proper monitoring of system, it is proposed that all the substation shall be manned substation.

Strategy:

a. Energy conservation measure:
Based on the below mentioned points, energy conservation measure can be achieved :
b. On Grid Solar PV System:
A grid-connected photovoltaic power system is an electricity generating solar PV system that is connected to the utility grid. A grid-connected PV system consists of solar panels, one or several inverters, a power conditioning unit and grid connection equipment. Considering On grid solar system, we can utilize maximum power at day time and when excess happen, it will be returned to grid power at 11 kV.
c. Sub Metering:
Sub metering is the installation of metering devices with the ability to measure energy usage after the primary utility meter. Sub metering offers the ability to monitor energy usage for individual tenants, departments, pieces of equipment or other loads individually to account for their actual energy usage.
d. Automatic Power factor correction
The Automatic Power factor Correction is a very useful for improving efficient transmission of active power. If the load is inductive, then the power factor lags, when the power factor goes below 0.97(lag) then the Electric supply company charge penalty to the consumer. So it is essential to maintain the Power factor below with in a limit. Automatic Power factor correction device reads the power factor from line voltage and line current, calculating the compensation requirement switch on different capacitor banks.
e. LED Lighting
Based on the LED lights technology, energy conservation can be achieved. As LED lights consume less power and provide maximum lumen output.
f. Occupancy Sensors
An occupancy sensor is a lighting or heating control device that detects occupancy of a space by people and turns the lights on or off automatically, using infrared, ultrasonic, microwave, or other technology. Occupancy sensors are typically used to save energy, provide automatic control, and comply with building codes.
g. Stand alone Solar Lights
h. Solar street lights are raised light sources which are powered by photovoltaic

panels generally mounted on the lighting structure or integrated in the pole itself. The photovoltaic panels charge a rechargeable battery, which powers a fluorescent or LED lamp during the night. solar panels turn on and turn off automatically by sensing outdoor light using a lux sensor.

Metering :

Based on the type of building and tariff scheme, metering is done through

1. 33 kV Meter connection is proposed for academic/Hospital/amenities building since the tariff plan for residential and commercial uses are different. 33 kV connection feeds all non residential loads and metering shall be done on a single point at 33 kV level.
2. 11 kV Connection for LT metering is proposed for all residential building. Power supply shall be received at 11 kV through underground cables . After each 11 kV substation power shall be distributed to each building through feeder pillars and through feeder pillars, LT cable shall connect to LT meters to each individuals located at ground level

i. To use the existing system/Network :

1. To use the existing system/Network wherever possible and utilize the healthy components of existing system for proposed buildings.

j. Modifications/Newly Proposed Network :

1. To Replace the old aged electrical component of the system network with new once as per latest technology available in the market.
2. To make necessary provisions for extra voltage routing at infra level excluding the system component but including piping excavation and other civil works.

UPS System

We propose to have UPS backup for certain critical loads inside Main Receiving Station those required uninterrupted power supply. It is proposed to have a 1x 7.5 kVA UPS for the critical load. The UPS shall feed emergency lighting, fire alarm panel, maintenance plug point, and auxiliary for substation equipments those required uninterrupted power supply. The UPS shall be IGBT based 3 Phase input 3 phase output type with isolation transformer (preferably inbuilt). The minimum permissible THD (Total harmonic distortion) level shall not exceed 3%. The UPS must also have a feature of audible alarm in case of battery mode, Low battery, Overload and faults. The UPS must also have LED indicators for Load level / Battery level, Battery, Utility Power, Inverter, Bypass, Overload, and Faults.

Solar PV System:

Solar PV System is proposed for the complete Campus according to space availability in the terrace. A grid-tied electrical system is a semi-autonomous electrical generation which links to the mains to feed excess capacity back to the local mains electrical grid. On grid solar system is proposed. At day time maximum power is utilized by the utility loads and excess power shall be returned to grid through 415V/11kV step up transformers.

ELV Systems

As the existing campus is running and some building are already provided extra low voltage supply.

These extra low voltage cables are connecting to different building through fiber cables which are running inside the Hume pipes. Two nos. Hume pipe of 100 mm dia have been proposed for extra low voltage.

Telephone and Intercom

Telephone and intercom points have been proposed for each substation. Each substation will be provided with telephone, service. Telephone Networking System for substation building will consist of telephone devices throughout. All of the Telephone devices will consist of RJ45 jacks, wired with Category 6 unshielded twisted pair cable.

Addressable Fire Alarm For main Substation

Addressable fire alarm shall be considered for the Main Receiving Station with heat detectors and smoke detectors looped together in a closed ring fashion and connected back to main fire alarm control panel. Detectors shall be installed inside the trenches. The complete system shall be UL certified.

Plumbing System:

Policy

- To ensure reliable and continuous supply of water for domestic purposes and effective and hygienic disposal of sewage following policies adopted in proposed design:
- Measuring and recording water use allows the effectiveness of water efficiency Initiatives.
- Reduce Fresh Water demand by utilizing low flow fixtures within building and reutilization of STP treated water in landscape.
- Planning and routing the services based on actual head loss calculation for optimizing energy usage.

- Filtration system proposed that will remove suspended solids, odour and coli form in tube well water. This will also prevent scaling in pipes and enhance life of RO used within buildings.
- Semi Automation filtration system proposed that will limit human intervention and its plan in such a fashion that in future same thing can be converted in fully automatic.
- Cost and Space Optimization by allocating right size of equipment at plumbing treatment station that will helpful in hassle free maintainability of services
- Pumps are sized for delivering water at roof of each building for gravity system.
- Efficient utilization of the existing resources by proposing water network as per demand calculation of each building
- Maintaining adequate flow and pressure at each ferrule point

Strategy

- Sewage and sullage collection & conveyance system based on IS standard and applicable guidelines by NBC. Strategically collection of sewage and sullage from each individual building to respectively zoned sewage treatment Plant.
- Emphasis on water conservation by optimizing size of pipe.
- Transfer system for water supply distribution to ensure adequate availability and pressure at each point for the consumer.
- Modular harvesting pit and Flood retention water features proposed at rocky bed that will ensure not water logging during flood and same can be adopted as water feature and creating microclimate in nearby area, Traditional rainwater harvesting proposed for other than rocky bed.
- Storage capacity of one day requirement planned for underground reservoir and half day planned for overhead reservoir. Planning done considering existing tanks as resource and same area proposed for expansion as per detailed layout,
- Domestic water supply: Water sourced from the tube well shall be passed through basic water treatment plant comprising of multi grade filters and activated carbon filters. Further specialized treatment, may be provided based on the source water analysis report. Water shall be used for domestic usage in toilets (wash basin), Kitchen, water body, filter back wash and other areas where direct human contact/ use are envisaged.
- Irrigation water Supply: Irrigation requirement for the project shall be sourced from in house sewage treatment Plant and shall have acceptable parameters as per the governing authority.
  The Planning of Underground tanks and Sewage Treatment Plant shall be built in phases in such a way that the part for next stage shall be built in continuation to the existing service.
- Water metering at Municipal/Borewell supply, treated water supply, irrigation water supply.
  Sewage / Effluent Treatment Plant comprising of preliminary, biological and tertiary treatment for recycling of the effluent. The treated effluent shall be used for gardening / irrigation purpose.

WATER SUPPLY COLLECTION AND DISTRIBUTION SYSTEM

The water supply system is designed to provide reliable service, easy maintenance of system and most hygienic conditions:

- Source of fresh water supply is from the Bore well.
- Overflow from fire water tank to raw water tank.
- Filter feed pump supply to filtration system and then to treated water storage tank.
- Transfer system to overhead tank.
- Overhead tank supply via gravity.

RAIN WATER HARVESTING

Scheme:

Taking in to consideration the intensity of rainfall in the last 10 years, which is considered as 30 mm /hr., an effective scheme for rainwater disposal has been designed. The run-off rainwater from roof of each building will be drained out effectively by providing sufficient no. of rainwater outlets / khurras and heavy duty / gauge PVC down take pipes designed to handle the intensity / flow of rainwater.

These rain water pipes are located along the periphery of the building. These pipes arerouted with necessary slope and dropped vertically down to GL. The rain water pipes finally will be conveyed to the storm water drain at ground level through pipes of suitable diameter with network of storm water catch basin of suitable size located at appropriate place with RCC Hume pipe of NP2 class.

TYPES AND METHODS OF HARVESTING:
Recharging of the ground water by percolation pits, running alongside the drain and the storm water collected from the

terraces of the buildings shall be diverted to the external storm water drain.

LAND SCAPE IRRIGATION

The source of water distribution for irrigation is from STP recycled water collection tank.
The water from STP will be used for Irrigation and HVAC purposes.
A separate ring main for the network of pipes shall be provided connecting all green scape trees, shrubs and all kinds of foliage planned by the landscape architect.
A comprehensive system will be worked out based on the landscaping consultant requirement.

RAINWATER MANAGEMENT

The average rainfall is approx700 mm per year and the available data from IMD site is enclosed on next page. The design hourly rainfall is 30 mm/hour and the rainwater harvesting tanks shall be planned accordingly. Adequate provisions in landscape design to provide rain gardens, swales shall be done to retain precipitation to the maximum extent.

FIRE FIGHTING

Policy:

To ensure essential fire safety procedures following shall be taken into consideration:
Fire drills should be planned in every quarter to aware people living in campus about fire safety.
All exit routes should be indicated by signage.
Fire triangle should be demonstrated to all residents, students to make people aware about all components of fire
Fire Extinguisher signage and use should be indicated in all hazardous area
Precautions from hazardous and highly inflammable substances should be indicated and properly demonstrated in all the areas.
Safety data sheet should be located in all hazardous storage area
Fire Fighting extinguishers should be replaced/refill as per operations and maintenance schedule

Strategy:

As per the classification of buildings as per the NBC 2005, IS 3844, IS 15105 and IS 9668 the buildings are classified into Four classes namely Residential, Educational, Institutional and assembly.
Residential building without Basement is classified as Low Hazard and with basement of area more than 200 sq. mtr. and used for car parking is classified as Moderate Hazard, which need to be sprinklered in basement as per NBC.

Requirement for internal hydrant, sprinkler system and external hydrant for Educational, Institutional and assembly building shall be as per NBC 2005.

The storage tank for buildings requiring sprinkler shall be provided with underground storage tank of 200 KL as per IS 15105 which states that for moderate hazard storage capacity equivalent to 2 hour pumping capacity or 200KL whichever is greater.

The overall storage capacity shall be in compliance with IS 9668 which states that water for fighting shall be provided at the scale of 1800-l/min for every 50 000 population or part thereof for towns up to 3 lacs population and an additional 1800 l/min for every 1 lac population of more than 3 lacs. The requirement should be on the basis of 2 hours duration.

In-addition to the population criteria, it should be ensured that sufficient water at the above scale is made available within every 1 km" area of the city/town and it should be ensured that it is equitably distributed. In the case of smaller towns with population of 1 lac and below the total requirements should be doubled.

Design Concept:

The firefighting arrangement shall be designed as per the requirement of local guidelines, NFPA & engineering design standard.

The entire fire safety installation shall be compliant with the most stringent codes/standard for the entire block to ensure the highest safety standard and uniformity of system. Further, before property is opened to public, the fire protection shall be fully operated and tested under simulated conditions to demonstrate compliance with the most stringent standards, codes and guidelines.

- Piping System: Piping system confirming to IS:1239 – MS Heavy Class
- Fire water static Storage: Fire water static storage has been provided in Accordance to NBC requirement.
- Fire Pumping system: Pumping system comprising of independent pumps for hydrant, stand by diesel & jockey application has been provided.
- Hydrant system: External & internal hydrant complete with hose reel.
- Hand held fire extinguishers: Strategically placed at designated areas.

System Description:

1. Fire water storage - Static fire water storage tank for Fire Protection System has been

provided at underground level of 200 cum capacity each at multiple location. The requirement has been achieved as per requirement of IS 3844, IS 15105, IS 9668 and NBC-2005.
Moreover the existing overhead tank shall be utilized as standalone fire water reserve.

Fire department connection, tanker inlet connection and draw-out shall also be Provided at each tank along for fire tender requirement. These shall comprise of 4 Nos. 63mmdia male outlets capable of directly feeding the ring mains through Non return valves or directly filling the static fire storage tanks. These shall be Mounted in specially identified boxes.

2. **Fire pumping system**

The fire pumping system shall comprise of independent electrical pumps for hydrant, diesel engine driven pump &jockey pump for hydrant system at each UGT level. Electrical pump shall provide adequate flow for catering requirement of hydrant system. Diesel engine driven fire pumps shall be provided for ensuring operation & performance of the system in case of total electrical power failure. Jockey pumps shall compensate for pressure drop and line leakage in the hydrant installation.

Individual suction lines shall be drawn from the fire reserve tanks at the basement level and connected to independent fire suction header. The electric fire pumps, this suction header.
Delivery lines from various pumps shall also be connected to a common header in order to ensure that maximum standby capacity is available. The sprinkler pump(to be installed in the future) shall be isolated from the main discharge header by a non-return valve so that the hydrant pump can also act as standby for the sprinkler system, for this application dead plug in the header shall be kept to meet future requirement. The ring main shall remain pressurized at all times and Jockey pumps shall make up minor line losses. Automation required to make the system fully functional shall be provided.

3. Fire hydrant system

Internal and external stand pipe fire hydrant system shall be provided with landing valve, hose reel, first aid hose reels, complete with instantaneous pattern short gunmetal pipe in the block.
The internal diameter of inlet connection shall be atleast80/100mm. The outlet shall be of instant spring lock type gunmetal ferrule coupling of 63 mm dia for connecting to hose pipe Recessed cupboard/fire hydrant cabinet shall be strategically located for firefighting requirement. Location of cabinets shall be accessed as per comport mentioned plan in consultation with the Architect. Provision of fireman's axe shall be made for internal hydrant.

External hydrant shall be located within 2m to 15m from the building to be protected such that they are accessible and may not be damaged by vehicle movement. A spacing of about 30 m between hydrants for the building shall be adopted.

TECHNOLOGY INTEGRATION

The campus master plan proposes high end technical integration at the campus level, through a integrated security system solution including the management of campus services through a resource management suite integrated on a high platform which are integrated with the building management system in all the buildings. Every building would have its own building management system which would be connected to the main IT hub supported by a central control and monitoring system.

The IT infrastructure of the campus has been created with one main data center (ERP)in the Admin block connected to the secondary data center in the library building through a 10 GB fiber optics network. The various building are provided with routers to make the entire campus WIFI enabled. The main data center will facilitate the internet solution for the university which will also support the university information and management system. This system would enable students and staff to acess all the information online including a payment gateway for the staff and students.

Each building would have its own set of switches and data run which would be connected to the main data center. It is further proposed to create a separate cloud space for the university.

INTEGRATED SECURITY SYSTEM:

The entry to the campus will be provided with boom barriers / flag barriers and central central system duly supported by RFID readers integrated with the entire academic community which will provide access into the campus and also the buildings. The entire network would be supported by the IT infrastructure of the campus . The periphery of the campus will be provided by PTZ cameras while every building shall have IR cameras along with the integrated system in all high end facilities of the university. The fire alarm system shall also be integrated on the common integrating software which would bring the entire security system on a common

platform duly monitored through the central monitoring station. which would also connect and disseminate information to all the key officials and the security in charge on the smart phones. the officials will also be able to monitor the information through there smart phone via an app.

SMART CLASS ROOMS:

The university has created a smart classroom cluster of various capacity duly supported by AV and IT network, similar facilities will be extended to each department along with video conferencing facilities. The content management from the smart classroom will be done through content management software and the lecture will be archived and also made available to the student through the intra net facility.

AREA PROGRAMMING & COST DRIVERS

The Campus Redevelopment Plan for the Jamia Hamdard University

PROJECT COST DRIVERS:

1. Benchmark Study
2. Key Cost Drivers

- Type of facility (Complexity - Role Delineation)
- Type of Department - Functional Unit
- Buildin Configuration - Footprint, No. of Floors
- Type of Work - New Building / Upgradation

3. Other Cost Drivers

- Locality of Site
- Timing of Project
- Architectural & Engineering Detailing
- Project Procedures
- Project Management
- Standards & Quality of Materials & Equipment
- Procurement Method
- Implementation Strategies

1. SCOPE CHANGE AND VARIATION ASSESSMENT
2. NEGOTIATIONS WITH CONTRACTORS
3. SAFEGUARDING INTERESTS OF THE UNIVERSITY
4. PROGRESS PAYMENT ASSESSMENT
5. REGULAR PROJECT FINANCIAL STATUS REPORTING
6. HIGHER LEVELS OF FINANCIAL CONTROL
7. REPORTING EARLY WARNING OF ADVERSE TRENDS

SUSTAINABILITY & INFRASTRUCTURE

Adopting the five 'R' philosophy of sustainable development

Refuse – materials, technologies, products, etc. Specially in areas where local substitutes/equivalents are available

Reduce – the dependence on high energy products, systems, processes, etc.

Reuse – materials, products, traditional technologies, so as to reduce the costs incurred in designing buildings as well as in operating them.

Materials generated from campus during construction can be stored and reuse for various purpose which will make the campus zero-discharge campus.

Recycle – all possible wastes generated from the building site, during construction, operation and demolition

Reinvent – engineering systems, designs, and practices such that India creates global examples that the world can follow rather than us following international examples

ENERGY EFFICIENCY

1. Energy Efficient Lighting
   Enhance energy efficiency in landscape areas to reduce environmental impacts from excessive energy use.
2. Lighting Power Density
   Design exterior lighting, interior lighting (as applicable), common and parking area lighting such that Lighting Power Densities (LPD) are at least 10% efficient than LPD requirements prescribed in ECBC, Section 7, ECBC for LPD requirements in interior & exterior areas.
3. Lighting Controls
   At least 50% of the exterior & common area non-emergency lighting such as pathways, landscaping, surface and covered parking, street lighting, staircases should have one of the following:
   - Timer controls for applications such as street lights
   - fountains, focus lights etc.
   - occupancy/ motion sensors.
4. On-site Renewable Energy: Encourage use of renewable technologies to reduce dependence on fossil fuels.

Install renewable energy systems to generate power through solar, wind, bio-mass/ bio-gas or any other forms of renewable energy for at least 1.5% of the annual energy consumption of landscape applications.

WATER REDUCTION

There is need to properly manage and reduce water use. Campus needs to be equipped with the use of high efficiency water fixtures, storm water, and gray water collection systems. The goal in Campus is to reduce fresh water use in every building. Storm water will be stored in large tanks and provided for the project's site irrigation needs, and will eliminate the use of potable water for landscape purposes.

Water

1. Reduce landscape water requirement.
2. Reduce building water use.
3. Efficient water use during construction.

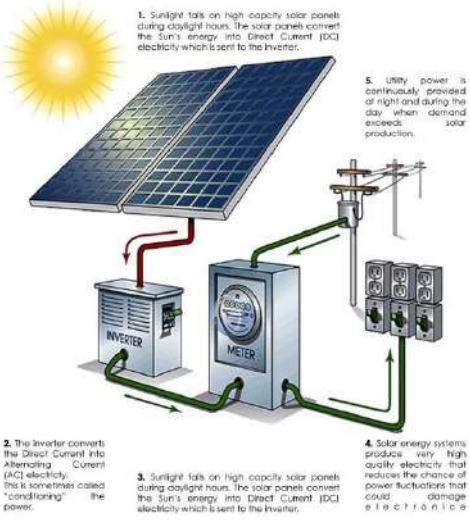
Recycle, recharge, and reuse of water

1. Waste- water treatment
2. Water recycle and reuse (including rainwater).

WATER MANAGEMENT

To reduce the water demand, buildings in the campus have been provided with low flow fixtures such as dual flush toilets, low flow taps and sensor taps that would result in 25% savings in water use. Further, the wastewater generated from the hostel building equivalent to 8 KL/day will be treated through efficient biological process using a combination of microorganisms and bio-media filter. The treatment system requires low area and energy. The treated water meets the prescribed standards for landscape irrigation. Rainwater run-off from roof and the site would be used for recharge of aquifer. This would enhance the sustainable yield in areas where over-development has depleted the aquifer.

Provision of separate Collection for various waste material at various site level



- Rainwater Harvesting, Non-roof
- Rain Water Filtration
- Use of Efficient Irrigation Systems
- Reuse of Treated Waste Water, Onsite & Offsite

ENERGY-EFFICIENT TRANSPORT SYSTEM

- Provision of e-rikshaw inside the campus will increase easy mobility with controlled speed which is for the safety of the pedestrian.
- Introduction of e-rikshaw will also control the air pollution helping the campus pollution free and at the same time it can major mode of transportation within the campus.

GREEN STRATEGIES

Site Level strategies :-

- The campus will recycle and reuse existing resources
  conserve natural resources.
- Respect the topography and natural drainage system.
- Water management at Campus level.
- Waste management at Campus level.
- Use of non-conventional energy.
- Energy optimization and utilization.
- Scalability and maintainability.
- Campus services and system design for flexibility and future expansion.
- Transport demand management with focus on pedestrianization and peripheral parking.
- Imageability and permeability on campus reinforced through public space design, scale continuity and coherence complemented by landscape.

BUILDING LEVEL

- All building level as per TERI GRIHA, IGBC
- Smart campus through use of IT.

Site Area: **91.6 acre**
Masterplan: **2015-2030**

Case study 2: Allahabad University Campus Redevelopment &Heritage Conservation
Neev Architects Interiors & Urban Design Consultants, 2008–2023 Masterplan

The University of Allahabad was established in 1887 as the fourth oldest university in India and has to its credit, several achievements in higher education. The university was initially an affiliating body and was established to relieve the burden of the University of Calcutta of supervising education in northern and central India. The university has been a unitary teaching institution since 1921 and was under the state of Uttar Pradesh after independence until 2005 when the Govt. of India recognized its role and contribution in the fields of higher and national development, the University of Allahabad was reincorporated as a Central University under the University of Allahabad Act 2005.

The University has undergone significant changes in institutional setup with continuity in the academic systems and processes. The university has emerged from a chronic resource crunch for over 2 decades until it became a central university. The inadequacy of resources hampered the expansion and infrastructural facilities, though new programs were instituted through new academic initiatives.

The University of Allahabad had drawn a vision plan in January 2002 for the period of 2002-2012 which was reviewed in 2006 and the revised vision plan mandates the mission statement of the University and has defined the institutional agenda up till the end of the 11th plan. Within the ambit of this agenda, various plans have been formulated towards establishing academic excellence and effective utilization and upgradation of infrastructural facilities. The University has given due consideration to the Knowledge Commission recommendations in the development of the vision plan and in specifying the objectives.
In the above pursuit, the University initiated the development of comprehensive master planning of all the existing properties and campuses to efficiently utilize the available real estate resource and to upgrade and add

new academic, research, housing and recreational facilities for the students and staff with an objective to make the University of Allahabad a global university in order to regain its old legacy. The University of Allahabad initiated this endeavor and the new Master Plan is an outcome of his great vision for the university, it is the first of its kind of redevelopment initiative undertaken by any Indian University, on this scale. This will become a benchmark for the future development of campuses in the country.

The University initiated the search process for Architectural and Urban Design consultancy firms throughout the country in March 2006 and after rigorous selection procedure and

scrutinizing 33 firms from all over India. The preparation of Mater Plan was to serve as a guideline for effective landuse planning and suggest mechanisms for optimum and efficient utilization of resources in view of the future needs of the academic departments, centers for research and advanced learning and other supporting infrastructural facilities such as staff and student housing, sports facilities, etc.

The emphasis of the development of the Master Plan was to prepare a methodology for integrated development of the campuses in harmony with the heritage buildings of the Allahabad University. The University had also initiated the conservation and preservation of heritage buildings. The work on the above had been entrusted to INTACH and is currently in progress.

The context & status

The University of Allahabad unlike many of the newer campuses with sprawling expanse of the land and exciting backdrops, finds itself tightly packed and wedged within the heart of the cantonment city. It has Katras with sprawling housing with ever growing commercial activities separating the two campuses with dense and organic urban fabric. The science and arts campus is divided by a old settlement called Katra which developed around 1801 characterized by high densities (500-750P/HA), dense grain, organic street pattern with an courtyard typology supporting intense commercial activity along linear spine having a status of central business district in Allahabad Master Plan. This area has now undergone deterioration and has entered into a state of blight and obsolescence. One edge of the district is owned by private trusts who have developed housing for the students and the vital link between the two campuses has generated student related activities such as book shops, printing houses, tailors/grocery shops, fast food joints etc. The Katra zone has an area of 2.6sq.km. with a population of over 50,000 persons approx. The Colonelgunj area in easterly continuation resembles the Katra, in structure and use, marking an extension to the activity pattern.

One major edge of the Science campus adjoins the major city level green area – Alfred Park along the highway. The other precincts of the campus namely the Bank Road, Church Road, Allengunj, Cantonment are characterized by adhoc development predominantly residential, in form of plotted housing with densities varying from 250-350P/HA. (Ground plus two/three storey developments.) Some of the buildings along the edge are undergoing transformations to support activities related to students but commercial in nature such as coaching institutes, typing colleges etc. The open spaces are loose and amorphous, with no hierarchy.

At present, the university finds itself in a state of unprecedented chaos. This has been the result of a variety of adhoc, unplanned and short sighted expansion programmes. The university has a variety of non-descript architectural styles. The first sight of the university campus is likely to generate mixed feelings. In the midst of lush green setting, some of the old heritage buildings are built in a colonial style comprising of domes and arches and wide verandahs. However, every inch of wall space within reach is covered with rude and crude lettering naming students, union candidates and slogans resulting in intense visual pollution.

In contrast to the older buildings in colonial architectural style, the newer generations of buildings, especially those constructed in last fifty years, find themselves in a very barren and bland settings. The buildings are totally insensitive to open spaces, scale and architectural style of older buildings, flouting every norm of appropriate urban and civic design. Much of the chaotic environment can be attributed to:

(1) the short sighted planning or no planning programs

(2) incontiguous university land holdings
(3) decentralized university facilities
(4) neglected buildings resulting in highly dilapidated structures

(5) scattered low cost class four staff housing units

(6) undeveloped parking and cycle stands at oddplaces
(7) lack of directional roads, paths, walkways and
(8) undefined and unstructured open spaces with little or no grass and barbed wire enclosures.

All the above conditions were on account of a tremendous resource crunch but after 2005, when the University became a Central University, consistent efforts and allocation of funds have been made in upgrading the existing facilities through organized repair and maintenance works undertaken by the University.

Vision and Themes for the Campus Redevelopment Plan

The campus plan is a vision for the physical future of the University of Allahabad. It was prepared in a process that engaged a broad cross section of people whose lives are closely linked with the campus, including students, faculty, staff, administrators, technicians and consultants. The plan's physical form represents a remarkable consensus, among the participants, about the qualities and values central to campus life. The emphasis for the development of a Strategic Framework was to develop a campus environment relevant for the 21st century which meets the future demands of the University. A detailed analysis of the campuses and their precincts can be summarized as under :

- The most highly valued asset of the campus is its magnificent heritage buildings, which should be the focus of campus spaces and more closely integrated into the patterns of circulation and use.

- The views of the heritage buildings should be an integral part of the design of both indoor and outdoor spaces throughout the campus.
- The many different academic disciplines and activities need to be bound together with a coherent and dignified system of open spaces and circulation. This is essential to promoting interdisciplinary dialogue and connecting the various parts of campus life through restructuring and by establishing appropriate landuses for various components of the campuses.
- A coherent system of pedestrian circulation well connected to destinations needs to be developed and conflicts between pedestrians and cars is required to be eliminated. The pedestrian environment thus created can be safe by efficient use of perimeter parking.
- A Sustainable Development Framework to guide the future development of the campuses, through use of appropriate technologies and management of systems needs to be developed.
- The design of buildings should contribute to the coherence of the campus in form, typology, scale and expression.
- The real estate value of the campuses should not be wasted with inefficient buildings, adhoc constructions and additions, temporary structures, or surface parking. The available resource needs to be optimally and efficiently utilized through structured development and allocation of Ground Coverage and FAR.
- The campuses should have a positive relationship with the precincts (the surrounding residential, commercial, and recreational areas) and the city of Allahabad.
- The challenge for the Campus Plan is to support the University in realizing those qualitative human goals which have universal appeal. Therefore, the Campus Plan attempts to establish the public and private realm and a pattern of common open space that can serve as a framework within which individual building projects can be developed. The regulating lines that define the public spaces should be respected. The buildings to be developed should be conceived as a means of creating public spaces as well as containers for academic functions and in this way each building will be another step toward realizing a common vision.
- This Plan builds on the efforts and vision of distinguished academicians, administrators and alumni whose vision and concepts which have been integrated into this plan and which are key to its form.
- The Campus Plan is described using three dimensional images of the spaces that can be created. These images can lead the process and serve as a reference to evaluate all proposals from this point forward.

An Approach towards an Integrated Campus Plan

The principle of linking the parts of the main Senate campus to the north and south campuses namely Chaitham Lines Campus, Muir Campus and part of the neighbouring community of Katra and Colonelgunj in the existing context, forms the basis for an Integrated Development Plan for the University of Allahabad besides defining appropriate uses for other properties owned by the University in the city.

The relationship between the three main campuses is not strong. Currently many students and staff live in precincts of the campuses wherein the University owns several properties and buildings. The University road has the opportunity to become a seam instead of a barrier, by developing compatible functions on the either side of the street, having tremendous urban development potential as this would provide an improved town-gown transition and provide much- needed high quality interface

The development and treatment of the university road and improvement of Chaitham Lines campus junction is an important part of this connection, and should be considered as a two-lane road with roundabouts in conjunction with other improvements to the traffic and as an interchange for public transport network. A magnificent landscape treatment is important to establishing the entrances to the Campuses.

The edge along the Muir campus, the University Road and Katra-Colonelgunj crossing is used mostly for parking and informal sector encroachments. The replacement of the existing off street surface parking with structured parking lots will result in creation of public space that take advantage of the views and strengthen the front door of the campus. Developing a public building at the edge of Katra-Colonelgunj junction and improvement of the node, can help to create a public square which can be an economic resource for the University and would be a transition between AN Jha Hostel and the student housing. The edges of the commercial

district also need to be upgraded with necessary facade improvements and street development to give a distinct character to the edges in order to enhance the quality of public spaces and its image through proposed urban design interventions.

The main Senate campus is one part of the overall UOA campuses. The north and south campus are primarily student housing and academic areas which should be better linked by a stronger framework of pedestrian and bicycle access, and a similar interconnected system of coherent open spaces and landscaping.

The Campus Planning Process

The Campus Redevelopment Plan process engaged Architects, Urban Designers, Landscape Architects and experts from Engineering Disciplines particularly Structural Engineering, Electrical, Public Health Engineering, HVAC Experts and a large cross section of the UOA community which included Students, Faculty, Administrators, and Non-Teaching Staff. The process was completed in three phases over ten months.

The first phase was a process of figuring out the existing conditions and collecting data. The process started in November 2006 with the collection of key information and establishing ground realities through detailed Physical Survey of all the properties using Total Station and developing base drawings on a digital format. The beginning of the campus planning process was a Campus and Building Audit conducted by a team of experts leading to detailed Urban Design Component Evaluation and Building Audit, which served as the basis for the Campus Plan. The design team visited the UOA campuses several times, documenting the campus and meeting with the campus community in a series of focus groups. Documentation included extensive drawings, photography, on site appraisal as well as analysis of campus spaces, appurtenant building spaces, building types, conditions of structures, entrances to campuses, circulation networks, pedestrian spaces, parking, infrastructural facilities, security systems, sports and housing facilities etc.

Focus group meetings included faculty, administrators, staff, students, and other campus community members. The analysis identified the strengths, weaknesses and opportunities of the campuses and subsequently resulted in formulating a vision for campus development. Also in the first phase, the design team compiled a series of parametric analysis drawings which examine the campus and its surroundings by its different systems using a systems approach.

A detailed Area Program was developed for all the Academic Departments, Central Core facilities, Staff and Students Housing, Sports and Recreational facilities and other supporting infrastructural services. The Building Audit identified the utilization of existing spaces and support services in each building. The future needs of all departments and projections have been considered towards development and rationalization of the Final Area Program. This document will form the basis for future development of each component of the university.

The recommendations of National Knowledge Commission Report 2007 and have been duly incorporated in the proposed allocation of areas for various components of the University.

The second phase of the process was exploring ideas and an intense working session which took place at the University during March April, 2006 through series of Working Group Meetings which identified and debated key issues for development .The participatory design process involved the input of many of the focus group participants from the campus community. A presentation to review the progress was given in the University followed by additional reviews and comments.

The advice of the Hon' Vice Chancellor was very valuable during the working group meetings and at every stage of design development besides, participation of the Registrar, Finance Officer, Senior Professors, Members from Planning & Development Board and the University Engineer, consistently facilitated the planning and decision making process.

The final phase of the process involved creating a Campus Plan, including design guidelines for the buildings and spaces on the campus. The Master Plan proposals for all the campuses were presented to the Planning and Development Board of the University in the Senate Hall on 9th October, 2007 by the Principal Architect and Urban Designer of Neev Architects Interior and Urban Design Consultants Pvt. Ltd. which was well appreciated and subsequently approval on the same was accorded by the Board. The schematics for infrastructural development along with implementation mechanism, phasing and scheduling was undertaken as part of the scope of work.

The portrait of existing conditions, illustrated on the forthcoming pages, is a compilation of the information gathered about the Campus. The

portrait shows land uses, open spaces, pedestrian and vehicular movement networks/parking, volumetric disposition, interfaces, conditions of buildings etc.. These analytical diagrams, pull the portrait apart into separate layers, examining each system separately. This analytical process, along with comments from focus groups, resulted in a set of core design principles, used to guide the design process and the preparation of the Campus Plan. The comparative diagrams on various aspects are presented to examine the outcomes of the Master Plan proposals and the existing realities.

Methodology for Campus Redevelopment

Existing Condition Analysis

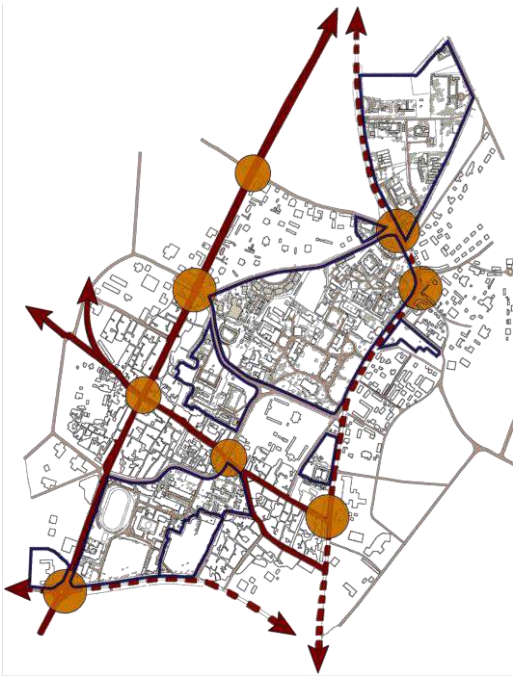
University Land Ownership

The university has ten campuses other than three main campuses distributed in the city falling under varied landuses and it is proposed to develop them as per prescribed

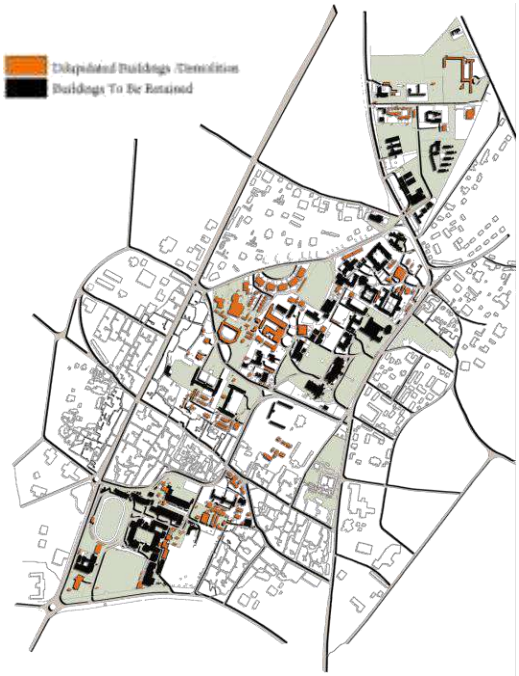
Master Plan guidelines and Zoning Regulations of Allahabad development authority.

Node Distribution

The campus edges are defined by thick vegetation, the scale is accentuated by the highway defining the districts. Activity nodes can classified into various types by virtue of the use and activity it supports but are weakly defined due to the amorphous spaces created between the forms.



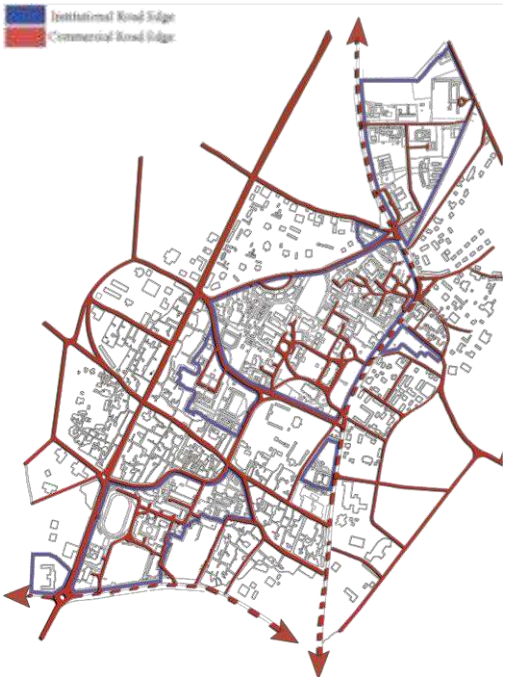
Condition of Structures



The typology of the campus is very similar to the adjoining urban fabric of civil lines with built form defined by spaces and courtyards to suit the climatic conditions. The old buildings such as the Vijaynagaram Hall and the Senate Hall are monumental in scale equivalent to ground+4 storey development while other buildings are generally low rise (ground+2 storey structures).

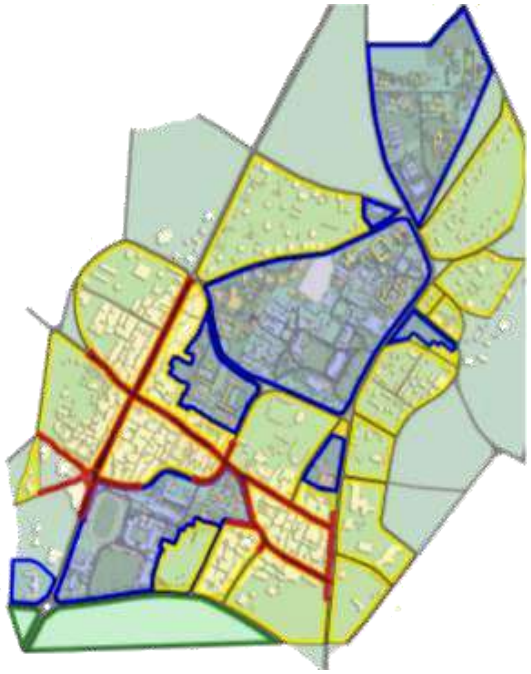
Major Road Network

The University has three distinct campuses namely the Science Campus, Arts Campus and the Law/Management Campus. The main edges of these three campuses are



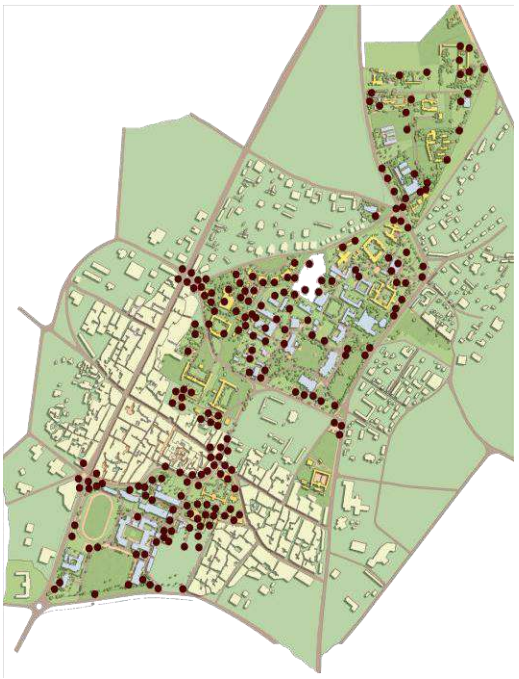
defined by the highways connecting Varanasi from Lucknow and Kanpur. These provide major linkages to the campus while Master Zahrulul Hasan Road, the major city arterial, also links the campus.

Interfaces and Edge Conditions

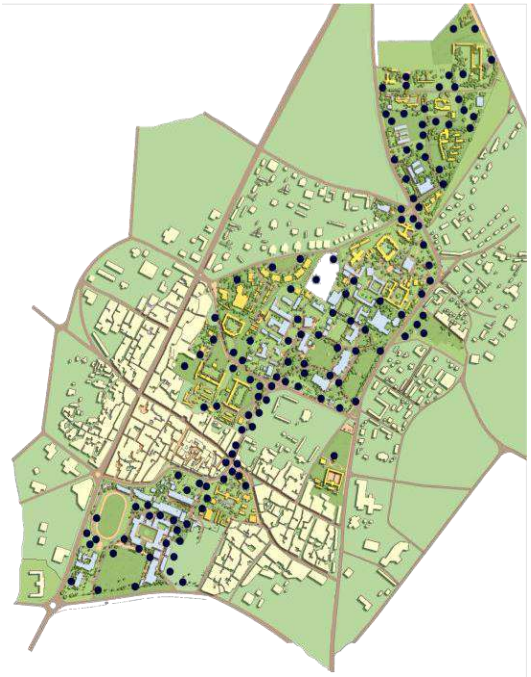


The University campus is truly an urban campus which was developed in phases in independent pockets of land dispersed as an integral part of the fabric of Allahabad. As a consequence of the above, the campus defines its district for institutional use but has interfaces with a variety of landuses, thereby creating very distinct edge conditions and street character.

Weaknesses



The detailed visual survey and discussions with the focus groups helped in identification of areas of weaknesses and strengths in the campus in terms of their physical perceptions, use and activity patterns supported by them. The outcome resulted in defining appropriate design strategies for these areas.



Opportunities

Existing Figure Ground

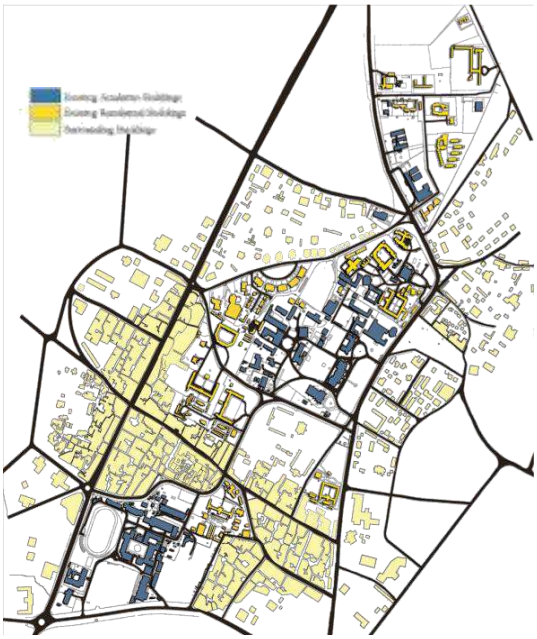
The typology of the campus is very similar to the adjoining urban fabric of civil lines with

built form defined by spaces and courtyards to suit the climatic conditions. The old buildings such as the Vijaynagaram Hall, the Senate Hall are monumental in scale equivalent to ground+4 storey development) while other buildings are generally low rise (ground+2 storey structures).

Proposed Figure Ground

The new Master Plan attempts to retain the existing typology with internal spaces created as courtyards and more intimate spaces as part of Academic Departments. The Plan proposes structured and designed parcels of land created through integration of movement systems and open spaces. The footprint has been developed to create a well-defined spatial structure.

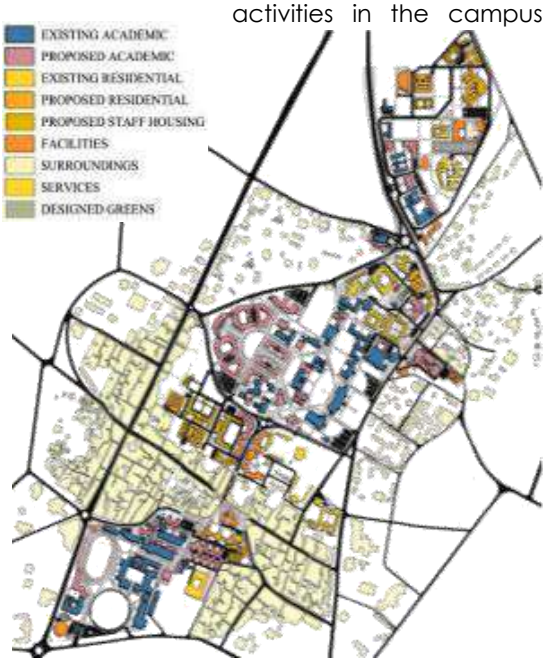
Existing Landuse



The campus structure is characterized by amorphous spaces and incoherent built form. The spaces are not contained and tend to lose scale. The faculties of Arts, Science and Law are distributed in three different campuses with 15% housing available for the students and just about 5% for the staff. The facilities within the campus are inadequate such as livable space, recreational space, parking, etc.

Proposed Landuse

The Campus Redevelopment plan has attempted, restructuring of spaces and detailing the overall spatial structure of campuses. The revised landuse pattern specifies concentration of academic activities in the campus



core with additional assignable FAR for new programs and expansion of academic and research facilities and expanding staff housing to other nearby properties though retaining student housing & sports within the campuses.

Existing Volumetric Disposition

The entire bulk disposition of the site is extremely unbalanced which is a consequence of adhoc developments and have no definite campus planning strategy. The buildings are loosely placed without any relationship to the adjoining buildings having amorphous appurtenant land. There is no defined scale and no definite massing in the campus.

Proposed Volumetric Disposition

The new Master Plan attempts to retain the existing typology with internal spaces created as courtyards and more intimate spaces as

part of Academic Departments. The Plan proposes a maximum foot print of 30% & FAR of 1, resulting in G+2 storey structures & thereby controlling the height of buildings to retain the landmark quality of heritage buildings.

Existing Road Network

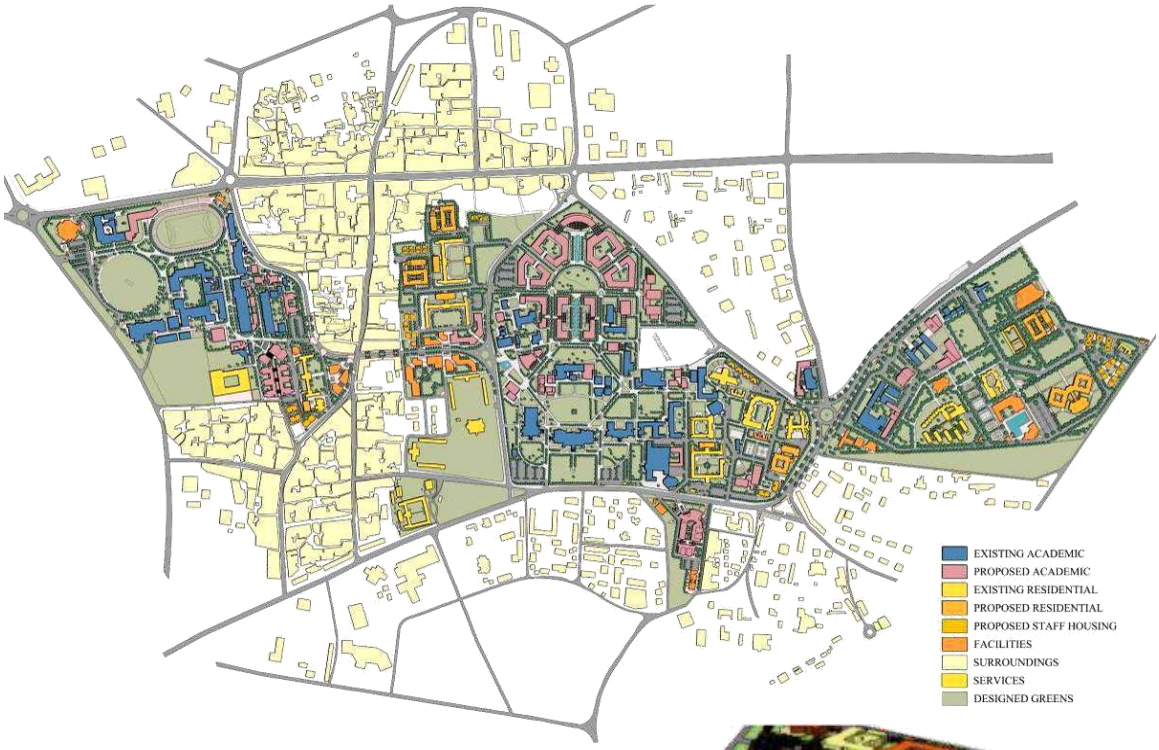
The use of bicycles and two wheelers are predominant mode of transportation and conflicts with pedestrians has been eliminated in the Senate campus but there are no controls in Muir and Chaitham Lines campuses leading to conflicts in circulations with pedestrian movement. There is no defined hierarchy of movement in the campuses.

Proposed Road Network

A system of peripheral road network is proposed in the Master Plan connected to the parking lots and the central areas have been

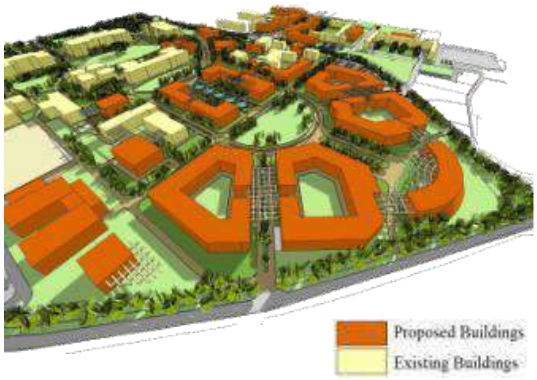
pedestrianized and have been kept free from any vehicular movement. The structure plan articulates the pedestrian movements with open spaces and built form to provide a rich experience of spaces to the academic community.

Building a Great University Campus



The present campus has a rich variety of spaces and a diverse collection of buildings which fail to create a coherent environment. The values, which emerged so clearly in this planning process, are the values stated in the preface to all previous planning efforts. Both the funding and implementation processes are so focused on individual buildings that these overall goals are achieved.

In the future the major public spaces will create a large scale order for the campus, within which the rich collection of smaller spaces and diverse buildings can be more logically and coherently organized. Although there is a perception that the campus is built out, implementation of the Campus Plan results in an additional 783413.72 sq.m. of assignable built up space while creating an orderly arrangement of buildings and expansive open spaces. The open spaces will frame views to the Heritage Buildings, providing direct physical and psychological connections to the extraordinary rich architectural marvels within the campuses.



Development Potential

The restructuring of grand campus spaces and the clarification of circulation networks results in a series of development blocks. Many blocks have existing buildings while others are proposed for development. The creation of well-defined blocks allows for the orderly arrangement of new buildings and additions to existing buildings. The Structures which were dilapidated or were inefficient have been identified as part of the phased renewal plan and clearing. The development potential of

the Campus Plan is calculated assuming a Floor Area Ratio (FAR) of 1 and a building coverage of 30%, which results in an average building height of three stories. This would restrict the Maximum height of the buildings to G+2 stories and would result in retaining the landmark image of heritage buildings.

Total balance ground coverage: : 230880.32 sq.m

Development potential at FAR 1 & 30% coverage: 783413.72 sq.m

Development potential at 65% efficiency of buildings (Net carpet area): 509218.91 sq.m

Net gain: 526766.10 sq.m

Redevelopment Proposal

The university has already proposed an elaborate Conservation and Preservation Plan for the heritage buildings through INTACH. The developmental plan recognizes the value of these buildings having great architectural value. Therefore no new building is proposed around 100m of these buildings other than the existing structures. The structure plan has been developed with heritage buildings as main landmarks and foci. The spaces within the campuses have been articulated to compliment the scale, volumetric disposition and architectural quality of the buildings with respect to the existing context and provide greater legibility and permeability. The space addressing the heritage buildings is proposed for development as part of landscape plan complimenting the scale of the buildings and the architectural quality. However, the existing structures constructed as additions for e.g. Physics Department extension, having no respect for the context, is proposed to be redeveloped with matching fenestrations.

The Comprehensive Master Plan proposes a Sites and Services approach for development wherein all the circulation networks, campus services, development of parcels of land will be undertaken. All the proposed buildings will be constructed in the parcels after development of campus infrastructure as part of the relocation plan, in phases. The departments under relocation or to be provided with new buildings will be shifted to the new premises before demolition of the existing dilapidated structures. The campus green areas which are not in conflict with any proposed construction will be developed simultaneously as per the proposed landscape plan along with horticulture, lighting etc.

Academic Areas

MUIRCampus

It is proposed to create additional spaces in buildings, wherein the condition of the structure is good and can take mezzanine floors to create additional usable spaces. It is also proposed to create additional spaces for cognate departments within the vicinity of the departments having the same resource

utilization. It is proposed to create a new block for physical education and also provide independent buildings for departments which currently share the same building such as Bio Chemistry and Home Science Department.

The department of Defense Studies will also be provided with new building in order to create more space for mathematic and statistic department. The plan proposes to create additional, advanced research facilities for the physics and applied physics department by clearing the USIC building.

The University can acquire, for its use, the building currently with IIIT as part with Nehru Science building, for the expansion of allied departments. The extensions proposed to the chemistry, geology and botany departments have been provided to efficiently utilize the appurtenant space by relocating small nurseries, animal houses and other temp. structures to create an improved spatial structure. It is also proposed to create a new library for the Science faculty after clearing the services area, which is currently not in use.

A Lecture Theatre complex comprising of 9 lecture theatres for under graduate teaching is proposed in Muir campus along with Deans Office and Proctors Extension Office and Placement Cell and it is proposed to restructure internal spaces in various departments generated after relocation of classrooms to be utilized for new PG Programs and Research Facilities/Lab and Faculty Rooms, Departmental Libraries and IT Facilities.

Senate Campus

The Strategy for Conservation of Heritage buildings and integration of the same as landmark buildings and Visual Foci forms the basis for structure plan of the campus. It is proposed to create additional spaces in buildings, wherein the condition of the structure is good and can take mezzanine floors to create additional usable spaces. It is also proposed to create additional spaces for Cognate Departments, Institutes and Schools of Learning offering programs at PG/M.Phil/Doctoral levels within the vicinity of

the departments for efficient resource utilization.

It is proposed to create a new block for Departments of Journalism and Mass Communication, Tourism, Economics, Medieval and Modern History, Philosophy and Academic Building in the Women's College Campus, Extensions to Ancient History Departments, Visual Communication, Fine Arts, Photo Journalism and create independent buildings for departments which currently share the same building.

It is proposed to provide a University Centre for Information Technology for managing the central networking facility of all the campuses along with Satellite Communication network, one section in the same building will be provided for all Confidential Work of the Examination Section and other Administrative functions. The plan proposes to create additional, advanced research facilities for department by clearing all the Staff Housing from this campus and GN Jha Hostel in a Phased manner. The University can acquire for its use the Hindu Hostel campus for the expansion for allied department.

It is also proposed to upgrade and refurbish the Main Library in the Arts Faculty which also is nodal centre for Networking with other Libraries in the country and abroad. This library will have the main administrative control of other proposed Libraries in Science and Chaitham Lines campuses.

A Lecture Theatre Complex comprising of 12 Lecture Theatres for Under Graduate Teaching and departmental extension offices is proposed in FCI Campus along with Dean Students Welfare Office, Proctors Extension Office, and University Information Centre along with Public Relation Officers office and it is proposed to restructure internal spaces in various departments generated after relocation of classrooms as an attempt towards capacity building and the above spaces will be utilized for new PG Programs and Research Facilities/Lab and Faculty Rooms, Departmental Libraries and IT Facilities.

The Dean's office and Proctors Office Setup in each Campus needs to be established in an appropriate manner and Executive areas need to be well defined.

ChaithamLinesCampus

It is proposed to create additional spaces in buildings by constructing additional floors, wherein the condition of the structure is good. It is also proposed to create additional spaces for cognate departments within the vicinity of the departments having the same resource utilization. It is proposed to create a new block for the Centre for Intellectual Property Rights and Integrated Law Program. It is proposed to provide independent buildings for new proposed allied departments/ disciplines such as Retail Management, International Business, Actuarial Sciences, and Resource Management etc. in the campus. The plan proposes to create additional, advanced research facilities for the Management and Commerce Departments.

A Lecture Theatre Complex comprising of 6 Lecture Theatres for Under Graduate Teaching is Proposed in Muir Campus along with Deans Office and Proctors Extension Office and Placement Cell and it is proposed to restructure internal spaces in various departments generated after relocation of classrooms to be utilized for new PG Programs and Research Facilities/Lab and Faculty Rooms, Departmental Libraries and IT Facilities.

FCI Campus

It is proposed to create Lecture Theatre Complex comprising of 12 Lecture Theatres for Under Graduate Teaching and departmental extension offices in the FCI Campus along with Dean Students Welfare Office, Proctors Extension Office, and University Information Centre along with Public Relation Officers office and Academic Section. This facility will also have an E- Learning Centre along with Seminar Rooms with Video Conferencing facility to organize Special Lectures and conduct interaction with Professors from other Universities. The above will also have a Food Court for the use of staff and students keeping in view the strength of students.

Computer Centre and National Centre for Experimental Mineralogy and Petrology

It is proposed to provide a University Centre for Information Technology to manage the centralized operations for all the Campuses and relocate the current Computer Centre to the Senate Campus and create more space for expansion of Department of Experimental Mineralogy and Petrology and for NCEMP.

Sports and Recreational Facilities

MUIRCampus

The existing facilities in the science campus will be upgraded by developing a new Cricket

Ground in front of Vijaynagaram Hall while the athletic stadium will be upgraded with Change Rooms, Rest Rooms and a score board besides up gradation of viewer's gallery and seating arena. This will accommodate Football and Hockey grounds .A State of the art Gymnasium and Aerobics hall is proposed as part of new Physical Education Block. The Athletic Association building will be conserved and preserved.

Residential Facilities

Students Housing

Development strategies for Student Housing in view of a Residential University have been formulated particularly in terms of the Heritage value of old Hostel Buildings and their restoration and preservation . It is proposed to provide State of the art hygienic Mess/ Dining Facilities, recreational facilities in all hostels and up gradation of existing facilities (Rooms and Toilets/External Services) to make conditions live-able. It is proposed to retain PG Students /Research Scholars in old Hostels like PCB/SSL/AN Jha/Diamond Jubilee as rooms with single occupancy after up gradation and preservation while all the new proposed hostels in science and arts Campus can be provided to UG students.

It is also proposed to generate space for development by combining the Chief Warden/Asst. Warden along with support staff residences as Cluster Housing near the Hostels as walk up apartments as proposed in Belifarm campus.

It is estimated that in the future about 80% of the students will be demanding Hostel Facilities and the University will be required to provide adequate infrastructure.

Senate Campus

It is propose to provide Indoor Sports facilities such as Billiards, Table Tennis, Carom and Chess etc. A Students Hobbies Clubs as part of the Central facility for the University is proposed near PCB Hostel

ChaithamLinesCampus

It is proposed to provide state of the art Sports facilities such as an International Size Swimming Pool, Indoor Badminton, Wrestling and Squash Courts along with Lawn Tennis, Volley Ball, and Basket Ball Courts in the Chaitham Lines Campus.

Additional New Students &Staff Housing

MUIRCampus

An annex is proposed to the AN Jha Hostel for

additional 100 students.

SENATE Campus

It is proposed to provide two more Boys Hostel near PCB and SSL Hostel with a capacity of 250 rooms each with integrated Mess and Recreational Facility. Each Hostel will be equipped with E-Centers having Internet Connectivity. The Rooms have been designed as per UGC Standards with inbuilt Storage space and a balcony shared between Two Rooms.

Additional Rooms are proposed to be added to existing Hostels in Women's Campus particularly in Priyadarshini Hostels and a new Hostel with a capacity for 250 Students is proposed with similar facilities as above.

ChaithamLinesCampus

It proposed to create additional student housings for 900 students by adding one new PG Hostel (300 students) behind International Hostel and one Hostel for 600 UG students after clearing of Pant Hostel. The existing Shatabdi Hostel will be upgraded and completed to add to the existing housing stock. A new block is proposed to be added to the existing International Hostel for married students (Research Scholars) and the facility will be upgraded. The requisite number of Staff Housing as Cluster Housing will be provided for

Wardens along with Type II Housing for Supporting Staff.

Transit Hostel and Conferencing Facility, ShielaDharInstitute Property, near Mumfordgunj

It is proposed to develop Visiting Professor's Transit Accommodation with Conference facilities at par with International standards near the Shiela Dhar Institute land.

BelifarmStaffHousing

The BeliFarm is proposed to be developed as Low Rise High Density Housing –Type-III to Type VI (As per GOI Guidelines) as per Allahabad Master Plan Zoning regulations for Faculty and Staff Housing Purposes. It is proposed to construct 328 Units on this Campus in various categories.

PuragarediaHousing

The Puragaredia Land is proposed to be developed as Low Rise High Density Housing for Non Teaching Administrative Staff in

various categories (Type-III-Type VII). All the other campuses other than the three main campuses are proposed with land-uses as per the Master Plan of Allahabad. This land also has the capacity to accommodate about 300 more housing units.

Core Facilities and Services

It is proposed to provide certain common facilities as a part of Core Campus facility such as an Auditorium for a capacity of 600 persons, an amphitheatre- 500 persons, Resource centers with Information and Placement services.

A commercial precinct at Katra –Colonelgunj junction near AN Jha Hostel is proposed as an attempt to generate economic resource for the University besides being a facility for the benefit of staff and students.

It is proposed to provide students hobbies clubs as part of the central facility for the University near PCB hostel.

It is proposed to relocate the University Hospital from Muir Campus to Chaitham Lines and is proposed to provide state of the art health care facility with a 50 bedded University Hospital with all diagnostic facilities and a medical ICU.

Sewerage System

The complete sewerage system of all campuses needs to be restructured and redesigned with biological waste treatment plants and recovery systems, such as a biogas plant in each campus, detailed Engineering and Technical guidelines for which needs to be developed. The waste water outfall rich in organic nutrients will be utilized for horticulture. The biological waste treatment system is used to reduce the volume of black water entering the municipal system. The alternative includes aerobic treatment system, solar aquatic waste system (or living machines), composting or ecologically-based toilets, etc.

Water Supply System

The water supply system for each campus will be supported by a grid system with bore wells and underground tanks, three to four in each campus, depending upon total water requirement, integrated with filtration and Chlorine dozing plants. It is proposed to recharge the ground water through integrated rain water harvesting system for all the campuses. The underground tank capacities are planned with adequate fire reserve with an up flow system design supporting the fire ring. All the campuses will be provided with Garden and Fire hydrants.

Electrical System

The Electrical System is proposed to be augmented with separate Unitized ESS's with a Ring Main Units in all campuses sourcing HT supply from 33kv Substation, proposed by UOA, with underground cable networking. The ESS shall be provided with step down transformers of 11000V to 440V and LT cables shall feed a network of Feeder Pillars for distribution of power to respective buildings. The Captive Power requirement shall be provided as per Electrical Demand Load with respect to Lighting, Power and Air conditioning loads on a Power Load Sharing

System. The existing substations will be upgraded and a minimum of three substations are proposed in each campus keeping in view the power loads and corresponding land use.

Waste Management System

A waste management system for garbage disposal will be provided. The entire garbage will be categorized into Bio -degradable, Non Bio- degradable and Recyclable waste.

Communication System

The Communication System integrating all the campuses is in progress with a Centralized EPABX Exchange and it is proposed to provide Fiber Optic connectivity for Networking, and satellite uplinking will the provided as a part of comprehensive integrated system for all academic and administrative departments and to all students hostel and staff housing provided on campus. This facility will also be provided in other residential campuses also.

A comprehensive landscape plan has been developed with detailed horticulture guidelines keeping in view the existing plantation on campus and landscape will be provided to compliment the structures. It is proposed to provide plant species using the regional bio diversity and the planting pattern has been detailed to create boulevards and avenues as part of the Campus Development Plan. The soft areas would be provided with green cover while other public spaces will be created as Plazas with variety of paving material, water bodies, sculptures, planting beds and landscape lighting. The transition spaces as part of the movement system will be provided with urban furniture elements and are to be utilized by students and staff as interacting spaces.

Water Management System

The development strategies include the systems to reduce building water use by the use of Infra Red Water Sensors and delayed action shut off or automatic shut off valves. Low flow toilets, waterless urinals, low flow kitchen faucets and shower heads and optimizing line losses and return cycle of over flow from overhead tanks to the main supply tanks will be used.

Energy Efficient Technologies

Energy Efficient Technologies are suggested as part of Comprehensive Master Plan Strategy towards long term sustainable development. The strategies for efficient energy use would include optimization of building envelope thermal performance, provide day lighting integrated with electric lighting control, use of an effective lighting system and control, maximized mechanical system performance and use of efficient equipment and appliances. The plan also proposes to use energy sources with low environmental impact by the use of Photo Voltaic cells, solar water heaters, etc.

Security Systems

An effective security and access control system is proposed for all campuses which include SWIPE CARD ACCESS CONTROL, BOOM BARRIERS, CCTV'S and IR detectors. The identity cards will be provided to all the staff and student for access into the campus. The boundary walls and general lighting on boundary walls will be provided and a complete security management plan will be implemented in consultation with the appointed security agency.

Urban Furniture/Signages &Lighting

Detailed Designs have been developed to provide Distinctive and Designed Urban Furniture, Signage and Street Lighting for UOA

Campus. The Plan will integrate Landscape Design, Surface treatments, Landscape Elements and Lighting of the Buildings. The design for Boundary wall, Drinking water Fountains and Entrance gates have been prepared for the University.

Material Resources

The strategies for effective utilization of materials and resources and waste include

reduction in consumption of material resources, which are non renewable. Minimized waste generated from construction, renovation and demolition of buildings by reuse and recycling of materials can be utilized for construction purposes. The strategy also specifies use of material with low life cycle cost in order to conserve embodied energy of material and utilized the locally available materials. It is also suggested to encourage better management of waste and minimized waste generated during building occupancy.

Indoor Environment Quality

It is proposed to provide effective lighting, vibration and noise control in buildings and provide views to the exterior from the interior work spaces, thereby providing a connection to the natural environment. The indoor air quality shall be maintained through HVAC system along with moisture control and provide ample ventilation for pollutant control and thermal comfort. It is also proposed to use low volatile organic compound, emitting materials.

New proposed buildings

CENTRE FOR FOOD TECHNOLOGY

LECTURE THEATRE COMPLEX, MUIR CAMPUS

Salient features of comprehensive master plan

LECTURE THEATRE COMPLEX-FCI CAMPUS

The development of Structure Plan for the University of Allahabad campuses is an outcome of very detailed analysis of existing typologies of spaces, architectural expressions and built form characteristics besides other morphological aspects. The plan recognizes

the great Architectural Heritage as a predominant asset of the university and the entire planning gives due emphasis, through structuring, to these significant structures. The developmental guidelines have been prepared with the above focus.

Open Space Structure

The current open space network of the development parcels, parks, greens, quads and courts are perhaps the most valuable asset of the UOA campus. The existing open space network is confusing and does not have a clear hierarchy. The Campus Plan solves problems identified through the analysis and responses of the campus community and

identifies a number of key open spaces and disposition of built form which define the character of the campus. The open spaces are defined by existing buildings and important view corridors which define sites for new buildings and for additions to existing buildings. The framework of open space also defines zones for circulation of pedestrians, bicycles, and motorists. Studying the plan by its different elements clearly defines the limits within which new development projects can fall. The open space structure establishes the hierarchy of major parks and malls as well as paseos.

Circulation Networks

The existing campus street network does not support an orderly, beautiful campus. The

existing perimeter city streets are wide but not efficient .The existing street systems are proposed as feeders to the entrances and parking lots of the campuses. The center has been made traffic free and all spaces are connected through pedestrian networks. This will enhance better security within the campus as all access control facilities are proposed to be created at the access points. The Campus Plan calls for improving the existing street geometrics and development of verge, footpaths, signage, lighting, horticulture and urban furniture elements including public facilities and development of intersections using public art installations by appropriate traffic planning principles, treatment of edges, drop off locations, bus stops, parking lots etc. The internal pathways have been designed as boulevards with public art and landscape elements as intermediate markers to provide legibility and association with spaces.

The major buildings of the campus have been located as visual foci and have been used as a structuring tool. The widths of pathways have been designed on an average of 3-4m which can be used to move vehicles such as Ambulances or Fire Tenders incase of any exigency.

The proposed changes to peripheral city roads will increase the capacity of the system sufficiently to relieve congestion and to support the anticipated growth of the campus. The University road, the Bank road and Chintamani Ghosh road can be developed with double lanes supporting one way traffic system to act as a loop to the Jawaharlal Nehru road (Lowther road) which

needs to be developed as a major arterial road with three lanes on either sides of the central verge.

The same improvement is suggested for the Kamla Nehru road and main national Highway along science campus as the volume of traffic is very high. It is preferable to provide 7.5m service roads along the highway. Reconfiguring the intersections as traffic circles greatly increases their capacity and is suggested at the Bank road and JLN road intersection. The city development authorities need to urgently improve the traffic networks, design of roads and geometrics as it involves the safety of large number of students and other citizens. The movements and trips are generated as major activity cycle is generated by the UOA.

Parking

The proposed parking plan for UOA campus is proposed as a peripheral parking system with parking lots located on the periphery of the campuses fed by a system of internal peripheral road or specified entry points to the campuses for access control and effective security management. This perimeter parking strategy is positive for pedestrian circulation as the campus core is free of vehicular traffic, but the surface parking lots consume a lot of

valuable developable land therefore, for new extensions it is proposed to provide basement parking for ticketed cars of the faculty.

Key Elements of the Campus Plan

The disorderly and cluttered form of the existing campus is transformed into an orderly sequence of grand campus spaces enabling the addition of potential assignable built up areas while creating a more open and spacious campus. There are two critical elements in achieving this transformation, firstly, the immediate replacement of dilapidated buildings with new appropriately designed buildings with a firm commitment to the architectural controls and developmental guidelines for each campus. Secondly, when individual buildings are proposed, they should be designed within the framework of open space and development parcel specified.

The Campus Plan includes a series of new building sites, areas for additions to existing buildings, and a network of circulation for all modes of travel. The main spaces of the transformed campus are detailed as under:

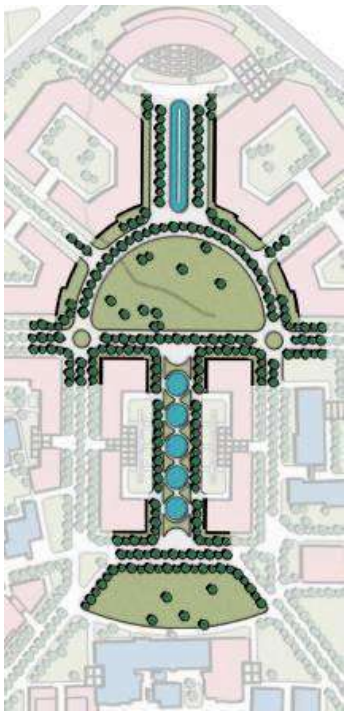
• Muir Mall and Muir Plaza
• Senate Square and Quad
• Campus Crescent
• Library Mall
• Chaitham Greens and Shatabdi Square • FCI Development
• Belifarm residential development
• Delegacy Square
• University Road Development

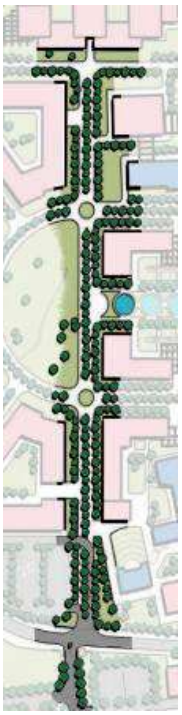
Public Spaces of a Great Campus

The central goal of the Campus Plan is to provide a coherent system of open space that is appropriate for a respected University and which facilitates communication and access among all parts of the campus. The Plan recommends the early implementation of four key spaces which establish the framework for developing the campus. Each of these spaces will have a unique character and function. They are:

- Muir Mall and Muir Square - A grand entry space leading from Muir Road to Library Plaza with Transition forecourt of Muir Square addressing the Vijaynagaram Hall.
- Senate Square and Quad - A busy public space addressing the University Students Union building, north - south pedestrian senate street running from University Road to the Senate Hall and the main quad, large formal green space consisting of the Great Banyan Tree.
- Chaitham Greens - Large central public space between academic zones and residential areas developed as formal green park.
- Library Mall - A linear park from Darbhanga Hall to the Central Library.

Site Area: **346 acre**
Masterplan: **2008-2023**





Greenfield - Development of New Campuses

Case study 1: Nalanda University, Rajgir
Ar.B.V.Doshi and Rajiv Kathpalia –
Vastu ShilpaConsultants
2013 - Ongoing

Positioning through self-referential accretion

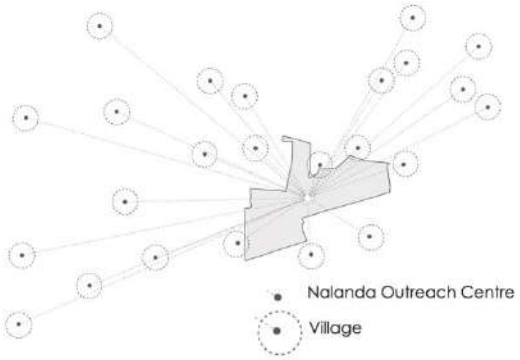
Nalanda University is envisaged as the campus of the future, positioned at the forefront of global education and the hub of intellectual excellence. Equally, the master plan of the campus must be an iconic beacon that attracts global attention for adopting sustainable methods to achieve social and economic integration with the local community.

The location of the campus, in a predominantly agricultural area, implies a larger impact on the adjacent areas. It is bound to transform the land use pattern of the surroundings through the creation of supporting infrastructure and linkages, resulting in the creation of a large tract of gated islands within the ever-expanding sprawls, disrupting natural connections between surrounding villages. This, in turn, will impact the very survival of the farmers with small land holdings.

The master plan integrates sustainable practices at every phase of the project, from site planning of the campus through the creation of infrastructure, cost-effective ways to both reduce consumption of natural resources and minimize dependency on off-site building materials. The plan allows for incremental growth and flexible expansion and phasing, while preserving the agricultural and environmental basis of the region.

Diagram highlighting interconnectivity of resources

The intent is to create a model campus plan that aims to replicate the spirit of Nalanda that endured in its relevance for 800 years by embracing environmental strategies that are



simple, efficient, and appropriate to the place.

There is a need for the university to engage with inhabitants from surrounding villages by opening its doors. To ensure ecological and economic sustainability of the region, a large part of the campus is reserved for development and dissemination of information about modern practices in agricul ture and biotechnology.

The plan reserves a large tract of land within the campus primarily for advancing agriculture as the area's major economic engine. It proposes setting up a research centre that will focus on ecological research, demonstrating advances in biotechnology and agriculture practices, fulfilling Nalanda University's outreach objectives.

The whole master plan in itself is transitional, as it demonstrates the integration of the campus into a large eco-system of the site. The plan aims to combine state-of-the art technologies with planning principles of erstwhile Nalanda University to create a carbon-neutral and zero waste campus.

The soil collected from excavation of the lake and other water features can be used for producing compressed stabilized earth blocks. In addition to these principles, there is a whole palette of ideas operating at different scales, from the scale of individual cluster, to the scale of the campus, to the scale of individual building. The ideas include the cooling as well as cleaning of air through the use of selected native plants and lowered microclimate around the water bodies.

The wastes collected from within the site and from the neighbouring villages are used as biogas to produce electricity with the help of the Combined Heat and Power Engine (CHP). This, along with the solar panels help to meet the air-conditioning and electrical requirement of the campus throughout the year.

PLANNING THEMES

Generative principles that define the master plan include ecologicalintegrationwiththenaturalsetting,

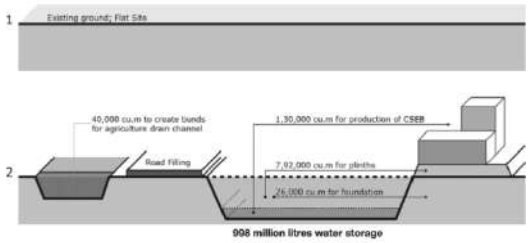


Diagram highlighting land and water management system

diversity of land uses, and permeability through the site, dense and compact character of the built form, visual cohesiveness, and scale compatibility with the surrounding land subdivisions.

A 455-acre campus is planned for an eventual 7000 population. It is composed of three primary land use elements: the academic facilities, student/staff housing, and the campus preserve to advance agriculture as the area's major economic engine.

Like many historic settlements, a lake forms the epicentre of the campus. After careful analysis of the terrain and the flooding pattern of the site, the creation of a manmade lake that feeds on a network of storm water channels was suggested. By using permeability as the main theme, the plan seeks to accentuate the existing linkages that pass throughsite connecting the surrounding villages.

The different components of the campus are clearly articulated as interconnected clusters grouped around the lake. All the buildings are positioned along the water networks, thus creating a generative system that can grow in small increments. Each cluster could be developed separately and independently. The balanced public space structure, together with a diverse program and sustainable infrastructure systems, create a high quality environment with a near-zero to positive total energy.

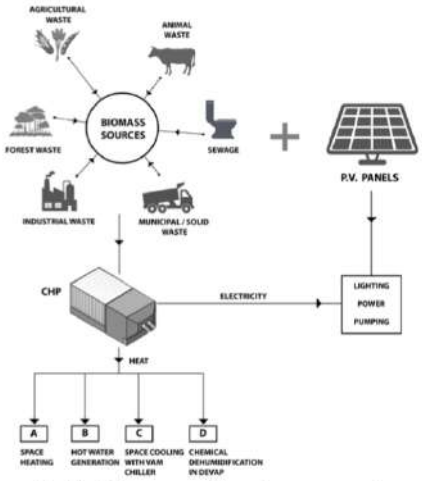


Diagram highlighting generation of energy on site

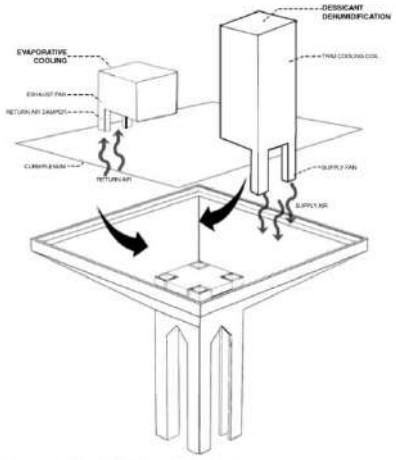
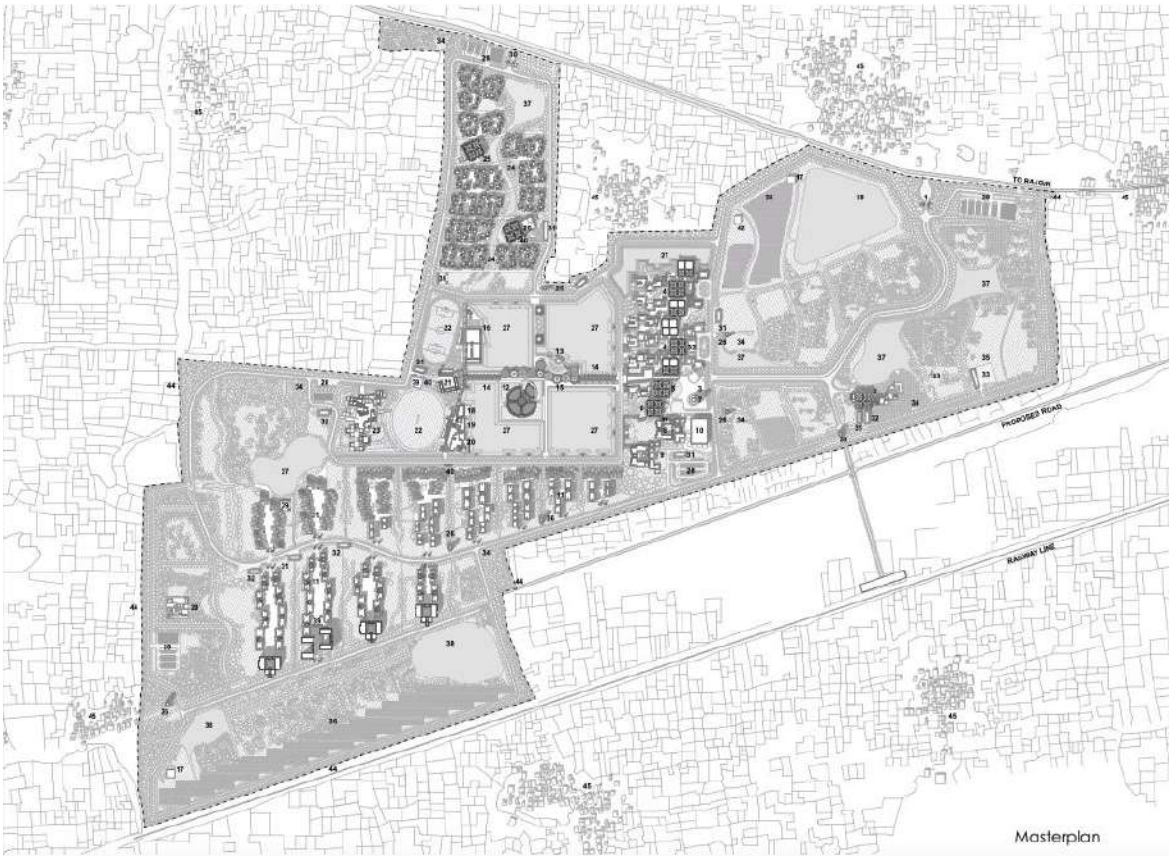


Diagram highlighting (D) DEVAP system

By limiting vehicular access to the perimeter of the site, the plan enables 80% of the campus to be reached by walking within 10 minutes. Combined with pedestrian and bicycle friendly pathways, this network connectivity links academic facilities with residential quarters, recreational facilities, green areas, and cultural amenities. Electrical or bio-fuel vehicles will transport people around the campus.

Tech energy saving methods. Fundamentally, it is addressed through orientation of buildings along a north- south direction and surrounded by water features reminiscent of the Nalanda ruins. The campus grid is angled to maximize cooling breezes off the lake. The plan allows for infrastructure implementations in phases.

More than seventy five percent of the land is open, made up of the campus reserve and landscaped public spaces. Collectively, these areas help to recharge the aquifers, in addition to harvesting rainwater from roads and rooftops. The proposal aims to recycle 100 percent of water used on the campus.

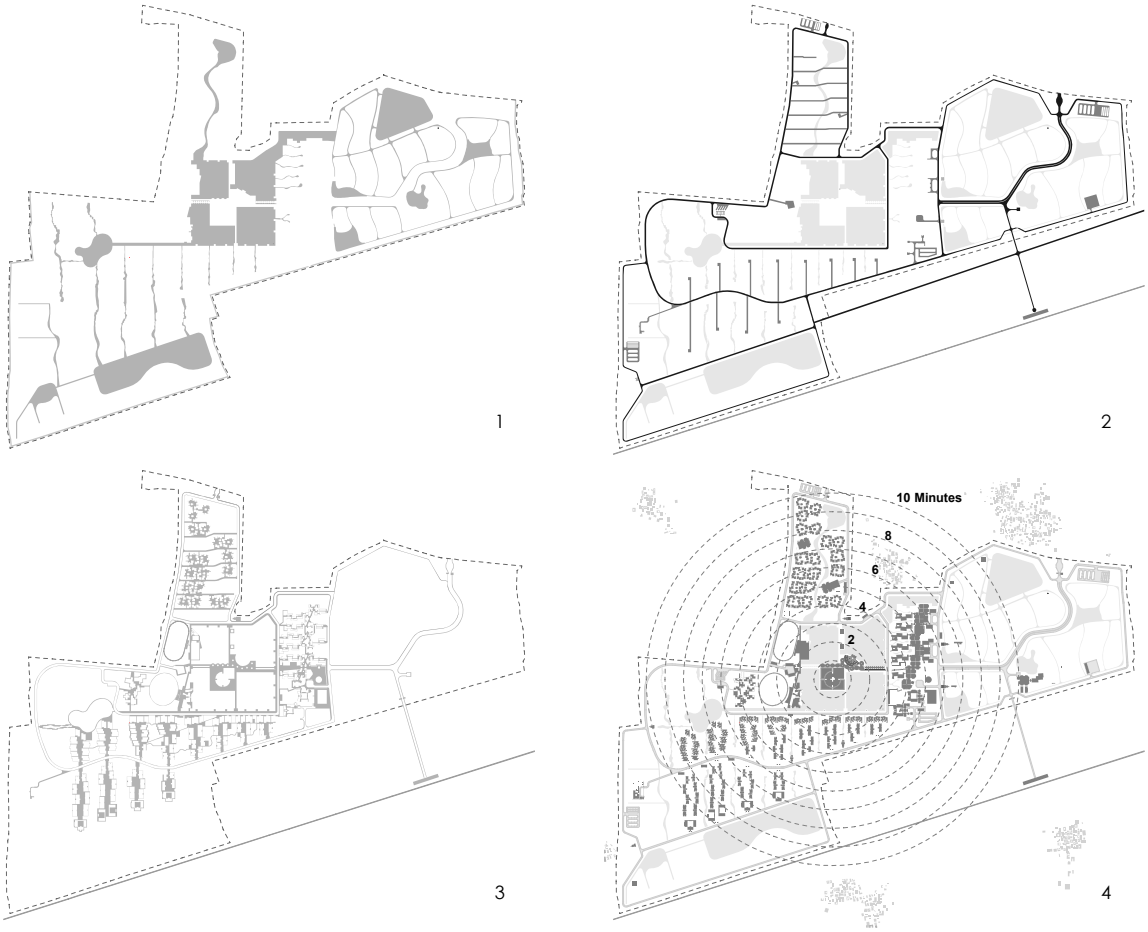


Masterplan

LEGEND

1. Main Entry
2. Administration Building
3. Entrance Plaza
4. Academic Building
5. Inter-Relation Office and Controller of Examination
6. Communication Center
7. Museum(Phase 2)
8. Campus Inn
9. International Center
10. Auditorium(Phase 2)
11. Faculty Housing
12. Library
13. Amphitheatre
14. Campus Amenities
15. Student Center
16. Sports Center
17. Central PV Station
18. Multipurpose Hall(Phase 2)
19. Faculty Club
20. Infirmary
21. Commercial Market, Bank and Post Office
22. Sports Field
23. Teaching Block
24. Student Housing
25. Dining
26. Elevated Service Reservoir
27. Kamal Sagar
28. Parking
29. Vice Chancellors Bungalow
30. Other Entries
31. Substation/s
32. Chiller/s
33. Main Receiving Station+Yard
34. DEWAT System
35. Space for Bio Gas Plant
36. Solar Farm
37. Ahars
38. Balancing Tank
39. UG Drinking Water Tank
40. Fire Tank/s
41. Proposed Railway Station
42. Central Receiving Centre
43. Mock Up Gopuram
44. Edge Drain

Nalanda Administration block



1. diagram showing the water network 2. diagram showing the vehicular network 3. diagram showing the pedestrian network
4. diagram showing the built character and walkability

Nalanda Acedamic blocks facing Kamal Sagar

Visulaization of the Proposed Campus, Academic Building in the foreground

Case study 2: IIM Udaipur
Ar. B.V. Doshi and Rajiv Kathpalia, Vastu Shilpa Consultants, 2013 - Ongoing

Preamble

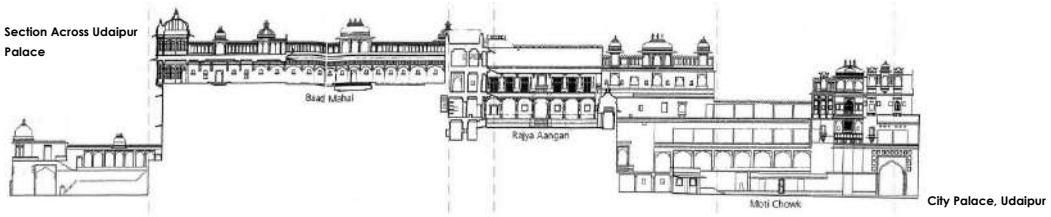
About 8 km from the old city of Udaipur, the site for IIM Udaipur is relatively isolated. The existing landscape on the 300 acre site is full of sharp slopes and deep valley's. Through extensive grazing, the native flora is damaged and un able to retain water. Monsoon rains transform the area for a short while, but water quickly drains away, so that the land is left arid again. The relative isolation of the site also meant that no existing water, sewage or electrical connection existed.

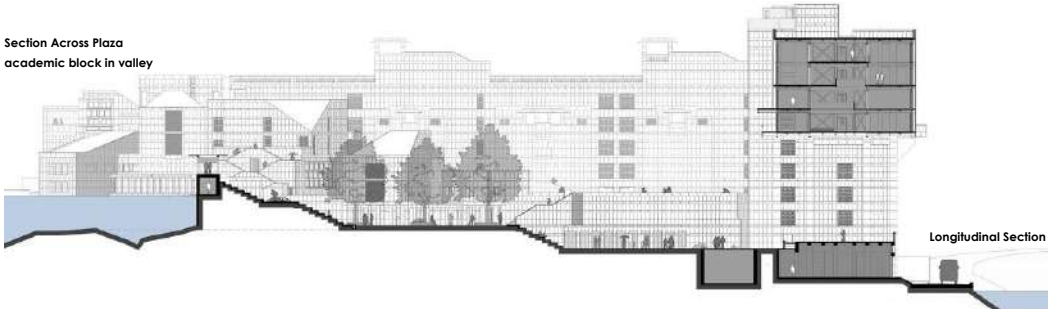
To this background, of landscape conditions and to make the campus self-sufficient, the basis of the de- sign was formed by the retaining of water. By placing check-dams at strategic locations within the hilly terrain, a system of interlinked lakes is created. Based on extensive calculations, enough water can be retained from the monsoon rains to feed the campus water year round. In order to do so, the monsoon rains that run off from roofs, street surfaces and land- scape have to be collected and treated first. Water used for washing, cleaning and flushing will be re- used for irrigation.

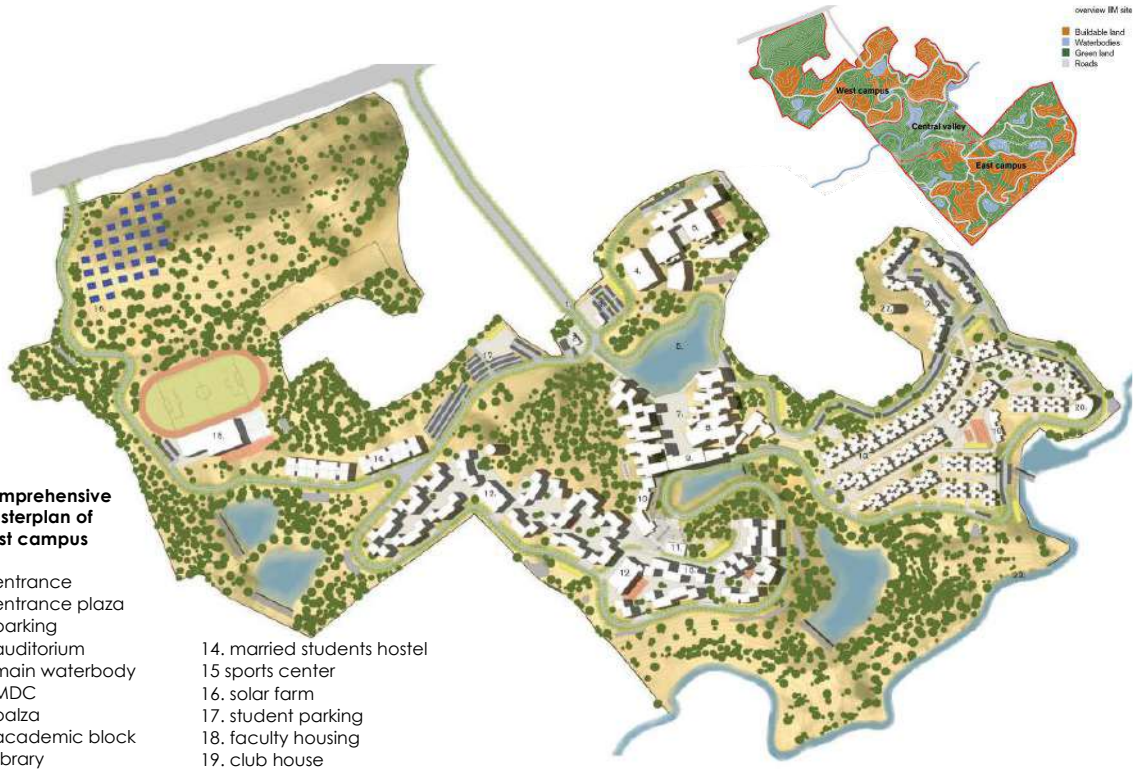
The IIM Udaipur site under normal circumstances would be considered unbuildable. The usual approach is to look for the flattest pieces of land and distribute the components of the campus at these locations and then find ways and means to connect them.

Historical Precedence

However, our reading of traditional architecture of forts and palaces in Rajasthan is a little different. Be- cause of issues of security, the location of forts and palaces was usually on the steepest parts of the land. This often created a dramatic setting for these forts and palaces, where the cooling breeze from the valleys rose up, providing better climate control and long vistas and dramatic views further added to the comfort of the inhabitants. Though security from at- tack was not an issue, the benefits of that approach were apparent.







Comprehensive Masterplan of west campus

1. entrance
2. entrance plaza
3. parking
4. auditorium
5. main waterbody
6. MDC
7. palza
8. academic block
9. library
10. amenities
11. amphitheather
12 student dining
13. hostels
14. married students hostel
15 sports center
16. solar farm
17. student parking
18. faculty housing
19. club house
20. faculty housing
21. staff housing
22. water tank
23. seasonal stream

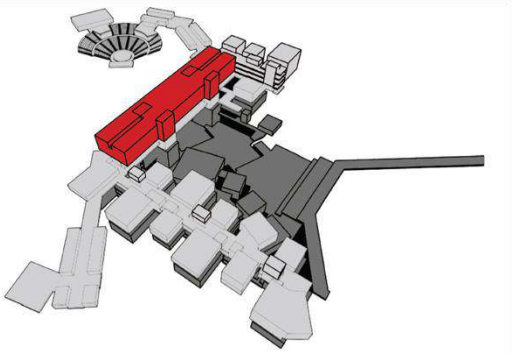
Contemporary facilities & Connections

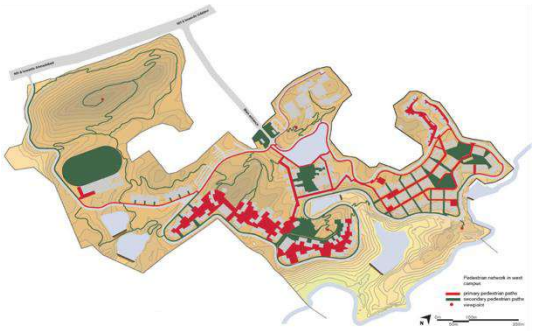
The campus has been envisioned like the medieval city of Udaipur. There is a symbiotic relationship established between the created lakes and the built along the surrounding hillsides. The Academic block anchored by the large Graduation plaza sits be- tween two lakes on its east and west ends. The class-rooms descend on to this plaza from both the north and south hills, which enclose this bowl like space. The complex is situated on a high ridge, enveloping a central valley. From the centre, two arms extend out across the landscape. To the east the faculty housing, with easy access to Udaipur and excellent views of the surroundings. To the west the student housing is organized along a winding ridge.

Other programs, like sports facilities are organized at the north side of the campus. The housing is organized in a dense pattern; partly because of limited availability of land, but also to save energy and to create an intimate pedestrian domain. From the housing, there is direct pedestrian access to the academic buildings. The walking experience is one of discovery and exploration, with not one, but many routes to walk and stroll along.

Though the social and climate friendly characteristics of the medieval city have been echoed in thebuilt form for passive climatecontrolmeasures,thevarious classrooms, seminar rooms and the other facilities are of the most contemporary standardswith all the information technology and electronic support comparable to the best standards anywhere in the world.

A very significant landmark visible while approaching the academic block is the steel bridge structure which is suspended five floors up in the air, spanning across over a hundred feet and of four floors height. This houses the library and is also the main link at its lowest level between the north and south block academic facilities at the entrance level as well as the bazaar for daily needs for the faculty and their families as well as the students.





Even though the campus is located on the slopes of several hillsides it is planned to provide universal access to all.Comfortable slopes for pedestrian and cycle access are provided all through the campus.

The landscape ecology around and in between the campus buildings is important for the water-balance and the quality of public space. The arid landscape is being rehabilitated in a number of stages over a period of several years. Once completed, the IIM Udaipur campus will be largely self-sufficient in terms of water, waste and energy. As IIM students set the standard in management across India, likewise, the campus would have an exemplary role to the Udaipur region and India at large.

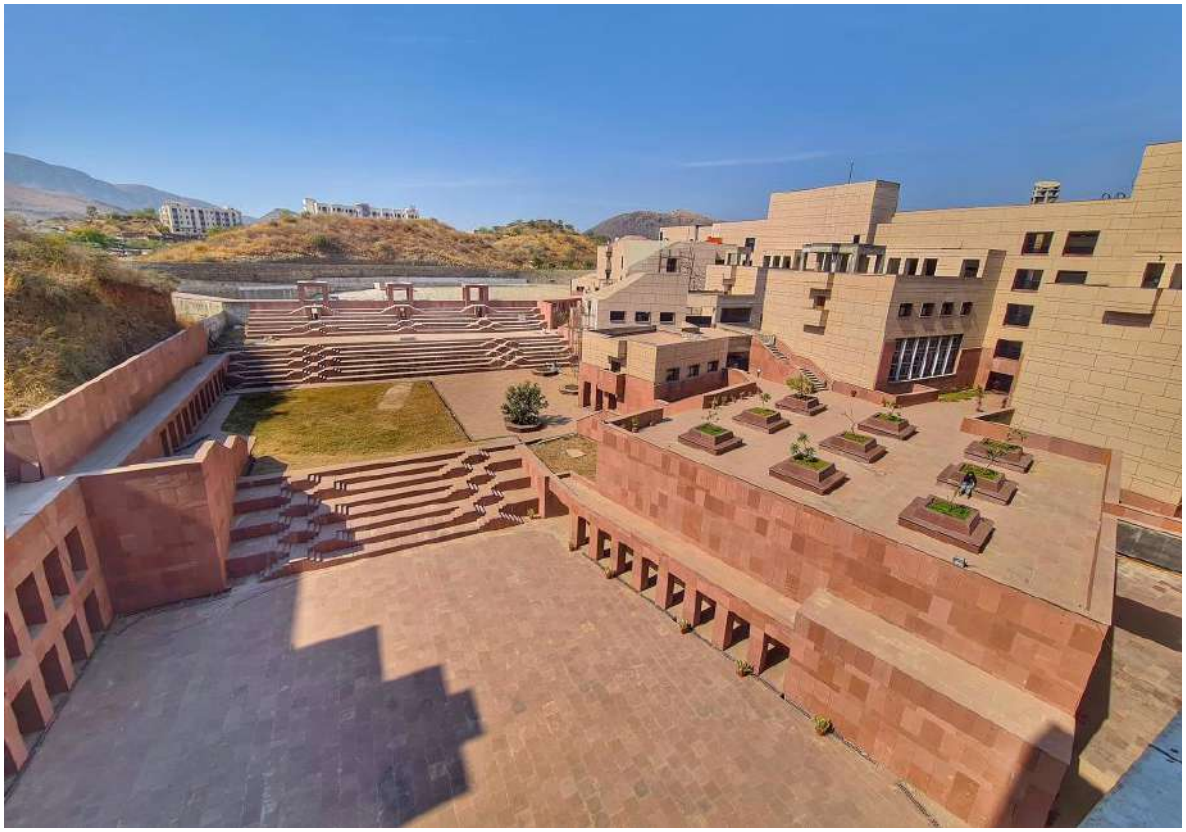
Interactive Clustering

Over many studies done it has been established that learning is not confined to classrooms but is arich mix of stimuli and inputs from many sources. To allow such chance encounters between students and faculty, students with their peers etc. on this campus five clusters are planned and many more are possible in additional phases. These clusters are a mix of class- rooms, seminar halls, faculty cabins and support staff with suitable service infrastructure.

All clusters are connected across the main Graduation Plaza, as well as the Bazaar Street suspended in the air. In a similar fashion student residences are in clusters with cafes, laundries, gyms and outdoor play facilities clustered at convenient intervals around plazas, which not only provide a unique variety of interactive spaces but also connect to the wonderful vistas that open up on the horizon and connect to the scenic natural surroundings.

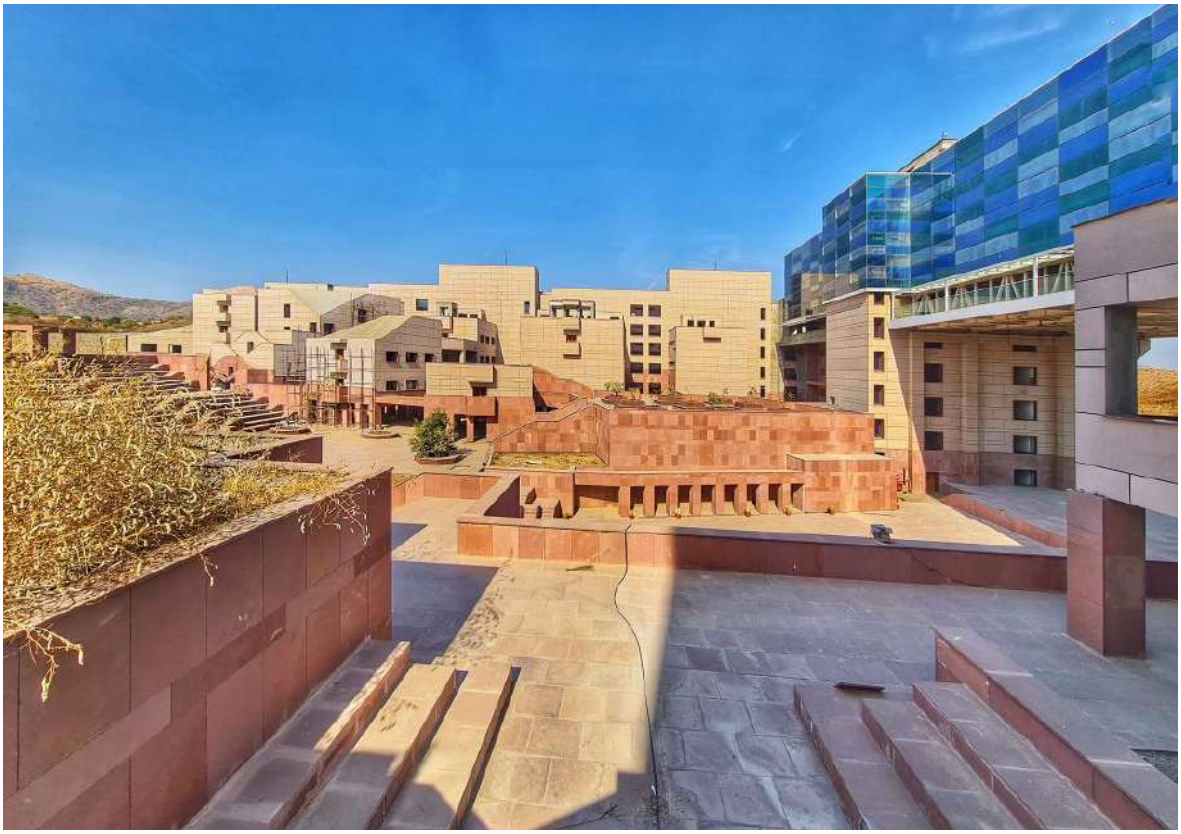
Civic Offerings

Most campuses in our country are gated and have limited access to the surrounding city. The IIM at Udaipur has from its inception been conceived to welcome citizens of Udaipur to partake its beautiful lake fronting the academic block and the walkways that circumambulate it.

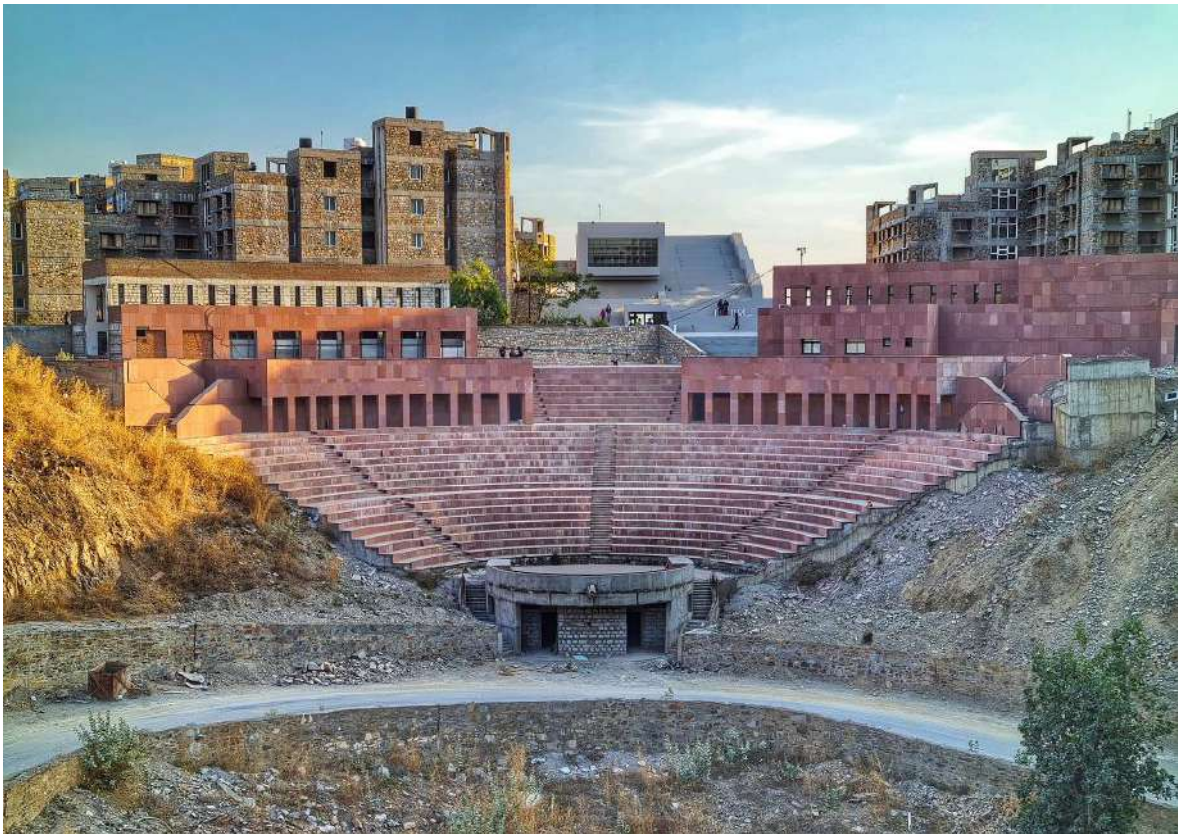


Graduation Plaza between the two academic blocks

The Bazaar and library spanning over the Graduation plaza



North academic block



Hostels, Dinning and Amphitheater

Case study 3: IIT Gandhinagar, Gujarat
Mitimitra Consultants Pvt. Ltd, HCP Design Planning & Management Pvt. Ltd., Vastu Shilpa Consultants, and Jhaveri Associates
Completion - 2015

India's first campus to receive a five-star GRIHA LD rating

Site location and characteristics

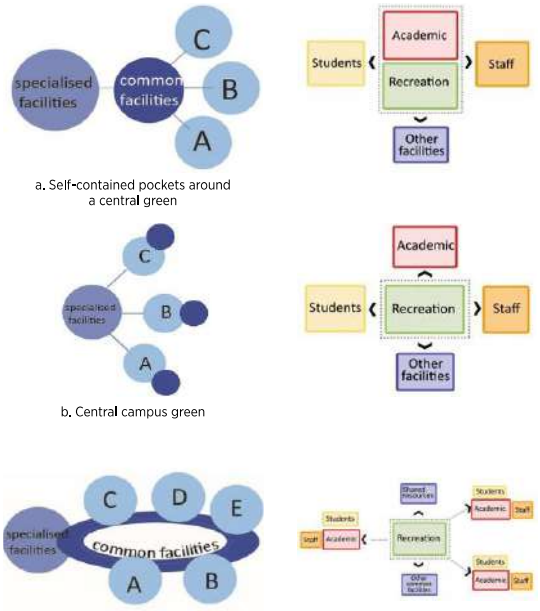
The site, spreading over an area of 399 acres, stretches for a distance of about 3 km along the western bank of the Sabarmati River, across from the city of Gandhinagar, located in Gandhinagar district, Gujarat. The site is in two separate parcels, with the village of Palaj (together with its 45 m access road to the river) in between. On the eastern side, the new highway forms the boundary to the site as well as to the village. Of the total site area, the southern parcel consists of 305.1 acres; 93.9 acres lie in the northern parcel. Earlier, the land in the southern parcel was being used for forage research. Sand mining is practiced on the river bed and sand is transported via trucks or tractor trailers through ravines in the site. At present the land is lying fallow. There is a temple to the south of the site.

The Masterplan

Student Hostel

The Masterplan envisioned a campus on the Sabarmati River, determined in large measure by the river bank location and the extensive ravines. It was planned as a green campus with an emphasis on pedestrian movement, largely free of vehicular traffic. The layout was designed to maximise views along and across the river and to retain two existing natural depressions. The visitors' entrance to the campus was planned using a major ravine as a scenic drive. There are two other entrances to the campus for the staff and students.

A participatory design process was followed by IITGN, wherein faculty, staff and student representatives were part of the committee that discussed the Masterplan with GCDC. Several different layout possibilities, both dispersed and compact, were tried before



Academic Campus Organisation

the present compact plan was selected. This plan places the main campus for ultimately more than 4800 students in the southern section of the site.

Urban Design

Arrival Court

The Masterplan defined land parcels for various uses in terms of size, shape and development potential. The phasing of development was also defined. The built form of the campus is mainly 'low-rise' with elevator-free buildings. Only a few high-rise apartments were proposed to give better definition to open spaces and to add interest to the skyline. The predominant building form is the courtyard type. Gateways, courts, colonnades, water features and a shaded academic spine are the major architectural components of the campus.

The compact forms of Academic, Residential and Hostel areas have been integrated through the use of open space. A linear open 'Mall' runs through the campus, starting from the academic core and ending at a natural water body between the hostels and staff housing. This 'Green Mall' will be lined with various kinds of activities and is expected to become one of the most 'imageable' elements of the campus. Another open space runs at a right angle to this mall and connects the campus to the river. This space accommodates all the sports facilities of the Institute. At the intersection of these two campus level open spaces, an 'Arcade' has been proposed, housing various amenities for the students and staff. This place will be the 'hub' of all non-academic activities of the Institute and is expected to be a very active, vibrant and popular joint for all.

The visual character of the Institute is defined at two levels. At the overall campus level, the 'theme' is set by the use of gateways, courts, colonnades and water features. This level of character was defined by the Masterplan. At the building level, the architectural style,

Mall and Central Vista

modular system, materials and colour are used to define the character. This level of character has been defined by the architects designing various complexes of the new campus.

Gateways:

Gateways highlight entries to a place or a building and announce the act of 'arrival'. At IITGN it happens at various levels and in different ways. The 'Arrival Court' at the end of the 'Scenic Drive' is the symbolic gateway to the Institute. At the entry to the academic axes, the building configuration presents an inviting 'gateway' feeling.

Courts:

Courts have been used throughout the campus as 'organising' elements for buildings, as 'positive' open spaces to accommodate various activities and to control the microclimate. The 'Arrival Court' is the symbolic entrance to the campus and it also contains an existing water body. The academic buildings are all arranged around 'courts' of various sizes. All the hostels are grouped around a large court and each

Site Layout Plan

hostel in turn has a number of smaller courts accommodating various student activities.

Colonnades:

Important courts, movement spines, arcades etc. are lined by colonnades of various types. Colonnades define public spaces and add distinctive character to them.

Water features:

Water features are extensively used throughout the campus landscape. Not just a visual element, water is also used as a cooling agent. All the water bodies are a part of the water management system. The form and design of these water bodies reflect the local character.

At the building level, the architectural style, the structural system, the material and colour use greatly contribute to the visual character of the campus.

The Spine:

The academic areas of the campus are grouped along two linear spines. These spines are primarily pedestrian movement corridors where different department buildings, lecture halls, common teaching labs, etc. are located. Functionally, besides being movement paths, these spines play a major role in encouraging interaction among students and faculty. Different departments have entrances to their buildings from these spines. Physically, it is not just a long corridor but an interesting place with a variety of open spaces accommodating various formal as well as informal student activities. The space of the spines are modulated both horizontally and vertically in shape and size through the use of courtyards, terraces, and upper level

Academic Complex

cross overs, etc. These spines are partially covered at various levels to provide a continuous weather-protected path for movement. The building blocks on the spine are located so that there is always a visual link to the open spaces beyond. The spine as a structure and a shading roof has been made from a variety of materials, including concrete, steel, polycarbonate, fabric and vegetation.

The urban design controls in the Masterplan control the movement systems, infrastructure systems, land use parcels and the buildable areas in those. The shape, location and size of the Arrival Court, the Academic Spine, the Arcade, the Central Vista, the Greens, and the major Hostel Court were also controlled. The urban design of the campus was not intended to control the architectural

expression, style, material or colour, although suggestions were made to not use certain materials on campus. These included aluminium composite panels and high pressure laminates of acrylic.

Landscape Plan

The very unique terrain of the campus, which includes the wild and eroded ravines along the riverfront, was used in a creative way to draw visitors to the site and to clearly define the spaces and their uses. By emphasizing the walkability of the site, the scale of interaction becomes more human.

The landscape structure has been developed as a series of open spaces arranged as a visually interesting and varied network to facilitate comfortable and unhindered pedestrian movement. Tree-shaded pedestrian footpaths follow the alignment of this open space system, connecting academic, residential and recreational areas not only to each other, but also to the riverfront and to the ravine landscape. The landscape structure is held together by the River Promenade, the Ravines and a Central Vista.

Infrastructure Design

It was proposed to treat sewage at the campus through a two-or three-stage process consisting of an anaerobic bio-reactor and constructed wetlands (root zone treatment system) and then to use the treated water on the site with zero discharge. After ultra-filtration, the treated water is being used for flushing toilets and irrigation. Rainwater collected from roofs is stored and used after filtration and disinfection. Rainwater collected from open spaces on-site is being charged into the ground. The shortfall of water is made up by a dedicated pipeline from Narmada Canal.

Sustainability Management Diagram

Solid waste is sorted, collected, treated to a large extent, stored and disposed of on-site. Bio-degradable waste is being treated through biological processes. The power supply is available at 11 KV initially and will be at 33 KV in later stages. Power is distributed at 11 KV and unitized sub-stations are provided at the building cluster level. The available power supply is stable and only the academic areas have some buildings with a standby power supply. A fiber optic cable supplies all communication requirements in the campus. A fire alarm system serves the hostels and academic buildings.

a) Academic building PV panels

b) Housing solar water heaters

A distinctive element of one of the academic buildings, Building 7, was suggested by the

Masterplan's recommendation to use architectural design features to help cool the buildings and to monitor the effectiveness of various approaches. Building 7 has a building management system in place that will allow campus staff to monitor the various cooling techniques that are being used in that building over time. In the future, these data can be shared with researchers and designers and used to help determine which techniques might be most appropriate and effective for future buildings.

Buildings are being built to Green Building Rating Systems India (GRIHA) and Energy Conservation Building Code (ECBC) standards. The Masterplan attempted to make this an exemplary project for sustainable development. The IITGN campus Masterplan subsequently was awarded a 5-star GRIHA rating in the large development category in 2016 and was first in the country to win such a rating.

Brownfield - Development of New Campuses

Case study 1: South Asian University, New Delhi
Architect Anupam Bansal, 2011 - Ongoing

The South Asian University, Village Maidangarhi, New Delhi

The South Asian University established by 8 SAARC countries in 2005 seeks to be a world-class Institution of learning, comparable to the best universities in the world, and hoping to attract Faculty and students of the same world-class calibre from the region and internationally.The Main Campus of the SAU has been proposed in New Delhi. In due course, regional campuses of the University may also come up in other SAARC countries. The Campus of South Asian University in Delhi has been conceived to be largely residential with 11 Faculties, and approximately7000 students and 700 teachers.

Competition and Award
An international competition was launched for comprehensive Master Plan and Architectural Design of the campus buildings in 2010 open to practicing Architects from all SAARC countries. Team comprising of Archiplan from Kathmandu and ABRD New Delhi were declared the winners in May 2011 by jury comprising of eminent architects; Charles Correa, Prof. Mohd. Shaheer and others University Members.

The Site
The site is located in **Zone-J of the Master Plan Delhi**, in village Maidan Garhi in South Delhi. It is adjacent to the Asola Wildlife Sanctuary and IGNOU. The site measures approx. 100 Acres , The terrain of the site is fairly flat and is slightly rocky. The site is flanked by a proposed 100 meter wide Road on Northern edge and 30 meter wide roads on other plot edges.

The Project Components
The main functional components on site are:

- **Academic units** in the form of 11 Faculties such as; Life Science, Earth Science, Faculty of Physics, Chemistry, Mathematics and IT, Faculty of Law and Humanities, Art & Design, Economics and Social Sciences.
- Ancillary functions like administrative blocks, library, auditorium/convention centre, student hostels, residences for faculty members and staff, student center, guest house, clubhouse, gymnasium & sports complex, swimming pool, health centre, service staff quarters, local shopping area etc. are also proposed on the Campus.

Parking Systems
The parking has been primarily provided in the

two multi storied parking structures and basements, which provides alternate opportunity to integrate the ground space into the design. Appropriately designed parking spaces would be provided to support the differently abled. Spaces would be reserved for carpool parking and alternate fuel parking with recharge stations.

Statutory Regulations and Development Controls

S. No.	Function	Permis. % of Plot Area	Permis. % Gr. Coverage	FAR [Sq.m]	Height [m]	Set Backs
1	**Academic**	**45%**	**30%**	[120%] 181605.08	37	Front - 15m
2	**Residential**	**[25%]**	**33.3%**	[200%] 168152.85	No Restriction	Sides and Rear - 12m
3	**Sports/ Cultural**	**[15%]**	**10%**	[15%] 7566.88	26	
4	**Mandatory Green Area**	**[15%]**				
Total			**[23%] 78443.30**	**[106%]357324.81**		

Proposed Area Calculations

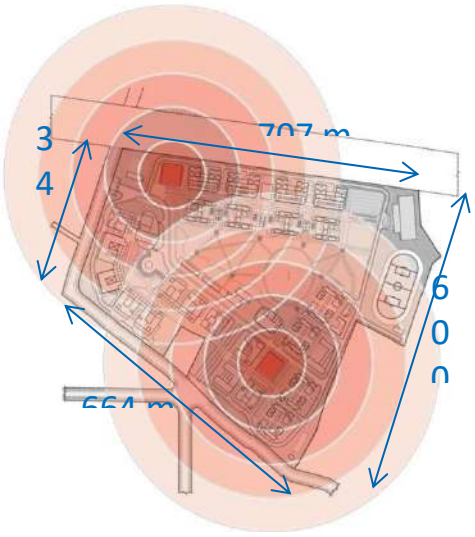
Sl No.	Function	Proposed Ground coverage [Sq.m]	Proposed FAR [Sq.m]	Set Backs
1	Academic	[28.5%] 43094.62	[115.3%] 45401.27	Front - 26-54 m
2	Residential	[31.0%] 26031.39	[194.3%] 27997.45	Sides and Rear - 20 - 68m
3	Sports/ Cultural	[9.9%] 5000.00	[14.9%] 7500	
Total		**[23%] 78443.30**	**[102.7%] 345425.15**	
Permissible FAR is 225 and used FAR is 115 (additional FAR will be consumed for future expansion				

Permissible Parking Details

S.NO	BUILDING TYPE	PROPOSED FAR	REQUIRED E.C.S per 100sqm	REQUIRED E.C.S	PROPOSED E.C.S
1	Academic	174547.67 sqm	1.33	2321.48	2321
2	Residential	164578.707 sqm	2	3291.574	3291
3	Sports/ Cultural	7500 sqm	1.33	99.75	101.31
TOTAL				**5712.804**	**5713.31**

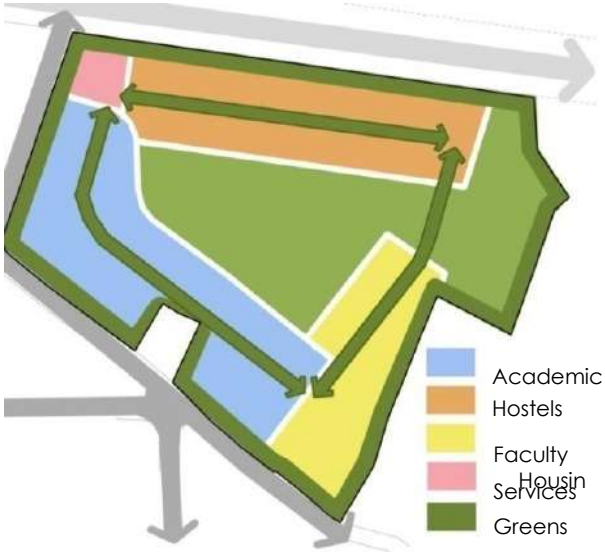
WALKABILITY

- 1 Min = 80 M
- 2 Min = 160 M
- 3 Min = 240 M
- 4 Min = 320 M
- 5 Min = 400 M



Master Planning and Landscape Principles

The three components of project program are proposed in three distinct defined zones; The Academic Zone, The Student Housing Zone (Hostels) and the Faculty and Staff Residences Zone are placed around the vast central green. The landscape acts as extension of adjoining wildlife corridor with central green Forest of over 11 acres christened as SAU Vanya. This open space is the main structuring element of the university master plan and landscape scheme. The rain water harvesting lake of the zero discharge site is also located here.



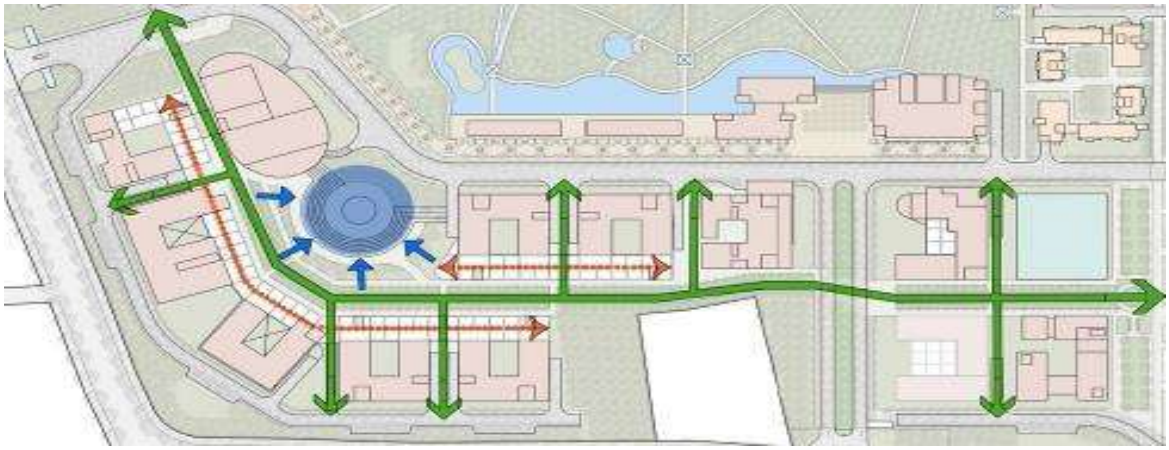
The movement network primary comprises of:

1. The Promenade
2. The shaded green
3. The Peripheral loop

The Promenade is the main pedestrian and cyclists link between the various functional components of the campus. The shaded green spine is also a pedestrian and cyclists loop. Vehicular movement restricted to peripheral loop – vehicle free zone in center. Movement of service vehicles in peripheral loop restricted for early morning and late evening.

Academic Buildings Zone

The faculty buildings are conceived as dense urban blocks set on floor high podium deck facing either the main road and the main internal loop. The blocks are closely placed on the podium, interconnected, and face a common urban space consisting of a landscaped street leading to the amphitheater and convention center. The general facilities of each faculty building like classrooms, cafes, seminar rooms etc. are located around this urban space. The main intent is to facilitate and encourage cross-disciplinary learning, possibilities for informal meetings, exchanges, sharing of facilities, and 24-hour functioning.



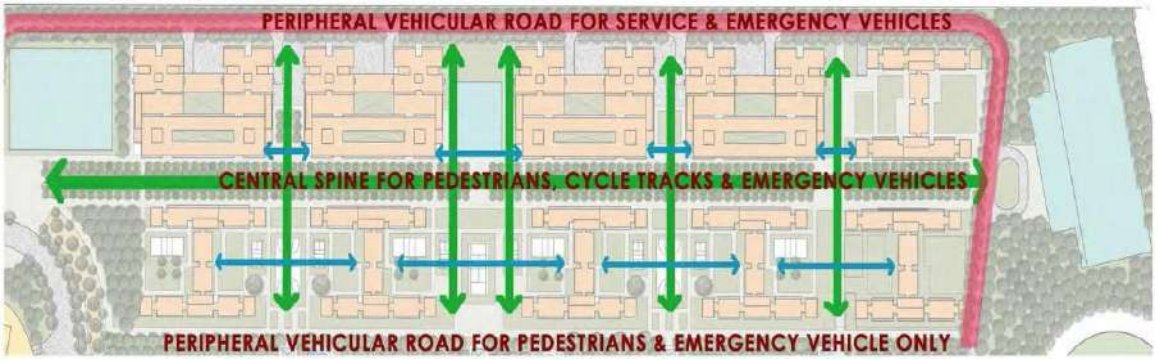
The academic buildings have a maximum height of five floors which, are planned as regular rectangular blocks around courtyards. Each block accommodates two or more faculties with common facilities such as auditorium, lecture theatres and cafeteria. Volumetrically the blocks are similar, but the programs vary according to the specific requirements of each faculty. The architectural schemes of the various academic buildings shall operate as per common theme, but the exact elevation of each block may vary according to the specific plan of each block.

LAYOUT SCHEME OF THE STUDENT'S HOUSING (HOSTEL) ZONE

The three different types of hostel blocks have been structured along a central pedestrian spine which is intercepted at intervals forming a network that is connected to a variety of spaces like the student support center, central greens etc. the pedestrian spine is lined with shared facilities like dining halls, cafe, shops, common rooms, clubs etc. which makes it a highly active corridor. The complex opens to the vehicular access road on one side and the open greens on the other. The intermediate spaces between the blocks accommodate the shared leisure spaces.

BLOCK

The large requirement for student housing within the limitations of the site requires a high rise building type. Therefore the hostel blocks have been configured to allow for variations in heights to develop a visually diverse skyline in the urbanscape. Each block has a mixed typology , accommodating housing flats, single rooms and some shared facilities. The typo logical variations in the two models of the student hostels are also configured in their relationship to the two major edges of the Hostel Zone, the North boundary of the Campus and the frontage towards the central green. The high rises are placed towards the edge and the volume reduces as one moves towards the greens.



Learning, Conclusions and Recommendations

The strict demarcation / zoning of plot and development controls do not work well for an International University such as SAU.

- 45% area of plot with 225 FAR allocated to academic functions is adequate. It is proposed that no height restriction should be applicable to this typology of buildings to enable vertical stacking of similar and repetitive functions. All spaces such as lecture theatres, auditoriums with large student gatherings can be located on lower floors and functions with lesser foot fall such as faculty office can be located in upper floors of the buildings. Ground coverage of 30% may also be relaxed to 35% or up to 40% for specialized universities since a lot of complex functions such as; Auditoriums, Laboratories, workshops etc. cannot be vertically stacked.
- For a fully residential international University, 25% area demarcated for housing is inadequate. This particularly *less* because the campus is located on the periphery of the city and considerable number of students and faculty are from outside India. Ground coverage of 33.33% may also be relaxed to 40% or up to 45% for hostels and staff & faculty housing. Vertical stacking of a lot of diverse functions such as; Dining Halls (Mess) and kitchens Student's Activity Centre, Utility Shops, Club and Guest House etc.. Is not an ideal condition.
- Parking requirement calculated at 1.33 ECS for Academic zone and 2.0 ECS for Hostel and Housing zone is not justifiable. On a fully residential campus influx of vehicles is likely to be very low a large area of car parking space created will lead to unused spaces leading to *undesirable* activities and an extra burden of cost for construction and maintenance of unusable space. It is very important that all parking requirements of the campus should be met within the campus and if in future the parking requirement is generated then it can be accommodated in for of Multi Level Car Parking.
- In order to promote healthy environment Circulation system comprising of bicycle and walking tracks needs to give priority over vehicular circulation.
- Zero Water Discharge site
- Roof top and over other semi open spaces for photovoltaic Panels for generation of electricity.

Case study 2: Flame University, Pune
Vastu Shilpa Consultants, 2005 - Ongoing

The Master Plan for FLAME University was conceived by us in 2005 and the first buildings on Campus came up in 2007. The campus started with 25 acres of land, which in a few years increased to 52 acres. By 2017 the campus acquired more land and today is 83 acres. In the past 16 years numerous facilities have been added on by us. Of these, four significant facilities are covered below.

Preamble

Nestled on the slopes of the Sahyadri hills in Pune, is India's first Liberal Education University - FLAME. FLAME's educational philosophy is rooted in the concept of liberal education, a system of instruction that transcends the artificial divisions that exist between disciplines and unmasks the underlying unity of all knowledge. It urges the student to engage with multiple disciplines in order to view issues from different perspectives leading to deeper understanding and better solution of problems. At the core of its educational experience is its resolute emphasis on lifelong learning, critical thinking, tolerance, and good citizenship.

The Site

The location of the University is on land which was once the periphery of Pune city. Today, the city is fast growing around and past this periphery. Land was bought and acquired over several years, piece by piece. Much of the owners are farmers and several continue agricultural activities in the surroundings.

The site is within a saucer like feature, it is a valley surrounded by the undulating Sahyadri hill rangethat rises 200 m high. Within the actual site there is a difference of 24 meters between the lowest and highest point located at the southern edge. There is large 10 acre lake which abuts the western edge of the cam- pus. This rain fed lake is used by the local farmers in the vicinity to irrigate their fields and also has a temple revered by the local community. To ensure unimpeded water run-off from the hills to this lake, was a driving factor of the campus site layout.

The Context

One of the peculiarities working in India is the constant change in any given situation, imparting a hybrid nature. The site boundaries, contours and the program brief for this project went through multiple changes right from conception to construction. So a lateral approach to design has been adopted from this understanding of 'constant change'. The uncertainties are acknowledged with due respect and an ideology to work with the known, holding on to identified, inviolable values, and yet moving forward emerges as the design philosophy.

One reflection of this is the size and scale of buildings. The early buildings on campus were relatively small in size and detached due to the uncertainties of land acquisition, as well as uncertainty of funds. As the University flourished, funds became more assured, ambitions of the promoters also grew. This shows in a marked increase in scale, size and area of the more recent buildings on campus.

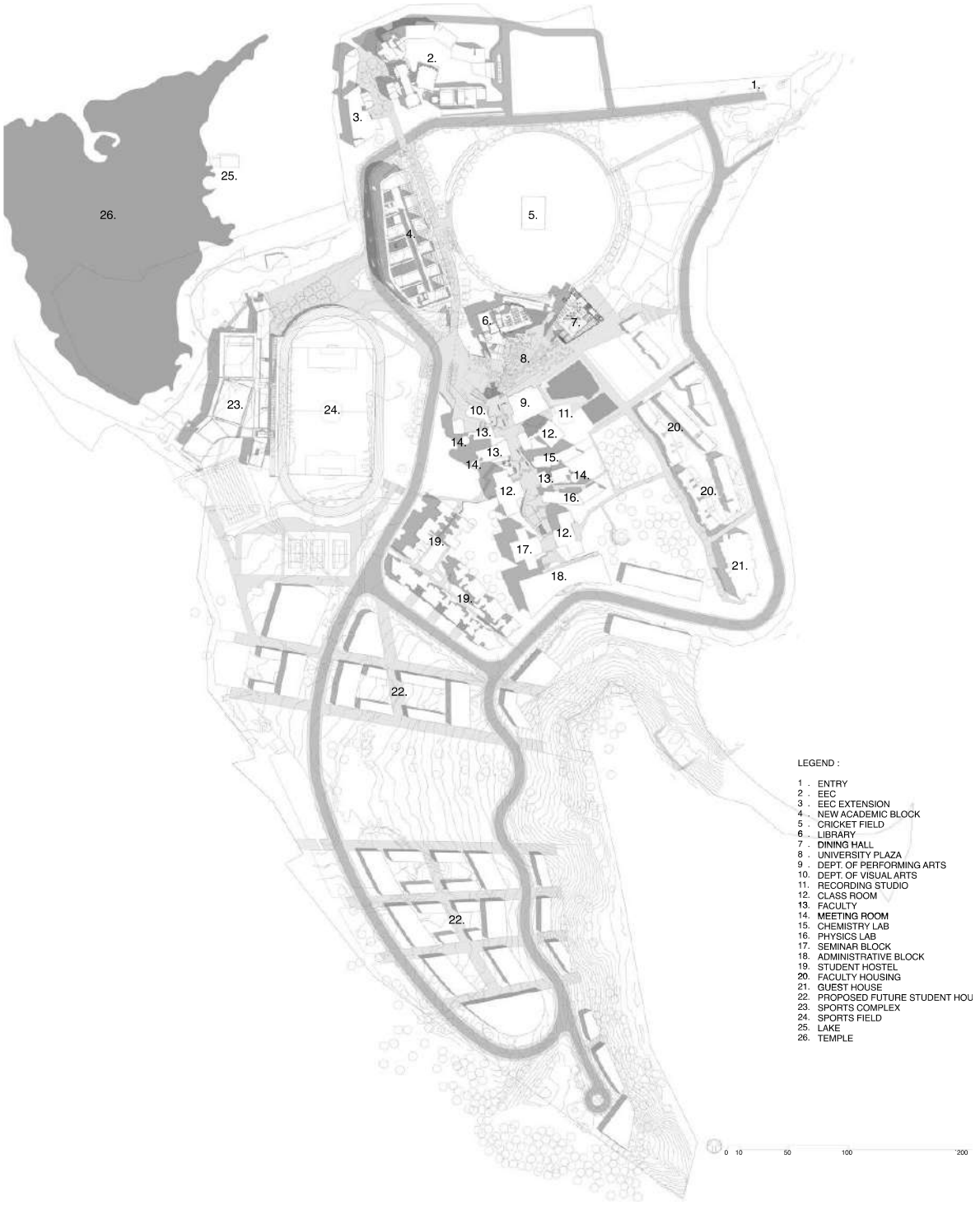
The Concept and Master Plan

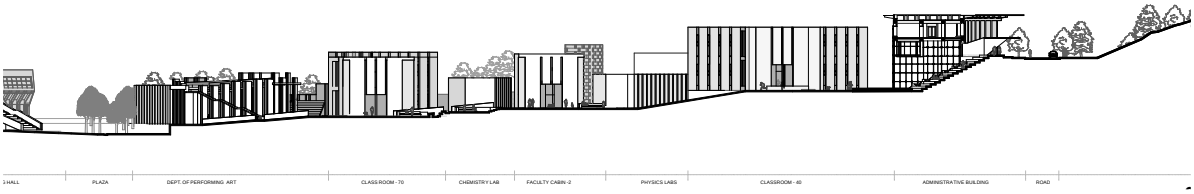
The master plan postulates the 'bazaar of education', a rather unusual approach to a campus de- sign. This echoes the idea of

'constant change' combined with 'evolution over time'. A texture akin to an Indian village street. The strong visual forces, looking on to the hills, combined with the activities makes the intended 'places'. Thus an open to sky pedestrian 'spine' emerges as the salient design feature that connects the various blocks, enacting as a 'breathing space'. The sequencing of program fabricates casual encounters, those accidental running into known and unknown faces, instituting the people from various disciplines to interweave and share knowledge - to share life. The classrooms, laboratories, faculty rooms, performing arts, visual arts studio and recording studio play a part in the making of the spine. On either side of the academic spine are the residential areas. On the eastern side are the faculty residences and on the western side are the student hostels.

Orientation of the spine along the north-south direction keeps a major part of the spine in shade, creating cool spaces of repose in the hot tropical sun during the day. The silhouette of shadows along the spine creates interesting patterns to behold. Innovative combination of clad and bare concrete surfaces explores a palette of myriad textures and play of light, augmenting the visual interest.

The ideology of minimum alteration of the original topography, leads to the twists and turns of blocks with the contours of the rolling ground. Thus the otherwise compact planning is eased and stretched out with this approach. Minimal footprint is achieved with the careful programming of the day-today activities in the university. Thus achieving a reduction in add-on landscaping, and water requirements. As one meanders along the spine, the spatial variation in terms of their constriction, heights, enclosures and framing of nature, makes one realise the connection to the 'infinite'. The spine merges to the university plaza, analogous to the core of a galaxy spread around. It becomes the loci of coupled activities for the res- idents of the campus and a confluence of the university town. The plaza climbs up to the rooftops of Library and Dining Hall through grand stairs


LEGEND :
1 . ENTRY
2 . EEC
3 . EEC EXTENSION
4 . NEW ACADEMIC BLOCK
5 . CRICKET FIELD
6 . LIBRARY
7 . DINING HALL
8 . UNIVERSITY PLAZA
9 . DEPT. OF PERFORMING ARTS
10. DEPT. OF VISUAL ARTS
11. RECORDING STUDIO
12. CLASS ROOM
13. FACULTY
14. MEETING ROOM
15. CHEMISTRY LAB
16. PHYSICS LAB
17. SEMINAR BLOCK
18. ADMINISTRATIVE BLOCK
19. STUDENT HOSTEL
20. FACULTY HOUSING
21. GUEST HOUSE
22. PROPOSED FUTURE STUDENT HOU
23. SPORTS COMPLEX
24. SPORTS FIELD
25. LAKE
26. TEMPLE
0 10 50 100 200


PLAZA
DEPT. OF PERFORMING ART
CLASSROOM - 70
CHEMISTRY LAB
FACULTY CABIN -2
PHYSICS LABS
CLASSROOM - 40
ADMINISTRATIVE BUILDING
ROAD

leading to their roofs which have amphitheatre's for casual performances and gatherings, in effect a fragment- ed large amphitheatre. Thus the three dimensional ordering of spaces along the spine culminates in the plaza, creating the feeling of expansiveness and limitless in the learner.

Expansion

Over the years as further land was added and new programs were introduced in the University, the Academic spine further expanded to the North and South. From the University Plaza, the Academic spine grew towards the North to end at the Executive Edu- cation Center anchored by an 8 storey tower. Almost simultaneously, the Academic spine also expanded towards the South to connect with the Loop road around the campus. This expansion locates the Ad- ministration block and its semi covered amphitheatre. The spine is now about 400 meters in length from one end to the other. It rises vertically towards the South end by 17 meters from the University Plaza and towards the North end drops by about 5 meters.

Construction System

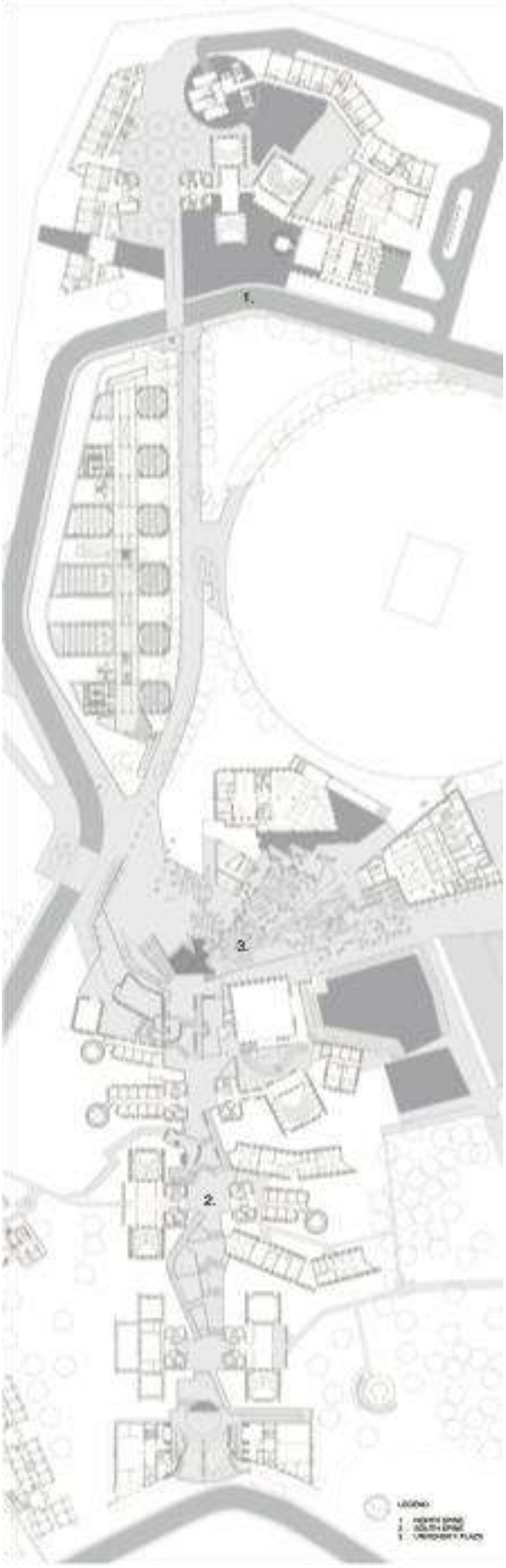
A very simple portal system is used to construct the various Academic buildings. Two columns, 23cm wide by 75cm deep tied by a RCC diaphragm 134cm apart with twin beams that span between 7m to 14m without any change in their profile. There is only change in the reinforcement for the increased spans. For larger spans up to 24m the thickness of the column increases to 30cm thus leading to a cheap modular construction system. The C shaped portal arrangement allows for multiple uses - as a skylight in places, as a service duct housing air conditioning and service pipes in other places

Some of the key buildings of the University:

The Library - Vivekananda

The Library sits almost at the centre of the 400m long Academic spine around which the entire campus is organised. It is flanked on its south by the University Plaza and the formal arrival to the Academic spine. On the north side of the library is the Flame cricket ground. The lush green cricket ground sets the fore- ground to the campus with the Library at the fore-front when one enters the campus.

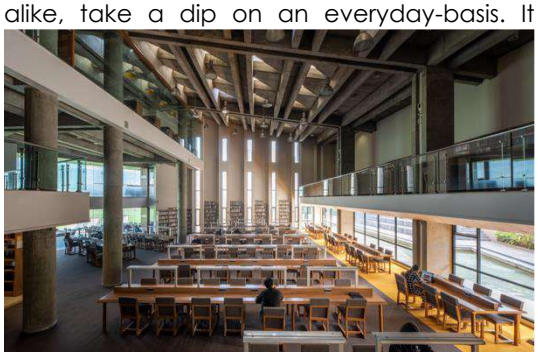
The Vivekananda Library with its state-of-the- art building, hardware, software and other allied resources is fast developing into one of the finest institutional libraries in the country. Its inviting architecture provides an ambience that is relaxed butmodern; and



space that is large yet intimate. The resources available include books on an impressive array of subjects, course specific reading material, academic journals and various digital resources. It houses sufficient reference and reading material for students and faculty from multiple disciplines. Books from humanities, social sciences, applied sciences, management, media, journalism, literature, environment, religion, languages, amongst various others adorn its shelves.

The library is a 2,555 square meter structure. The ground plus two storey building consists of reading areas, discussion rooms, computer lab, archival room and a reprographic room. One of the large reading rooms overlooks the green expanse of the FLAME cricket ground. The library also has a small cafe and a student lounge. The Library offers facilities for learning and research with study spaces for more than 420 readers of which over 64 are equipped with computers.

The library has evolved into a great fountain of knowledge into which students and faculty alike, take a dip on an everyday-basis. It



houses sufficient reference and reading material for students of the four residential programs. It has a collection of 41, 376 books, 63 specialised journals and a Media Library of CDs, VCDs and DVDs of films of Foreign and Indian origins. The library houses a computer lab in its premises where students and faculty members can browse varied databases such as EBSCO, Thomson Reuters, PROQUEST, JSTOR and other online resources.

The main reading hall of the library as well as all public areas are not air conditioned but ventilated by a series of extractor fans within the skylights which also bring in natural light. Large energy savings are achieved by this innovative sustainability strategy.

The Administration building - Chandragupta 2016-2019

Located at the highest point of the academic spine the Administration building or Chandragupta would seemingly be meant to dominate the campus. It is also the largest building in area and bulk on the academic spine. Paradoxically, while walking on the spine, Chandragupta almost ceases to exist. This strange phenomenon happens due to the fact that through the center of this building is a 24 meter long, three storey high opening. This opening, cradles an amphitheatre - the physical termination of the spine - a place of gathering, but continues the visual link of the spine upwards to the hills beyond. In effect connecting the spine to the infinite realm of the celestial. The fourth storey which bridges across the 24 meter opening is a student lounge with a coffee bar. Fit- tingly, students sit on top of the of the administration and enjoy commanding views of the campus and the surrounding hills. The amphitheatre and the student lounge activate this building and the surrounding area 24x7.

The Administration is a 3200 square meter structure and accommodates the FLAME administration. The offices of the President, the Vice Chancellor, the Registrar and 10 Deans chambers with their supporting staff are located within it. The Placement cell, Alumni meeting spaces and International relations office as well as multi use student rooms for seminars and classes are also housed within it. It's most prominent feature the Amphitheatre can accommodate about 600 persons and the Student lounge can seat a 100 persons in various configurations.

Visitors can approach the Administration directly from the upper part of the ring road without going into the spine or other student areas. At the ring road the building appears to be a two storey structure as the lower two storeys are not visible.

The Executive Education Center (EEC) - Vikram Sarabhai Center 2014-2018

Located at the farthest end in the North of the cam- pus The Executive Education Center - Vikram Sarabhai Center, was designed to accommodate the expanding program of the University. It marks the end of the campus by a 8 storey high tower. The tower and the 4 storey meandering slab block adjoining it accommodate 75 deluxe rooms. It has its own dining facility for 80 persons and has a cluster of two 40 seat- er class rooms and a 70 seater classroom. Another 55 rooms were added on the western side facing the lake soon after the completion of the initial 75 rooms. It is a mini campus on its own. It is also the end of the 400 meter long academic spine stretching between the Administration and the EEC. The top of the tow- er which marks this end of the

campus is about the same height as the top of the Administration building at the other extreme end of the academic spine. Be- tween the two ends of the academic spine one traverses a vertical distance of 22 meters. All of this is universally accessible by a series of ramps. The built up area of the entire complex is 11,500 square meters.

The Sports Center - Arjuna 2017-2020

On the western periphery of the campus across from the University Plaza is the University athletic track and football field. Sandwiched between the field and adjacent lake, the Sports Center takes the benefit of the great difference in level (5 meters) between its location and the University plaza, to make its

bulk virtually disappear, whilst giving great views towards the adjacent lake on its west.

The Center has indoor facilities for a basketball court, three badminton courts, two squash courts, a large gymnasium, Yoga hall, and space for table tennis, carom and other indoor sports. It also has an Olympic size outdoor pool, and a cafeteria. the total built up area is 7900 square meters.

The building is composed of two parallel longitudinal wings one thin and two storied and the other fat, spanning 24 meters and 9 meters high having all the large courts - basketball, badminton and squash. The two parallel wings split apart in the middle where the thin one remains parallel to the sports field whilst the fat one curves gently following the lake on its western edge. This split forms a triangular court which accommodates a cafe within it and allows ample natural light to infiltrate into the heart of the complex as well as naturally ventilates the indoor spaces.

Case study 3: NIIT University at Neemrana, Rajasthan
Vinod Gupta, Architect, 2009 - Ongoing

With a desert climate, highly eroded landscape and absenceof an infrastructure in terms of water supply and seweragesystem, building a university campus at Neemrana in the stateof Rajasthan, for a population of 7500 students on a small site,located right at the edge of Thar desert was a challenge. The feature discusses various strategies adopted, both in architecture and landscape design, to make it a sustainable campus.

Context

The sandy site, next to the foothills of Aravali Range, midway between Delhi and Jaipur, had been deeply eroded by the annual runoff gushing from the hills. The climate is typical for the desert with extreme temperatures, both in summers [accompanied by hot dusty winds] and winters. During monsoons, the humidity can be as high as 85%. The general dust level is high, because of the levelling of land in the neighbourhood. Rain and groundwater are the two main sources of water. The area lying between the site and the hill is barren land where no development is permitted. The design brief was to have a University with world-class facilities offering undergraduate, postgraduate and research programmes in different disciplines.

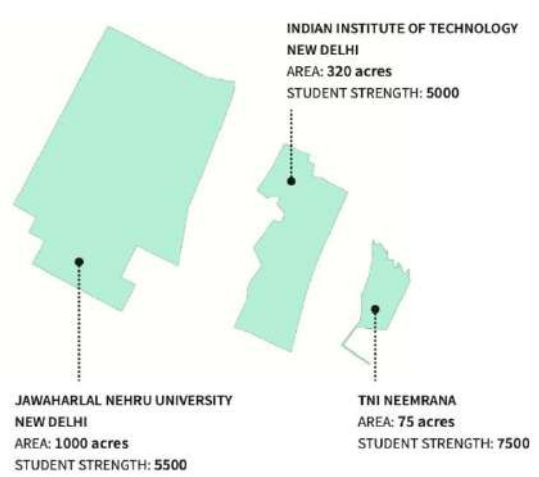
A Sustainable Campus

The main objective of the development was to use available resources to create a

SITE Sandy and deeply eroded by the annual runoff gushing from the hills

comfortable, healthy and interactive educational campus, to address off-site and on-site environmental issues and develop a prototype for future developments in the region and hence to apply the concept of environmental and economic sustainability as the major determinants for design.

Various strategies of the environmental management plan adopted on a macro scale included stopping illegal extraction and mining of stone from the adjoining hills, tree plantation on the eroded hillside, check dams to harvest rainwater and prevent soil erosion. Within the site, natural levels were maintained to minimize cut and fill, natural depressions and low lying areas were used for various activities like amphitheatres and sports arena. Within the campus, the practices adopted, include, efficient use of water and energy, preservation of natural features of land, treatment and reuse wastewater, use of solar water heating, use of recycled building materials and management of solid waste.



The site lies over a bowl-shaped underground formation that can provide a sustainable source of water. The hydrological survey showed that rainwater from the hills comes to the site through surface drainage channels and through sub-soil flows. Existing water courses on the site were maintained for drainage and rainwater harvesting. During the dry season, the same spaces are used for outdoor activities. This promotes the idea of water conservation amongst the resident population and through treatment and reuse of wastewater, the project draws no more water than the annual recharge. Water and energy- saving comfort cooling system and water-saving toilet fixtures are also being used. Treated water from STP is utilized for flushing toilets and for irrigation reducing the requirement of freshwater to about half.

The biotechnology department of the University has started a project of greening the hillside beyond the site boundary. Native plant species that require less water have been planted, a move away from a resource-consuming 'beautiful landscape' to a more contextual landscape that the site can support.

"Taking inspiration from a traditional Indian desert city, the campus has been designed as a compact, dense development which supports a larger population on a small area of land. It is planned to house 7500 students [5000 resident students] and 500 staff families on an area of 75 acres which makes it 6 times as dense as IIT Delhi and 18 times as dense as JNU Delhi. The tight site layout responds in a much better way to the harsh desert climate and allows the resources to be utilized more efficiently with the less developed area."

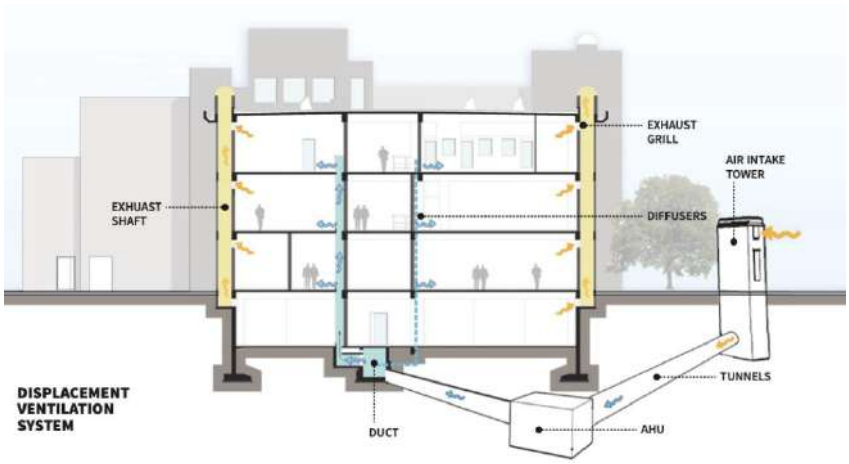
Climate-responsive Design

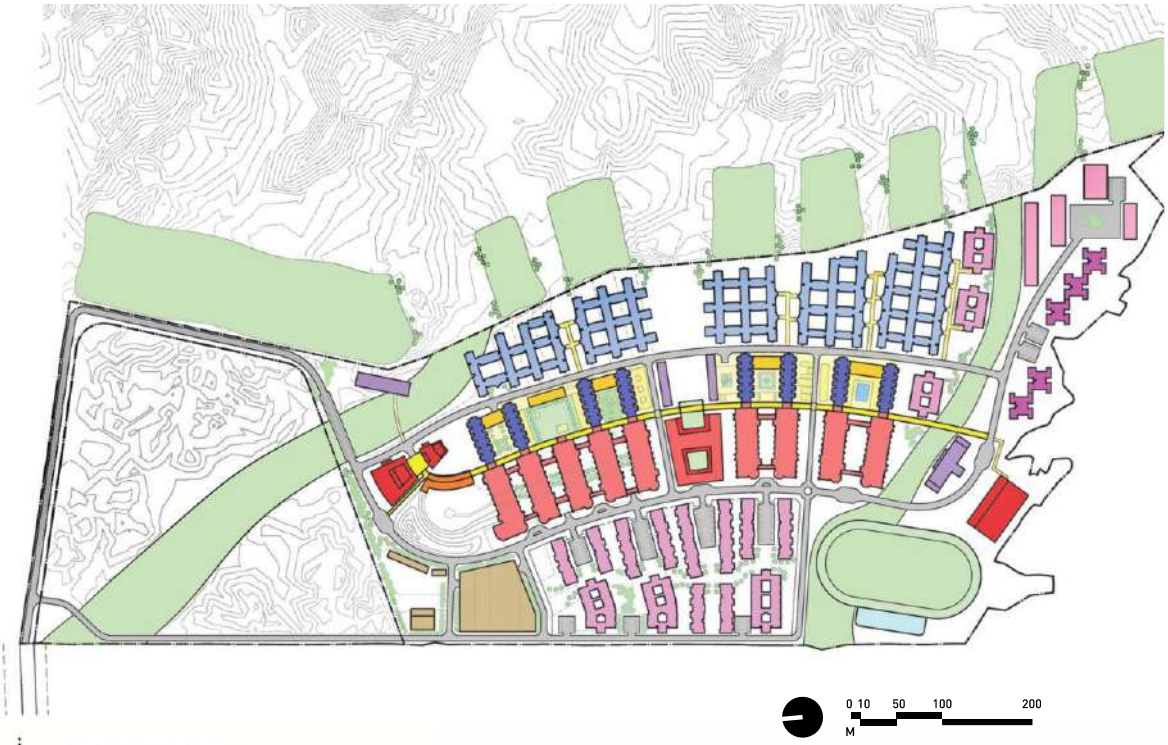
Traditional built forms and contemporary thinking about climate-sensitive and resource-conserving design have inspired the architectural design of various buildings in the campus.

Orientation

Location with north-south orientation, minimal exposure to the western sun, restricted use of glass on the exterior, external insulation of walls and roofs to avoid thermal bridges, design to keep buildings comfortably cool and dust-free without conventional air conditioning are some of the main features of the built form.

A high percentage of recycled materials have also been used to reduce the energy cost. The academic buildings are mainly daylit and artificial lighting is used only when daylight is not available. To make the best use of daylighting, the building blocks are designed with deeper rooms [10.8m] for laboratories on the south side and shallower spaces [7.2m] for classrooms on the north side. The south side rooms have high-level windows with external and internal light shelves that improve the distribution of daylight in the deep laboratories. These rooms also get light from skylights above the central corridor.





Faculty rooms, passages and cubicles on the top floor are also daylit through skylights.

Air Tunnels

At Neemrana, in addition to heat, there is an acute problem of atmospheric dust that appears as dust storms in the afternoon. Therefore an integrated, economical and sustainable way of cooling and dust control, an alternative to conventional air conditioning has been adopted. At any given place, the temperature of the earth at about four meters depth remains nearly constant through the year, day and night and from summer to winter. Air drawn through tunnels laid at this level cools the air passing through it in summer and heats it in winter. Earth is used as a heat sink and earth air tunnels are used for pre-cooling air before it is supplied to rooms. The same tunnels also provide a degree of heating in winter. The air is further humidified in dry summer months and dehumidified in monsoon season and then supplied to each room in the building. To keep the energy costs down, a displacement ventilation system is used in the buildings. Cool air [at 20 0C] enters the rooms at the floor level displacing warmer air to the top. This system provides 100% fresh air with low energy expenditure. It was calculated that the energy bill for lighting and air conditioning would amount to no more than 33 kWh per square meters of built space per year [much less than the norm of 140 kWh per square meters per year that the Energy Conservation Building Code provides for fully air-conditioned buildings].

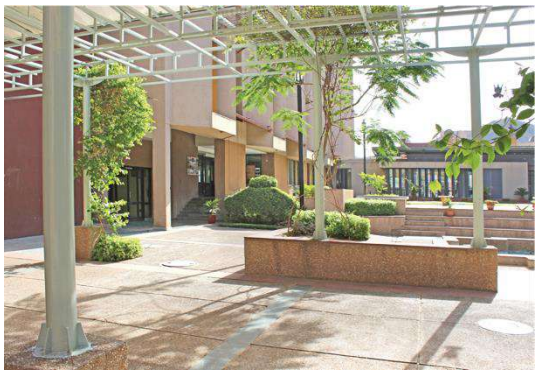
Site Planning

The main entrance to the campus, from the north, is through a vehicular road aligned with the existing site levels with a minimum amount of cut and fill. It is further connected by a road in the east passing through the students' residential area, and another parallel road passing between the academic area and the staff residential area in the west. The buildings accommodating the academic, residential areas for students and faculty are designed as a radial alignment of closely spaced linear blocks enclosing a series of courtyards. A centrally-shaded pedestrian spine,

conceived as a 24-hour activity zone, connects the students' hostels to the academic buildings. The mix of activities along the central spine by a different set of users imparts a vibrant and interesting character. The design of the spine as well as its interconnectedness allows for walking comfortably and safely, despite the extreme climatic conditions. Outdoor areas are designed with an extended view of the surrounding landscape of hills, which have been planted to improve the biomass and prevent soil erosion.

Walking Campus

To encourage the idea ofpedestrianisation and reduce vehicular movement inside the campus, most of the facilities are located within a walkable distance. The vehicular movement and parking of cars, bikes and motorcycles are restricted to the common parking area, from where one walks down to different areas. The high density allows it to be a walking campus where walking is faster than motorised transport. Only emergency and public service vehicles have access to the internal roads of the campus. The University has provided a free bicycle service to all students that allows them to visit areas within and outside the campus. Ownership of private vehicles is not allowed on the campus. Neemrana is 100 kilometers from Gurgaon and about 130 kilometers from both Delhi and Jaipur. The residential campus discourages students and teachers to drive to the campus on a daily basis. Day scholars would be admitted only in the last phase when the surrounding area will have acquired substantial residential development.



BUILT AND OPEN SPACES
Traditional built forms and contemporary thinking about climate and conservation of resources have inspired the design of the built and open spaces

Phasing

To avoid the appearance of a construction site during the continuous development phase, the University started from a small initial nucleus of academic and residential buildings that grow in a linear fashion. This approach of building in phases facilitates continuous expansion with the least disturbance to the buildings and landscape already in use. It also permits one to develop only as much land as required, minimizing infrastructural development costs.

WALKING CAMPUS
With most of the facilities located close together & its short distances connected with landscape areas, the compact planning of the campus encourages pedestrianisation

With the compact layout of buildings, breezeways oriented away from the

prevailing winds, tree plantation at strategic places, the campus has plenty of open spaces for rest, contemplation and community activity. NIIT University set out to demonstrate that financial sustainability can go hand in hand with environmental sustainability. This may not always be possible in individual buildings but where larger developments are visualized, local challenges can be met effectively if available natural resources are understood and deployed properly. Respect of site's natural conditions, climate and topography responsive design, adopting a high-density model of development, phased development [with a small area in the beginning], limited vehicular circulation roads within the campus, pedestrian-friendly development and solar-passive design with Earth tunnel cooling system are some of the strategies adopted to create a sustainable campus.

TOTAL AREA: **100 acres**
BUILT-UPAREATOTAL: **3,00,000 sqm**
AT CAPACITY OF 7500 STUDENTS
PHASE-1: **40,550 sqm**
Source: LA, Journal of Landscape Architecture, 66, 202, ISSN 0975-0177

YRM [London] created the first master plan for 3000 students on the 100-acre site. It was based upon the carrying capacity of site for available water from harvested rainwater. The number of students was not considered financially viable by the University. The final master plan was developed jointly by YRM and **Space Design Consultants** for 75 acres land and 7500 students after hydro-geological studies established greater potential for harvesting rainwater from the nearby Aravali hills. **Mohammed Shaheer** joined the team during the second master planning exercise, helped establish a method for conserving water for landscaping. He and his team continued with landscape development long after our work as master planners and architects of the first phase buildings was over.