Teaching Pedagogy
Building services (Fire fighting and Acoustics)

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Brick School of Architecture

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STRUCTURE OF THE PRESENTATION

- Pedagogy
- Pedagogical approach and teaching learning outcomes
- Sample outcomes to demonstrate effectiveness of pedagogy

COURSE OBJECTIVES

- To introduce aspects of Indoor Environmental Quality in terms of good hearing conditions.
- To make them understand fire safety's considerations by safe design and incorporation of safety norms the design of buildings

SPPU MARKING SCHEME

BUILDING SERVICES IV			
Subject Code		3201550 (SS) 3201551(PP)	
Teaching Scheme		Examination Scheme	
Total Contact Periods per week (Lectures = 2 Studio = 2)	4	Sessional (Internal)	25
		Sessional (External)	25
		Viva (Internal)	nil
		Viva (External)	nil
		In-Semester exam	30
		End-Semester exam	70
		Total Marks	150
		Total Credits	3

The credits assigned to this subject are really less. There is no viva but there is theory paper. Challenge was to make this technical subject interesting.

SYLLABUS AS PER SPPU

Unit I: Fire Fighting I

1.1. Fire triangle, Causes and spread of fire in buildings, fire resistance

1.2. Active control systems of fire: fixed and portable fire fighting equipment

Unit II: Fire Fighting II

2.1. Passive control of fire: fire safety codes, rules and regulations

Unit III: Acoustics I

3.1. Properties and defects of sound

3.2. Parameters for good acoustical condition of a room

Unit IV: Acoustics II

4.1. Noise control methods for air-borne and structure-borne noises

4.2. Acoustical materials and construction

4.3. Sound amplification system

Unit V: Acoustics III

5.1. Reverberation time calculation and recommendations for acoustical treatment

5.2. Acoustical treatment Layout design

PEDAGOGY WAS GIVEN THOUGHT DURING

1. Lesson plan preparation
2. Design of inputs and study material
3. Interaction with students, classes , site work and drafting
4. Assimilation

PEDAGOGY WAS FRAMED AROUND FOLLOWING POINTS

- Contextualization and Sensitizing about need of the subject in the area of architecture
- Use of modern teaching aids
- Challenging Activities
- Participative approach

CONTEXTUALIZATION AND SENSITIZING

- **Making Meaning: Connecting students to present environment and the places where they can contribute with their professional intellect**
- Students' own knowledge of experiences of spaces and their acoustical response to be revised as a foundation for new knowledge.
- Providing and discussing experiences that show abstract concepts are drawn from and applied to the everyday world.
- Developing 'understanding' by connecting new learning to previous knowledge of Building materials and technologies and building bye-laws.

Challenging Activities

•Contextualization and Sensitizing

•Participative approach

CONTEXTUALIZATION AND SENSITIZING-

THIS IS HOW IT WAS DONE IN THE FIRST CLASS

Week 1 of the acoustics was a discussion session on the experiential architecture. Students have memories of the spaces that connect to acoustical comfort or discomfort. To understand why it would have happened, there was a detailed discussion. Class happened in outdoor areas and students wrote their experiences in their book in 20 minutes and then they shared it with all. Faculty helped them understanding the key words of acoustics with these experiences. In every class and topic these experiences were taken as background of the principles.

Examples of key words that had come out of theis discussion-

Transmission of sound, Structure borne sound, Air-borne sound, Sound masking, acoustical comfort, acoustical shadows

CONTEXTUALIZATION AND SENSITIZING-

THIS IS HOW IT WAS DONE

All the students were asked to download the app "decibel meter" on their smart phone and then sensitization was done for all the various types of sound zone in urban context.

To begin with this, they were sent at different venues in campus and later they wrote the sound levels at these locations

Challenging Activities

•Contextualization and Sensitizing
•Participative approach

CONTEXTUALIZATION AND SENSITIZING-

THIS IS HOW IT WAS DONE IN THE BEGINNING

Week 1 of Fire-fighting was a discussion session on the parameters of architectural design that have role in fire-safety. The basic physics of spread of fire was introduced to them. Then they were asked to find the news regarding hazards that have happened because of fire. The discussion over these news happened to see where did architectural design go wrong and how architects can play role to make buildings fire-proof.

Later stage they were supposed to apply knowledge of this subject (acoustics and fire-fighting) to their present design.

CHALLENGING ACTIVITIES

- Cognitively challenges; i.e., instruction that requires thinking and analysis, not only rote, repetitive, detail-level drills.
- Giving them works that need careful leveling of tasks, so that students are motivated to stretch.
- Assisting students to accomplish more complex understanding by building from their previous success of the explorations.

CHALLENGING ACTIVITIES

THIS IS HOW IT WAS DONE

- **Connecting theory to practice-** The most challenging activity given was to correct the acoustics of their own classrooms with cost effective installation.
- They were asked to find out the sources of sound, make observations over the period of time (during morning, lunch break, post studio hours, festivals, etc, and then to see the role of building to achieve best possible environment for the purpose it has been designed.
- Market survey and its analysis were also the challenging task. As they were supposed to see the installation procedure with construction detail. Also, as the available materials in market for acoustics are generally expensive, they were made to think that what can make it.

CHALLENGING ACTIVITIES

THIS IS HOW IT WAS DONE

Students preparing installation to correct the acoustics

PARTICIPATIVE APPROACH

THIS IS HOW IT WAS DONE

- Teaching Through Conversation and working together
- Continuous connection with the class, and being with them even during site work and studio work
- Involving them in problem solving
- Making sure that student talk occurs at higher rates than teacher talking to them
- Ensuring that all students are included in the conversation according to their preferences.
- Listening carefully to assess levels of students' understanding.
- Assisting students' learning throughout the conversation by questioning, restating, praising, encouraging, etc.

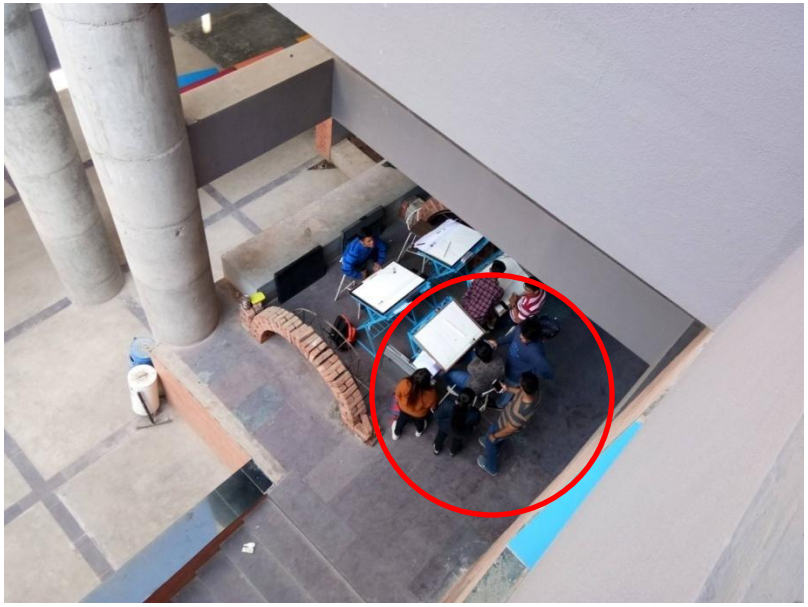
PARTICIPATIVE APPROACH

THIS IS HOW IT WAS DONE

- Two major explorations were designed for class group work, and faculty also acted like a mentor and team member.
- One was correction of studio acoustics, and the other was case studies for fire-fighting and acoustics.
- Every class had a discussion session, where, students' own experiences, thoughts were given priority and faculty just acted like a session chair.
- The individual works were two works, one small and one pertaining to their own design

PARTICIPATIVE APPROACH

THIS IS HOW IT WAS DONE



Students taking sound levels at different places

Challenging Activities

•Contextualization and Sensitizing
•Participative approach

PARTICIPATIVE APPROACH

THIS IS HOW IT WAS DONE

Discussion time in outdoor classes

Challenging Activities

•Contextualization and Sensitizing
•Participative approach

PARTICIPATIVE APPROACH

THIS IS HOW IT WAS DONE

Students preparing installations in class

PARTICIPATIVE APPROACH

THIS IS HOW IT WAS DONE

Students preparing installations in class

Challenging Activities

•Contextualization and Sensitizing
•Participative approach

STRUCTURE OF LESSON PLAN

1. Understanding course objective and interpreting in pedagogy
2. Designing Weekly schedule
3. Interpretation of sessional works in the explorations
4. Defining work assessment parameters
5. Incorporating learning applied from the previous term

2. PEDAGOGICAL APPROACH AND OUTPUT

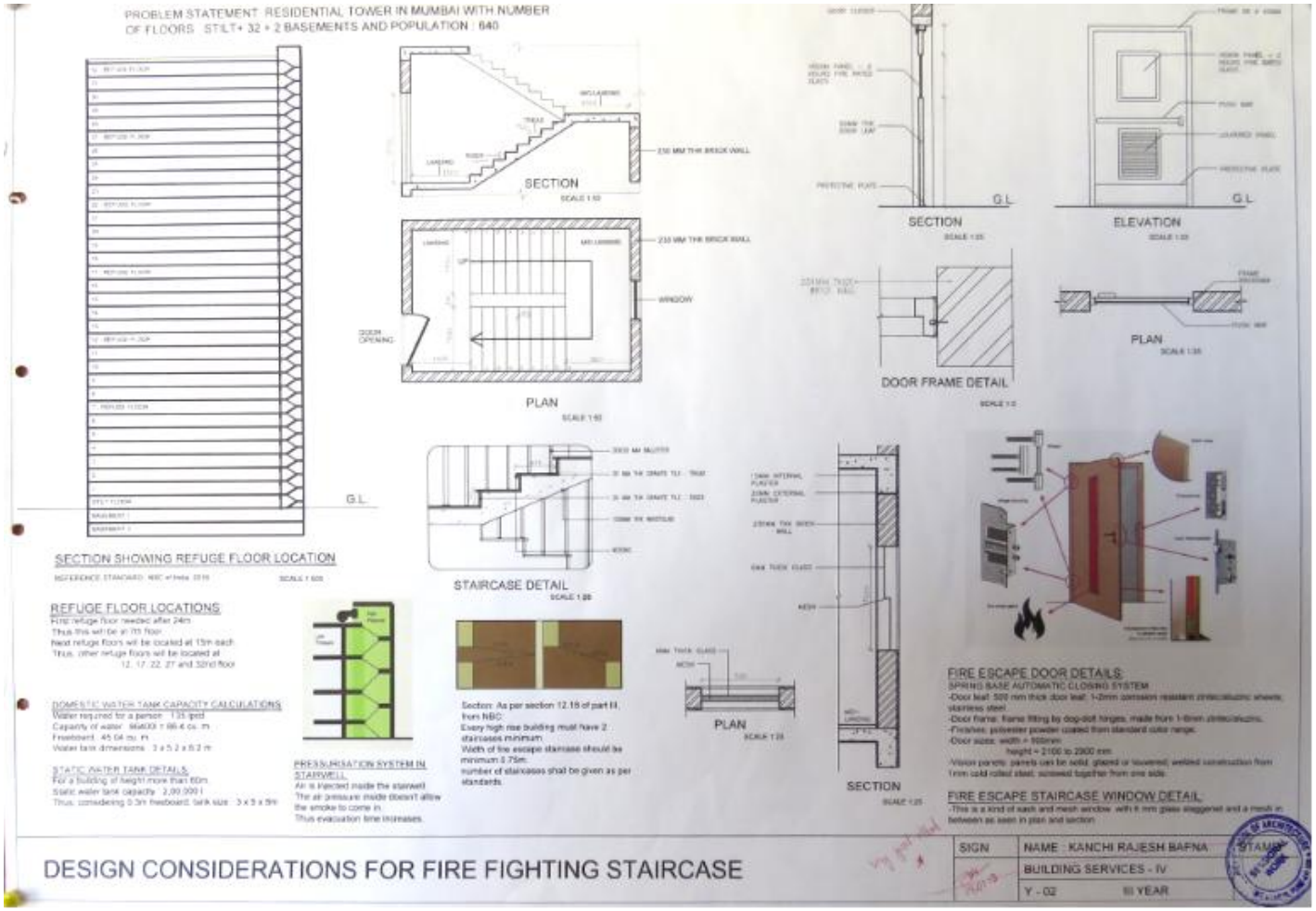
HOW THIS PEDAGOGICAL APPROACH IMPROVED TEACHING LEARNING OUTCOMES?

FOLLOWING WERE THE LEARNING OUTPUTS

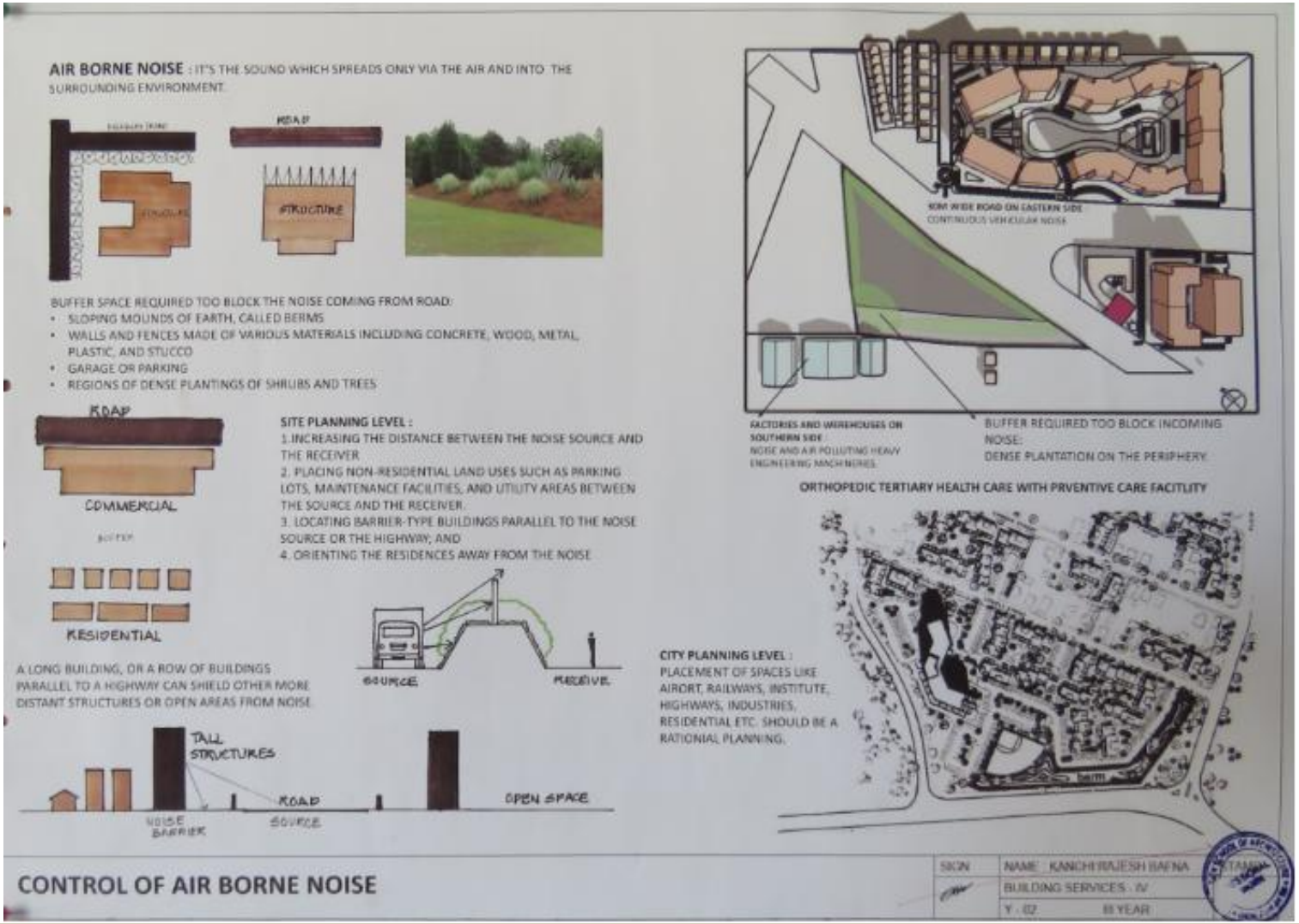
1. Students now are sensitized towards the passive design features that play major role in fire safety and acoustical comfort.
2. Concepts and Passive strategies adopted for acoustics and fire safe design are clear
3. Application base has been made stronger in Architectural Design
4. Enabling choice of appropriate system, materials and integration into Design

3. EXAMPLES OF OUTPUT

Design of fire fighting stair case

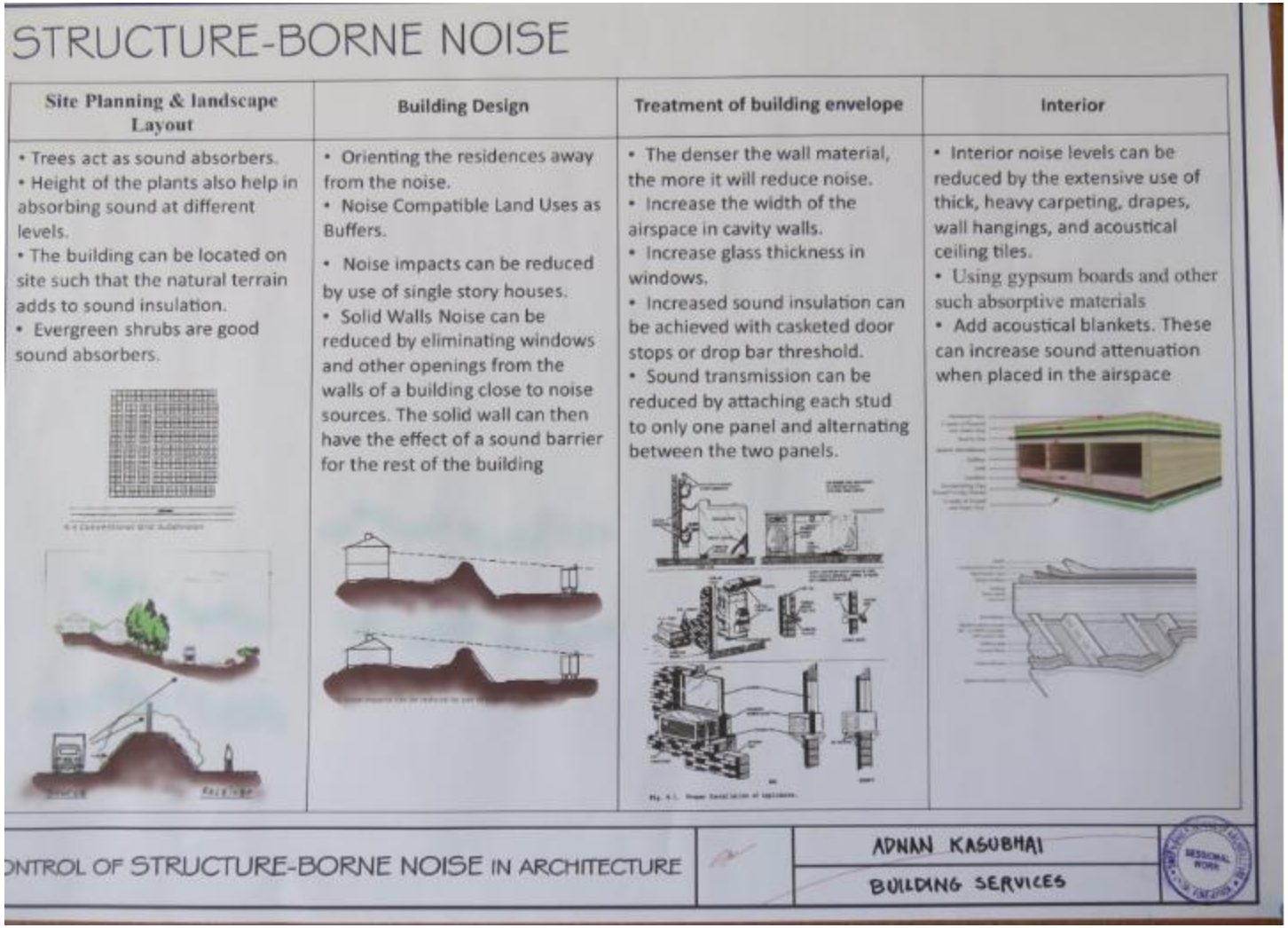


Control of structure borne and Air borne noise in Architecture



3. EXAMPLES OF OUTPUT

Control of structure borne and Air borne noise in Architecture



STRUCTURE-BORNE NOISE

Site Planning & landscape Layout	Building Design	Treatment of building envelope	Interior
• Trees act as sound absorbers. • Height of the plants also help in absorbing sound at different levels. • The building can be located on site such that the natural terrain adds to sound insulation. • Evergreen shrubs are good sound absorbers.	• Orienting the residences away from the noise. • Noise Compatible Land Uses as Buffers. • Noise impacts can be reduced by use of single story houses. • Solid Walls Noise can be reduced by eliminating windows and other openings from the walls of a building close to noise sources. The solid wall can then have the effect of a sound barrier for the rest of the building	• The denser the wall material, the more it will reduce noise. • Increase the width of the airspace in cavity walls. • Increase glass thickness in windows. • Increased sound insulation can be achieved with casketed door stops or drop bar threshold. • Sound transmission can be reduced by attaching each stud to only one panel and alternating between the two panels.	• Interior noise levels can be reduced by the extensive use of thick, heavy carpeting, drapes, wall hangings, and acoustical ceiling tiles. • Using gypsum boards and other such absorptive materials • Add acoustical blankets. These can increase sound attenuation when placed in the airspace

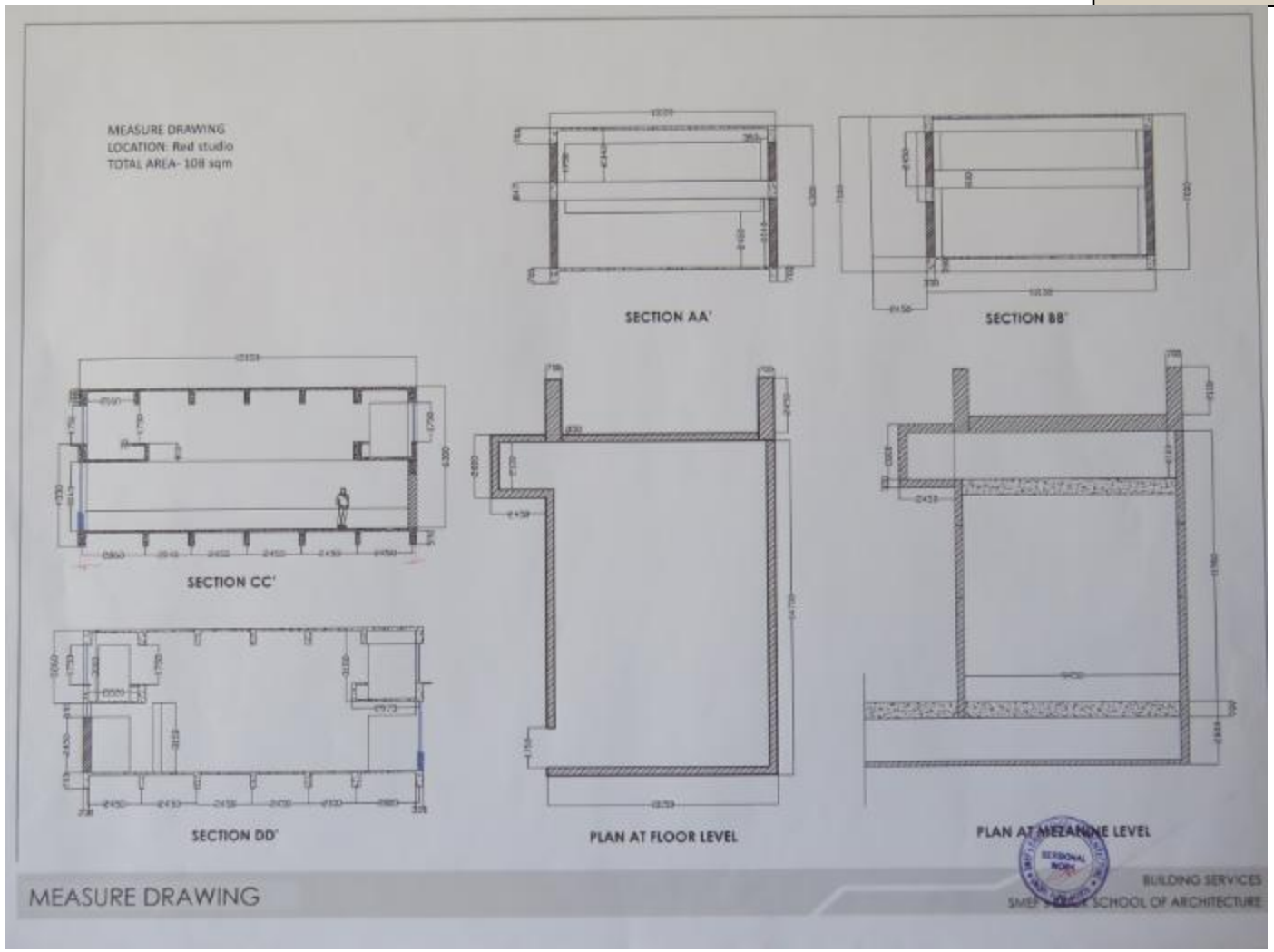
ONTROL OF STRUCTURE-BORNE NOISE IN ARCHITECTURE

ADNAN KASUBHAI

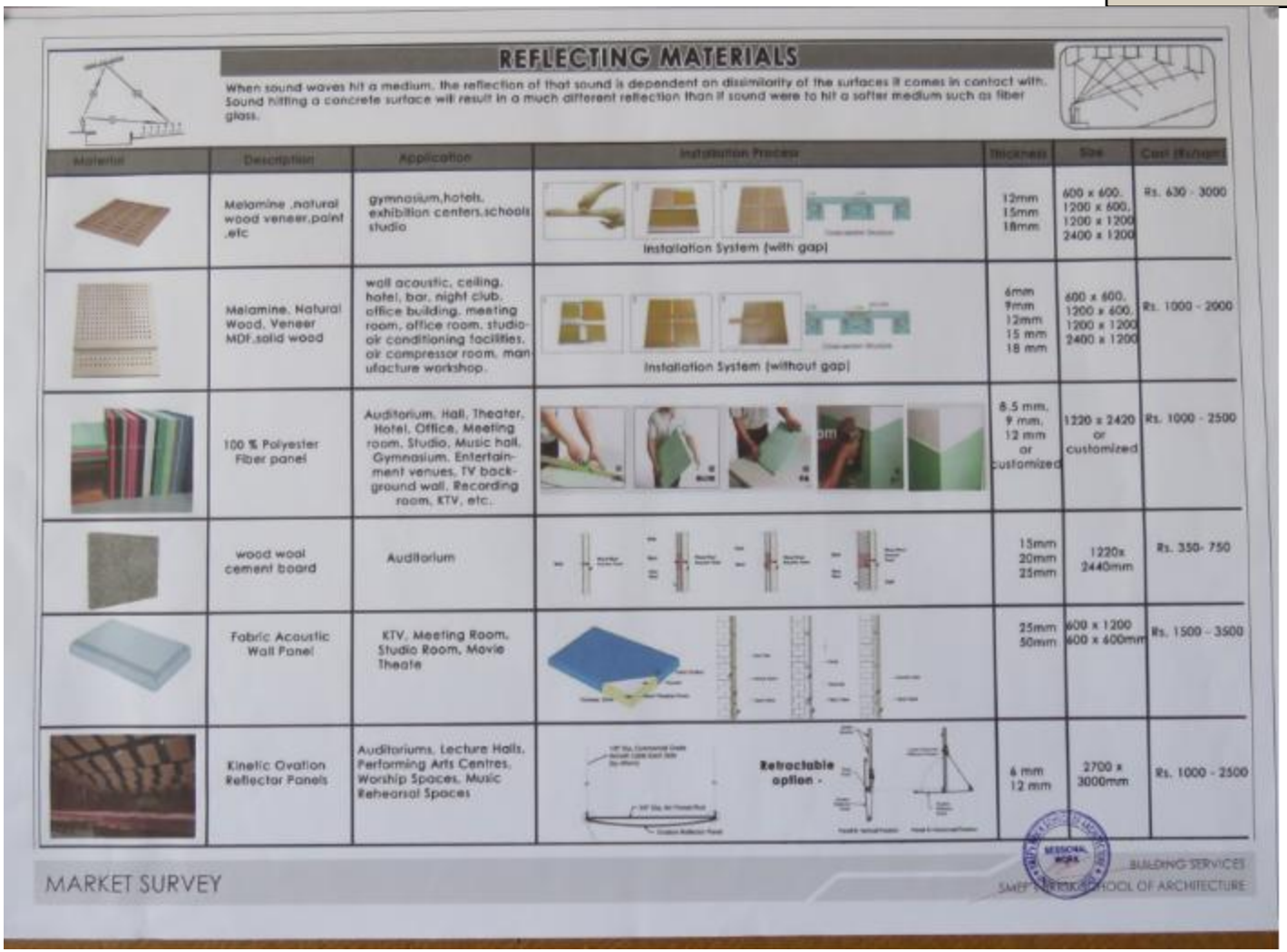
BUILDING SERVICES

3. EXAMPLES OF OUTPUT

Correction of studio acoustics



Correction of studio acoustics



REFLECTING MATERIALS

When sound waves hit a medium, the reflection of that sound is dependent on dissimilarity of the surfaces it comes in contact with. Sound hitting a concrete surface will result in a much different reflection than if sound were to hit a softer medium such as fiber glass.

Material	Description	Application	Installation Process	Thickness	Size	Cost (Rs/sqm)
	Melamine ,natural wood veneer,paint ,etc	gymnasium,hotels, exhibition centers,schools studio	Installation System (with gap)	12mm 15mm 18mm	600 x 600, 1200 x 600, 1200 x 1200 2400 x 1200	Rs. 630 - 3000
	Melamine, Natural Wood, Veneer MDF,solid wood	wall acoustic, ceiling, hotel, bar, night club, office building, meeting room, office room, studio-air conditioning facilities, air compressor room, manufacture workshop.	Installation System (without gap)	6mm 9mm 12mm 15 mm 18 mm	600 x 600, 1200 x 600, 1200 x 1200 2400 x 1200	Rs. 1000 - 2000
	100 % Polyester Fiber panel	Auditorium, Hall, Theater, Hotel, Office, Meeting room, Studio, Music hall, Gymnasium, Entertainment venues, TV background wall, Recording room, KTV, etc.		8.5 mm, 9 mm, 12 mm or customized	1220 x 2420 or customized	Rs. 1000 - 2500
	wood wool cement board	Auditorium		15mm 20mm 25mm	1220x 2440mm	Rs. 350- 750
	Fabric Acoustic Wall Panel	KTV, Meeting Room, Studio Room, Movie Theate		25mm 50mm	600 x 1200 600 x 600mm	Rs. 1500 - 3500
	Kinetic Ovation Reflector Panels	Auditoriums, Lecture Halls, Performing Arts Centres, Worship Spaces, Music Rehearsal Spaces	Retractable option -	6 mm 12 mm	2700 x 3000mm	Rs. 1000 - 2500

MARKET SURVEY

BUILDING SERVICES

SMRK BRICK SCHOOL OF ARCHITECTURE

Correction of studio acoustics

TYPES OF CEILING APPLIED ACOUSTIC MATERIALS

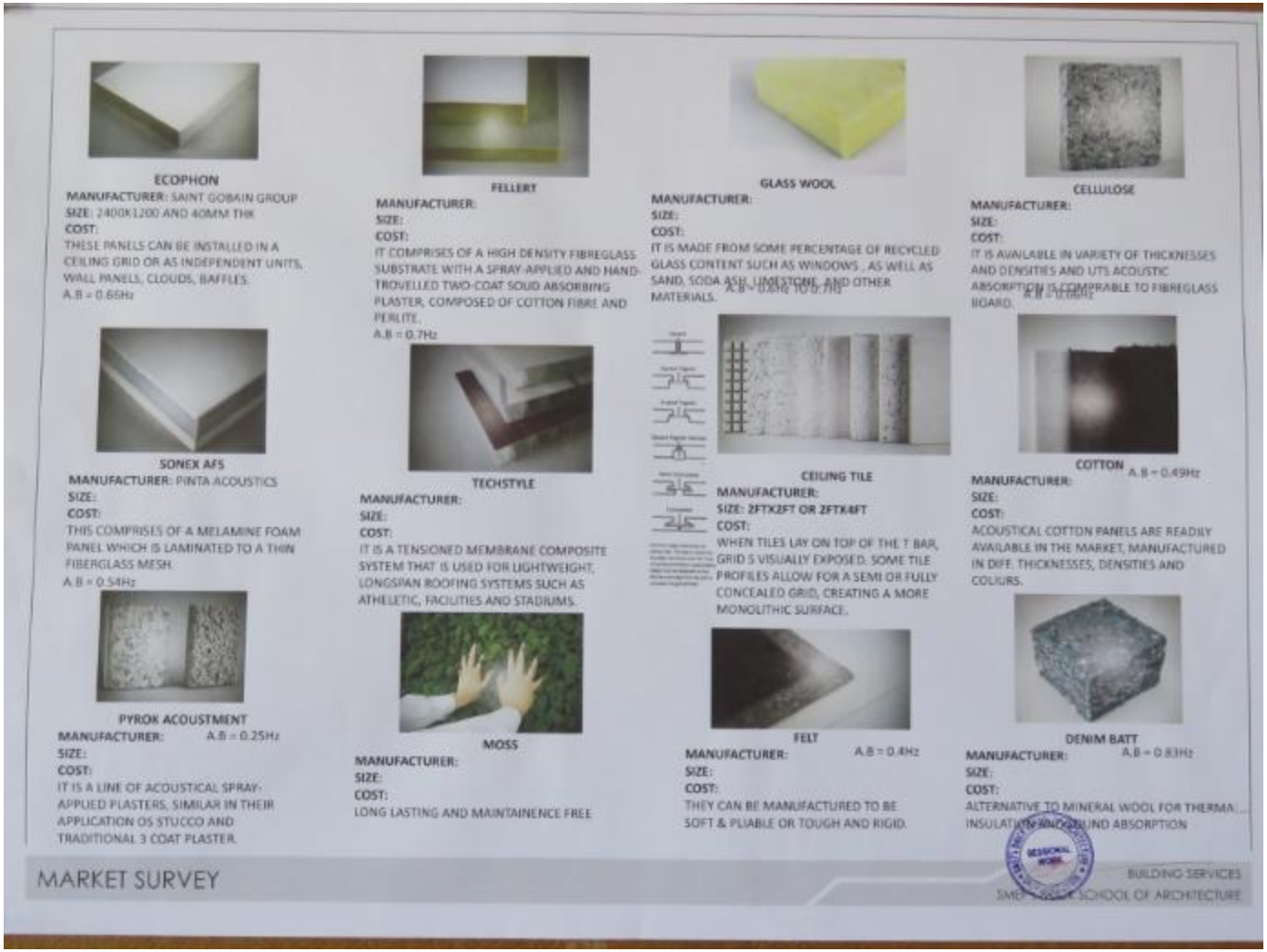
MOST COMMON MATERIALS USED: POROUS GYPSUM BOARD, FIBREWOOL, GLASSWOOL, MINERALWOOL, ACOUSTIC FOAM, FELT, PLUSH FABRICS, PVC SHEETS

CEILING TILES	CEILING CLOUDS	CEILING BAFFERS	CEILING BANNERS	CEILING DIFFUSERS
APPLICATION: COMMERCIAL SPACES, BOARD ROOMS, THEATRE AUDITORIUMS	**APPLICATION:**RESTAURANTS MALLS, ABOVE STAGE AREA, ARENAS, BROADCAST ROOM	**APPLICATION:** LARGE BOARD ROOMS, STADIUMS, INDOOR COURTS(SPORTS), FACTORIES	**APPLICATION:** RESTAURANTS OLYMPIC POOLS, THEATRES, ARENA, AUDITORIUMS	**APPLICATIONS:** BUNGALOWS RECORDING STUDIOS, THEATRES, LIBRARIES, CLASS
				
MANUFACTURER: SAINT GOBAIN **SIZES:** 600x600, 1200x600 **COST:** Rs.65/sq. ft.	**MANUFACTURER**: ACOUSTIC WORLD **SIZES:** 595x595, 1200x2400, CUSTOM SIZES AVAILABLE **COST:** Rs.500/sq. ft.	**MANUFACTURER**: ECOTONE INDIA, NOIDA **SIZES**: 250x1500, 250x1800 **COST:** Rs.145/sq. ft.	**MANUFACTURER**: ACOUSTICS FIRST **SIZES:** 600x600, 1200x600 **COST:** Rs.185/sq. ft.	**MANUFACTURER**: SANA ACOUSTICS, MUMBAI **SIZES:** 600x600, 1200x600 **COST:** Rs.2500/sq. ft.
MANUFACTURER: ARMSTRONG CEILINGS **SIZES:** 600x600, 1200x600 **COST:** Rs.78/sq. ft.	**MANUFACTURER**: ARMSTRONG CEILINGS **SIZES:** 600x600, 1200x2400 600-1500 DIA. CIRCULAR PANELS AVAILABLE **COST:** Rs.450/sq. ft.	**MANUFACTURER**: SNS ASSOCIATES **SIZES:** 250x1200, 250x2400 **COST:** Rs.145-/sq. ft.	**MANUFACTURER**: SAINT GOBAIN **SIZES:** 600x600, 1200x600 **COST:** Rs.290-340/sq. ft.	**MANUFACTURER**: PRIME ACOUSTICS, LUDHIYANA **SIZES:** 600x600, 1200x1200 **COST:** Rs.1600/sq. ft.
MANUFACTURER: VITERO TILES **SIZES:** 600x600, 1200x600 **COST:** Rs.75/sq. ft.	**MANUFACTURER**: SAINT GOBAIN GYPROC **SIZES:** 600x600, 1200x600 **COST:** Rs.650/sq. ft.	**MANUFACTURER**: ARMSTRONG CEILINGS **SIZES:** 400x1200, 400x1800 **COST:** Rs.165-180/sq. ft.	**MANUFACTURER**: ARMSTRONG CEILINGS **SIZES:** 200x1200, 500x1600, CURVED PANELS AVAILABLE. **COST:** Rs.225-245/sq. ft.	**MANUFACTURER**:SYMPHONY DESIGN GROUP, BANGALURU **SIZES:** 600x600, 1200x600 **COST:** Rs.1200/sq. ft.

MARKET SURVEY

3. EXAMPLES OF OUTPUT

Correction of studio acoustics



ECOPHON
MANUFACTURER: SAINT GOBAIN GROUP
SIZE: 2400X1200 AND 40MM THK
COST:
THESE PANELS CAN BE INSTALLED IN A CEILING GRID OR AS INDEPENDENT UNITS, WALL PANELS, CLOUDS, BAFFLES.
A.B = 0.66Hz

FELLERT
MANUFACTURER:
SIZE:
COST:
IT COMPRISES OF A HIGH DENSITY FIBREGLASS SUBSTRATE WITH A SPRAY-APPLIED AND HAND-TROVELLED TWO-COAT SOUD ABSORBING PLASTER, COMPOSED OF COTTON FIBRE AND PERLITE.
A.B = 0.7Hz

GLASS WOOL
MANUFACTURER:
SIZE:
COST:
IT IS MADE FROM SOME PERCENTAGE OF RECYCLED GLASS CONTENT SUCH AS WINDOWS , AS WELL AS SAND, SODA ASH, LIMESTONE, AND OTHER MATERIALS.

CELLULOSE
MANUFACTURER:
SIZE:
COST:
IT IS AVAILABLE IN VARIETY OF THICKNESSES AND DENSITIES AND UTS ACOUSTIC ABSORPTION IS COMPRABLE TO FIBREGLASS BOARD.

SONEX AFS
MANUFACTURER: PINTA ACOUSTICS
SIZE:
COST:
THIS COMPRISES OF A MELAMINE FOAM PANEL WHICH IS LAMINATED TO A THIN FIBERGLASS MESH.
A.B = 0.54Hz

TECHSTYLE
MANUFACTURER:
SIZE:
COST:
IT IS A TENSIONED MEMBRANE COMPOSITE SYSTEM THAT IS USED FOR LIGHTWEIGHT, LONGSPAN ROOFING SYSTEMS SUCH AS ATHELETIC, FACILITIES AND STADIUMS.

CEILING TILE
MANUFACTURER:
SIZE: 2FTX2FT OR 2FTX4FT
COST:
WHEN TILES LAY ON TOP OF THE T BAR, GRID S VISUALLY EXPOSED. SOME TILE PROFILES ALLOW FOR A SEMI OR FULLY CONCEALED GRID, CREATING A MORE MONOLITHIC SURFACE.

COTTON
A.B = 0.49Hz
MANUFACTURER:
SIZE:
COST:
ACOUSTICAL COTTON PANELS ARE READILY AVAILABLE IN THE MARKET, MANUFACTURED IN DIFF. THICKNESSES, DENSITIES AND COLURS.

PYROK ACOUSTMENT
A.B = 0.25Hz
MANUFACTURER:
SIZE:
COST:
IT IS A LINE OF ACOUSTICAL SPRAY-APPLIED PLASTERS, SIMILAR IN THEIR APPLICATION OS STUCCO AND TRADITIONAL 3 COAT PLASTER.

MOSS
MANUFACTURER:
SIZE:
COST:
LONG LASTING AND MAINTAINENCE FREE

FELT
A.B = 0.4Hz
MANUFACTURER:
SIZE:
COST:
THEY CAN BE MANUFACTURED TO BE SOFT & PLIABLE OR TOUGH AND RIGID.

DENIM BATT
A.B = 0.83Hz
MANUFACTURER:
SIZE:
COST:
ALTERNATIVE TO MINERAL WOOL FOR THERMA... INSULATION AND SOUND ABSORPTION

MARKET SURVEY

BUILDING SERVICES
SMD... SCHOOL OF ARCHITECTURE

Correction of studio acoustics

3. EXAMPLES OF OUTPUT

Correction of studio acoustics

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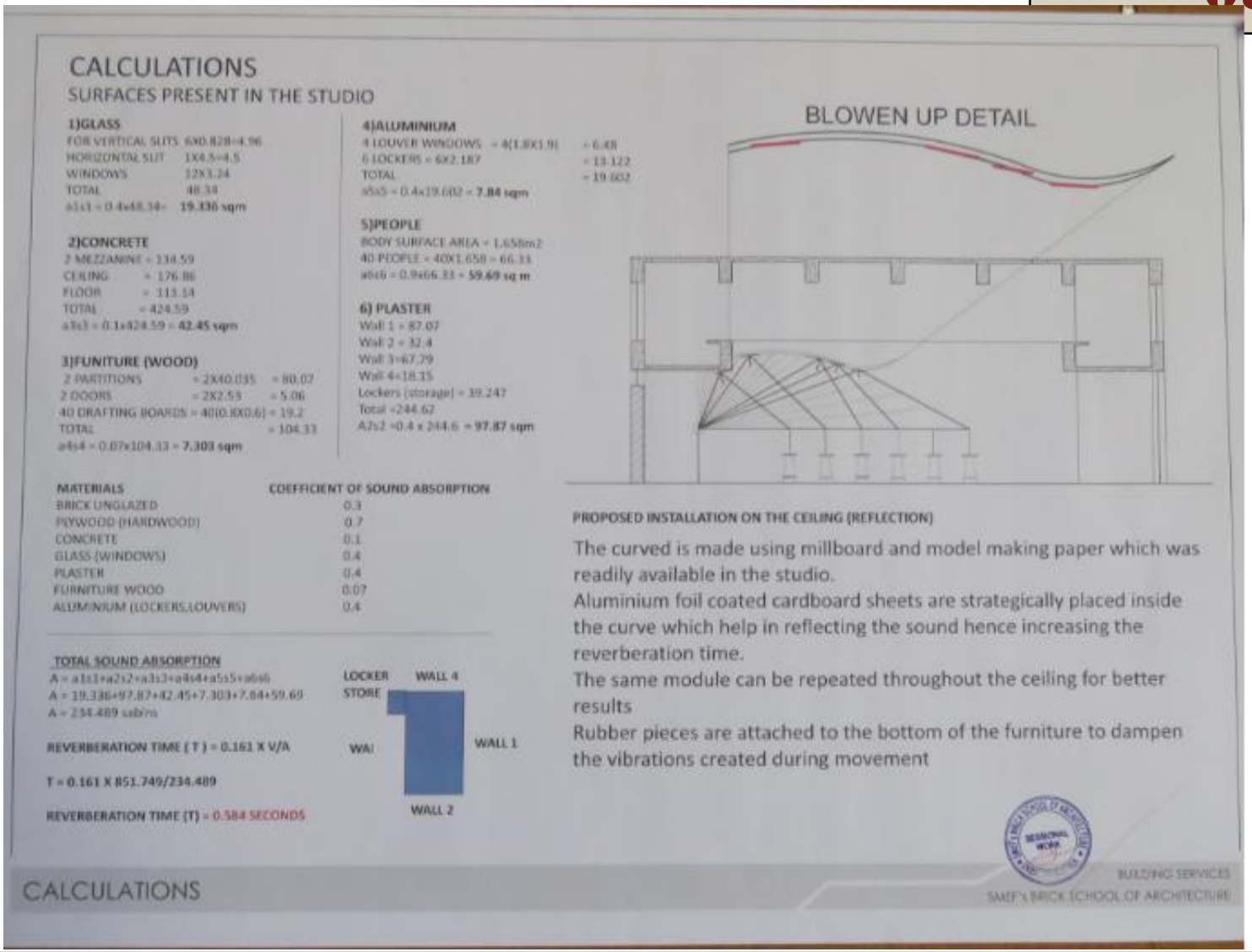


CALCULATIONS

SURFACES PRESENT IN THE STUDIO

1)GLASS
FOR VERTICAL SLITS 6X0.828=4.96
HORIZONTAL SLIT 1X4.5=4.5
WINDOWS 12X3.24
TOTAL 48.34
a1s1 = 0.4x48.34= **19.336 sqm**

2)CONCRETE
2 MEZZANINE = 134.59
CEILING = 176.86
FLOOR = 113.14
TOTAL = 424.59
a3s3 = 0.1x424.59 = **42.45 sqm**

3)FUNITURE (WOOD)
2 PARTITIONS = 2X40.035 = 80.07
2 DOORS = 2X2.53 = 5.06
40 DRAFTING BOARDS = 40(0.8X0.6) = 19.2
TOTAL = 104.33
a4s4 = 0.07x104.33 = **7.303 sqm**

4)ALUMINIUM
4 LOUVER WINDOWS = 4(1.8X1.9) = 6.48
6 LOCKERS = 6X2.187 = 13.122
TOTAL = 19.602
a5s5 = 0.4x19.602 = **7.84 sqm**

5)PEOPLE
BODY SURFACE AREA = 1.658m2
40 PEOPLE = 40X1.658 = 66.33
a6s6 = 0.9x66.33 = **59.69 sq m**

6) PLASTER
Wall 1 = 87.07
Wall 2 = 32.4
Wall 3=67.79
Wall 4=18.35
Lockers (storage) = 39.247
Total =244.62
A2s2 =0.4 x 244.6 = **97.87 sqm**

BLOWEN UP DETAIL

MATERIALS	COEFFICIENT OF SOUND ABSORPTION
BRICK UNGLAZED	0.3
PLYWOOD (HARDWOOD)	0.7
CONCRETE	0.1
GLASS (WINDOWS)	0.4
PLASTER	0.4
FURNITURE WOOD	0.07
ALUMINIUM (LOCKERS,LOUVERS)	0.4

TOTAL SOUND ABSORPTION
A = a1s1+a2s2+a3s3+a4s4+a5s5+a6s6
A = 19.336+97.87+42.45+7.303+7.84+59.69
A = 234.489 sabins

REVERBERATION TIME (T) = 0.161 X V/A

T = 0.161 X 851.749/234.489

REVERBERATION TIME (T) = 0.584 SECONDS

LOCKER STORE
WALL 4
WAI
WALL 1
WALL 2

PROPOSED INSTALLATION ON THE CEILING (REFLECTION)

The curved is made using millboard and model making paper which was readily available in the studio.
Aluminium foil coated cardboard sheets are strategically placed inside the curve which help in reflecting the sound hence increasing the reverberation time.
The same module can be repeated throughout the ceiling for better results
Rubber pieces are attached to the bottom of the furniture to dampen the vibrations created during movement

CALCULATIONS

BUILDING SERVICES
SMEF'S BRICK SCHOOL OF ARCHITECTURE

3. EXAMPLES OF OUTPUT

Correction of studio acoustics

Correction of studio acoustics

ACOUSTIC DEFECTS IN STUDIO

REVERBERATION
It is the persistence of sound in the enclosed space, after the source of sound has stopped. Reverberation time is, time taken for the sound to drop by 60db.

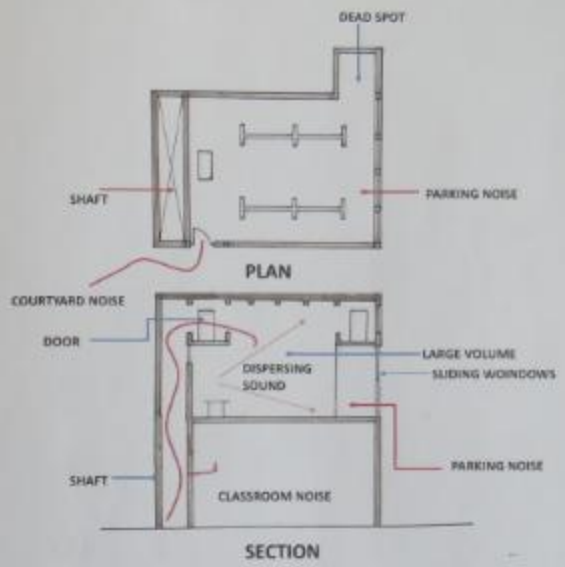
FORMATION OF ECHOS
An echo is produced when the reflected sound wave reaches the ear just when the original sound from the same source has been already heard. An echo must reach after one-tenth second of the direct sound.

SOUND FOCI
Sometimes the shape of the hall makes sound waves to concentrate in some particular areas of the hall creating a sound of large quality. These spots are called sound foci.

DEAD SPOTS
This defect is the outcome of formation of sound foci. Because of high concentration of reflected sound at sound foci, there is deficiency of related sound at some other points. These spots are known as dead spots where sound intensity is so low that it is insufficient for hearing.

EXTERNAL NOISE
External noises from vehicles, traffic engines, surrounding buildings, construction machines etc. may enter the studio either through openings or even through walls and other structural elements having improper sound insulation.

INSUFFICIENT LOUDNESS
Insufficient loudness is a factor affected by planning. The loss of sound as it travels across the studio due to the volumes and the materials of the space.



SOURCE	ACTIVITY	LOUDNESS(dB)
Courtyard	Playing + Breaktime	65-70
Shaft	Lectures	55-60
Mezzanine Door	Banging due to wind	45
Parking	Dispersal	30
Parking	Car horn	68-70

Note: All openings closed causes loudness to decrease by 8-10dB

INFERENCES

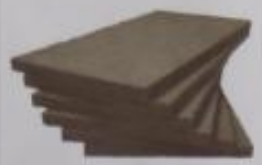
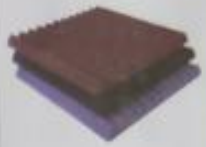
1) The initial sound from the source should be of adequate intensity so that it can be heard throughout the hall.
2) The boundary surface should be so designed that there are no echoes or near echoes.
3) The sound produced should be evenly distributed so that there is no dead spots and sound foci.
4) Dead spots can be removed by suitably placing diffusers and reflectors and with right proportions of internal spaces.
5) External noises can be removed by proper planning of the studio with respect to its surroundings and by proper sound insulation of external walls.

Richa Asangi, Pratik[illegible], [illegible] Mahore, Swarali Kapadnis, Nidha Sarif

3. EXAMPLES OF OUTPUT

Correction of studio acoustics

Correction of studio acoustics

TYPES	INSULATIVE WALL COVERINGS		ABSORPTIVE WALL COVERINGS		REFLECTIVE
COMPANY NAME	NanKarrow GeoWool Premium Acoustic Panels	NanKarrow QuadraFuse Premium Acoustic Diffuser	NanKarrow IsoBoard High Density Soundproofing Panel Board	Nankarrow GeoHive Wood Panels	Nankarrow NeoWave Wedge Acoustic Panel
IMAGES					
MATERIAL	PREMIUM ROCK WOOL	PREMIUM TAIGA SPRUCE WOOD	CEMENT - BONDED PARTICLE BOARD	NATURAL PINE WOOD	FUSED FOAM SHEETS
SIZES	4ft x 2ft & 12mm thk	2ft x 2ft & 6mm thk	8ft x 4ft & 10mm thk	1ft x 1ft & 2mm thk	2ft x 2ft & 4mm thk
COST	Rs.655/- per panel	Rs.1438/- per panel	Rs.1084/- per panel	Rs.410/- per piece	Rs.2980/- per panel
FEATURES	1. SUPERB ACOUSTIC PERFORMANCE. 2. DENSITY – 120 KG/CUBIC METER. 3. EXCELLENT LOW FREQUENCY ABSORPTION. 4. HIGH INSULATION EFFICIENCY FOR MAXIMUM THERMAL COMFORT. 5. NON-COMBUSTIBLE. 6. HIGH FIRE RESISTANCE.	1. FULLY CNC CUT WITH NO IMPERFECTIONS. 2. 2-D GRID DIFFUSER WITH HEMISPHERICAL SOUND SCATTERING. 3. EASY TO INSTALL. 4. COLOUR : NATURAL.	1. EXCELLENT SOUND ANNEUTATION PROPERTIES. 2. HIGH FIRE RESISTANCE. 3. EXCELLENT LOAD CARRYING CAPACITIES. 4. HIGHLY MOISTURE RESISTANT. 5. RESISTANT TO FUNGUS, TERMITE/VERMIN, IMPACT. 6. NON-TOXIC AND ENVIRONMENT FRIENDLY.	1. NATURAL PINE WOOD PRODUCT. 2. ENSURES OUTSTANDING ACOUSTIC PROPERTIES DUE TO OPEN SURFACE STRUCTURE. 3. NOT AFFECTED BY HUMIDITY. 4. PAINTABLE SURFACE.	1. FULLY CNC LASER CUT WITH NO IMPERFECTIONS. 2. ABSORBS MID AND HIGH FREQUENCY REFLECTIONS TO CONTROL AMBIENCE. 3. ALLEVIATES FLUTTER ECHO AND SLAP BACK.

MARKET STUDY - WALL COVERINGS FOR ACOUSTICS

B.S.O.A. T.Y.B.ARCH
BUILDING SERVICES 6

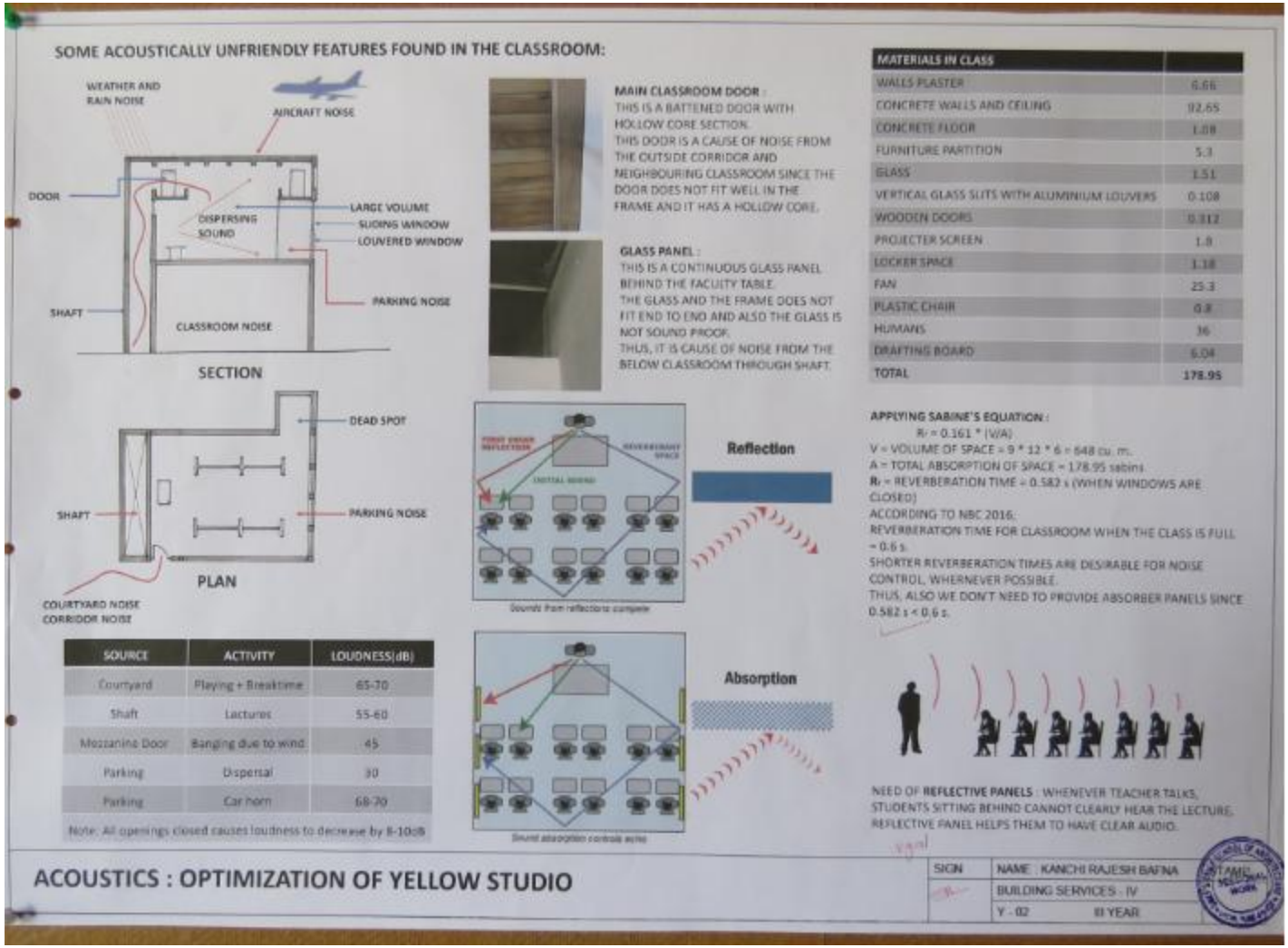
ANGH S (34) HEENAL S (37) SHREYA S (38) SMERA O (29) VIVEK J (17) BADR K (20) FATEMA K (21) SIDDHANT P (31) KRINJAL J (14) RASHMEET C (8)

Correction of studio acoustics

Correction of studio acoustics

3. EXAMPLES OF OUTPUT

Correction of studio acoustics

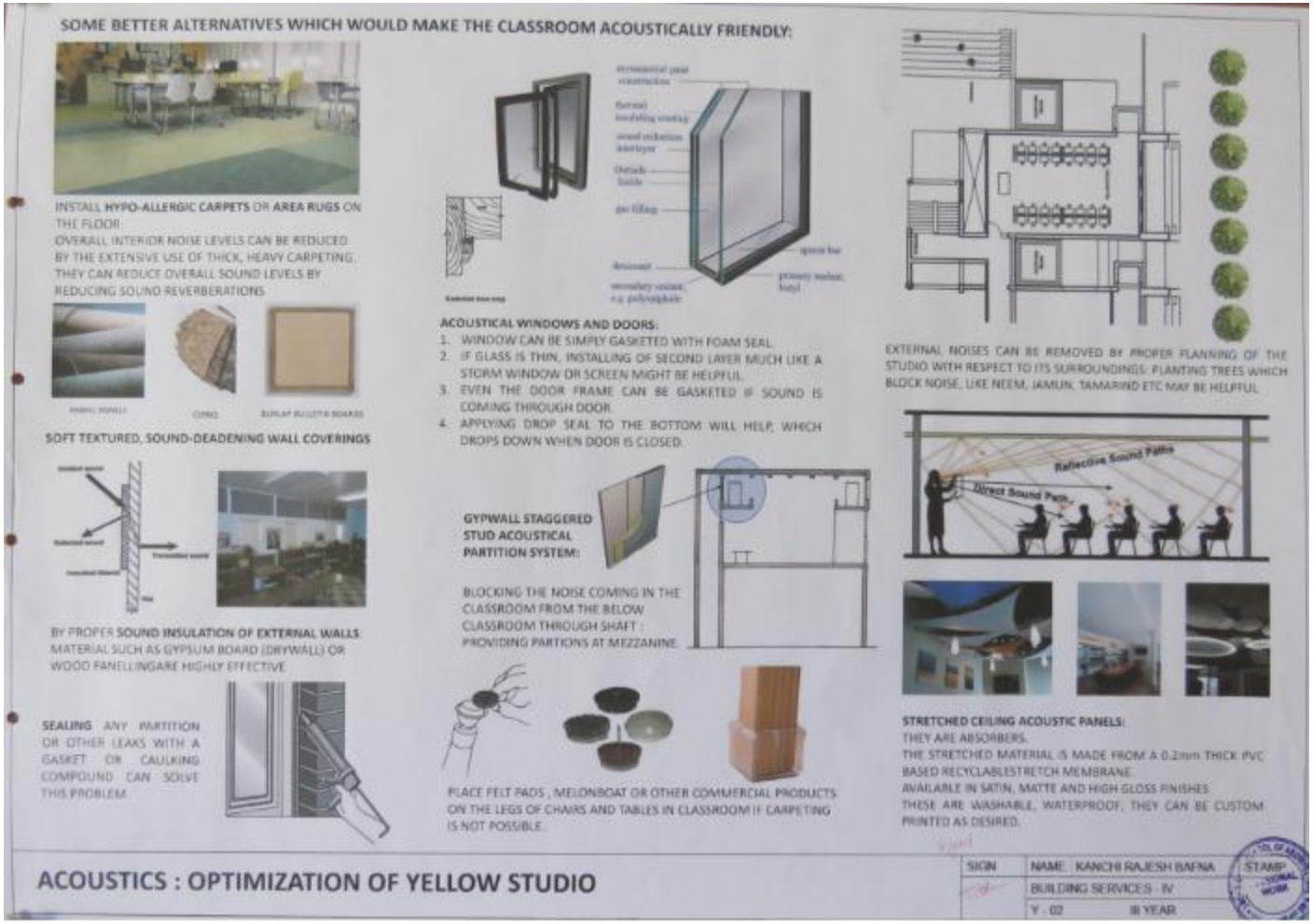


MATERIALS IN CLASS	
WALLS PLASTER	6.66
CONCRETE WALLS AND CEILING	92.65
CONCRETE FLOOR	1.08
FURNITURE PARTITION	5.3
GLASS	1.51
VERTICAL GLASS SLITS WITH ALUMINIUM LOUVERS	0.108
WOODEN DOORS	0.312
PROJECTER SCREEN	1.8
LOCKER SPACE	1.18
FAN	25.3
PLASTIC CHAIR	0.8
HUMANS	36
DRAFTING BOARD	6.04
TOTAL	178.95

SOURCE	ACTIVITY	LOUDNESS(dB)
Courtyard	Playing + Breaktime	65-70
Shaft	Lectures	55-60
Mezzanine Door	Banging due to wind	45
Parking	Dispersal	30
Parking	Car horn	68-70

Note: All openings closed causes loudness to decrease by 8-10dB

Correction of studio acoustics



3. EXAMPLES OF OUTPUT

Application of acoustics and fire-fighting principles in Architectural Design project of the current semester

Acoustical design- following points were expected in this exploration.

•Mapping of audible experiences within every space that is part of the design

•Listing down the design criteria as per students' concept and also w.r.t. the NBC 2005.

•Taking any two spaces from their building and making it fit for the given reverberation time.

Fire Safe design- Following points were expected in this exploration.

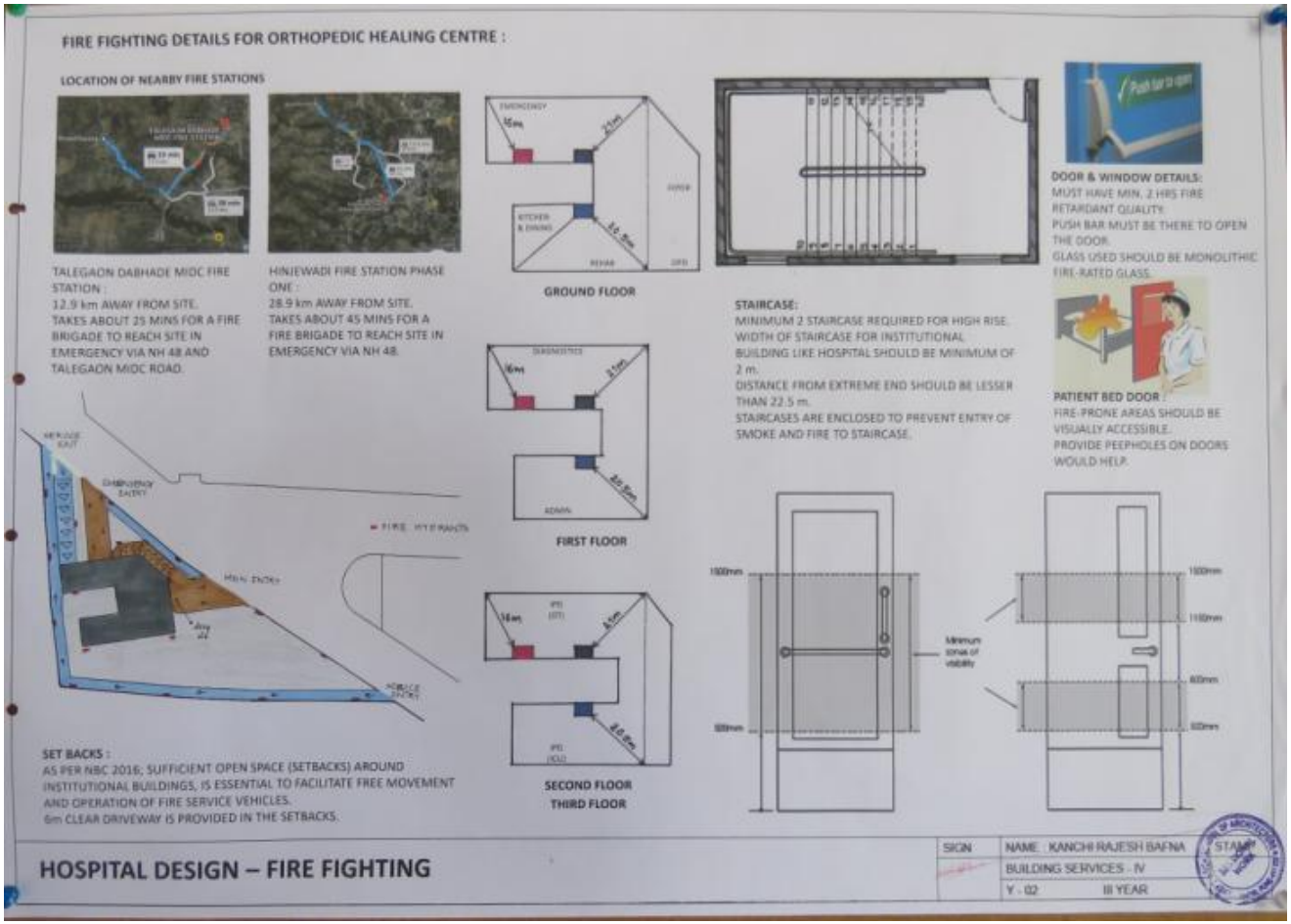
•Listing of the standards given in NBC in terms of the capacity of water tanks required, design of the sprinkler system, location of smoke detectors, fire alarms etc

•Site plan with the basic infrastructure required for fire safety.

•Layout of sprinkler system on typical floor plates

3. EXAMPLES OF OUTPUT

Application of acoustics and fire-fighting principles in Architectural Design project of the current semester



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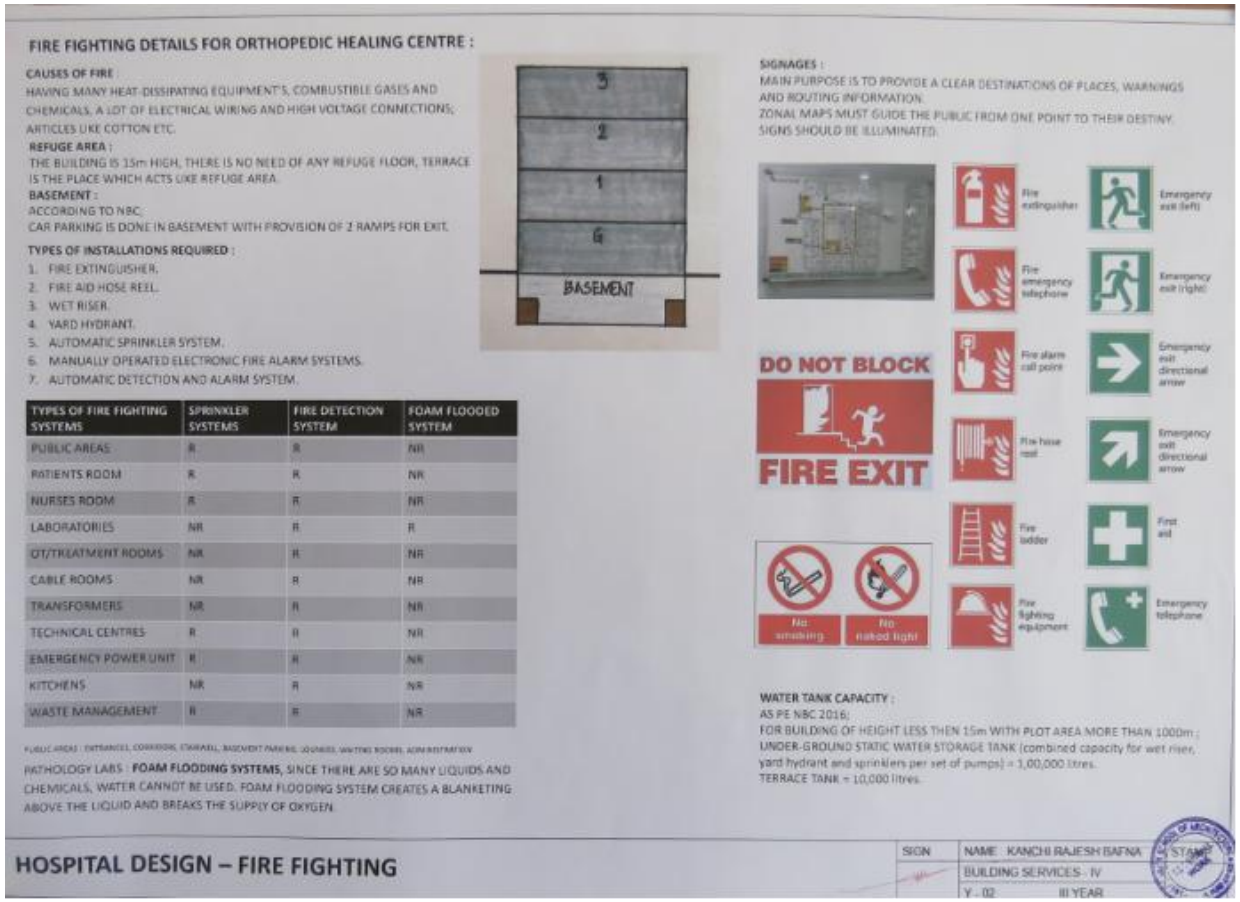

FIRE FIGHTING DETAILS FOR ORTHOPEDIC HEALING CENTRE :

CAUSES OF FIRE :
HAVING MANY HEAT-DISSIPATING EQUIPMENT'S, COMBUSTIBLE GASES AND CHEMICALS, A LOT OF ELECTRICAL WIRING AND HIGH VOLTAGE CONNECTIONS; ARTICLES LIKE COTTON ETC.

REFUGE AREA :
THE BUILDING IS 15m HIGH, THERE IS NO NEED OF ANY REFUGE FLOOR, TERRACE IS THE PLACE WHICH ACTS LIKE REFUGE AREA.

BASEMENT :
ACCORDING TO NBC,
CAR PARKING IS DONE IN BASEMENT WITH PROVISION OF 2 RAMPS FOR EXIT.

TYPES OF INSTALLATIONS REQUIRED :
1. FIRE EXTINGUISHER.
2. FIRE AID HOSE REEL.
3. WET RISER.
4. YARD HYDRANT.
5. AUTOMATIC SPRINKLER SYSTEM.
6. MANUALLY OPERATED ELECTRONIC FIRE ALARM SYSTEMS.
7. AUTOMATIC DETECTION AND ALARM SYSTEM.

TYPES OF FIRE FIGHTING SYSTEMS	SPRINKLER SYSTEMS	FIRE DETECTION SYSTEM	FOAM FLOODED SYSTEM
PUBLIC AREAS	R	R	NR
PATIENTS ROOM	R	R	NR
NURSES ROOM	R	R	NR
LABORATORIES	NR	R	R
OT/TREATMENT ROOMS	NR	R	NR
CABLE ROOMS	NR	R	NR
TRANSFORMERS	NR	R	NR
TECHNICAL CENTRES	R	R	NR
EMERGENCY POWER UNIT	R	R	NR
KITCHENS	NR	R	NR
WASTE MANAGEMENT	R	R	NR

PUBLIC AREAS : ENTRANCES, CORRIDOR, STAIRCASE, BASEMENT PARKING, LOUNGES, WAITING ROOMS, ADMINISTRATION

PATHOLOGY LABS : **FOAM FLOODING SYSTEMS**, SINCE THERE ARE SO MANY LIQUIDS AND CHEMICALS, WATER CANNOT BE USED. FOAM FLOODING SYSTEM CREATES A BLANKETING ABOVE THE LIQUID AND BREAKS THE SUPPLY OF OXYGEN.

SIGNAGES :
MAIN PURPOSE IS TO PROVIDE A CLEAR DESTINATIONS OF PLACES, WARNINGS AND ROUTING INFORMATION.
ZONAL MAPS MUST GUIDE THE PUBLIC FROM ONE POINT TO THEIR DESTINY.
SIGNS SHOULD BE ILLUMINATED.

WATER TANK CAPACITY :
AS PER NBC 2016;
FOR BUILDING OF HEIGHT LESS THEN 15m WITH PLOT AREA MORE THAN 1000m ;
UNDER-GROUND STATIC WATER STORAGE TANK (combined capacity for wet riser, yard hydrant and sprinklers per set of pumps) = 1,00,000 litres.
TERRACE TANK = 10,000 litres.

HOSPITAL DESIGN – FIRE FIGHTING

SIGN | NAME KANCHI RAJESH BAFNA | STAMP
BUILDING SERVICES - IV
Y - 02 III YEAR

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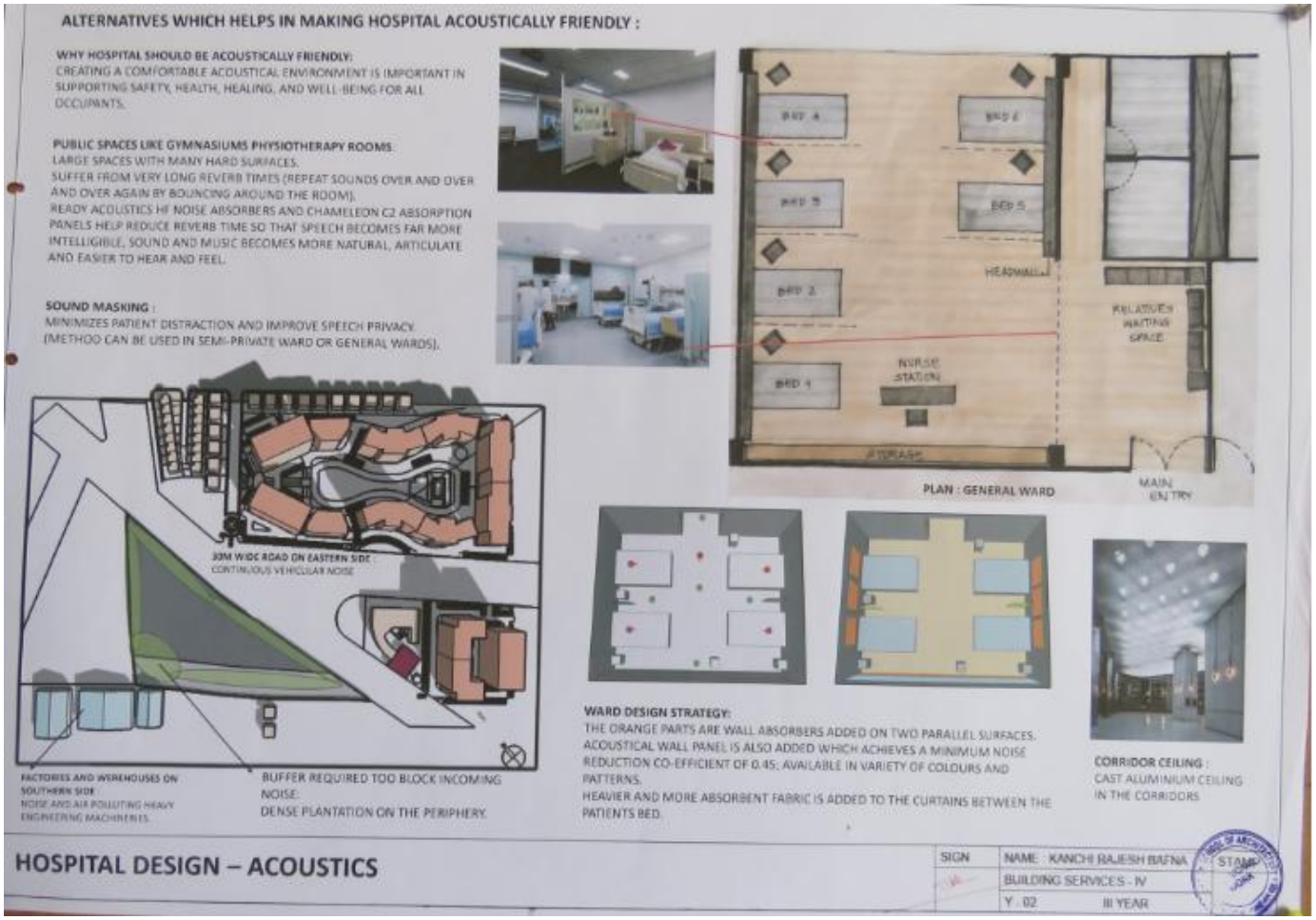
Application of acoustics and fire-fighting principles in Architectural Design project of the current semester



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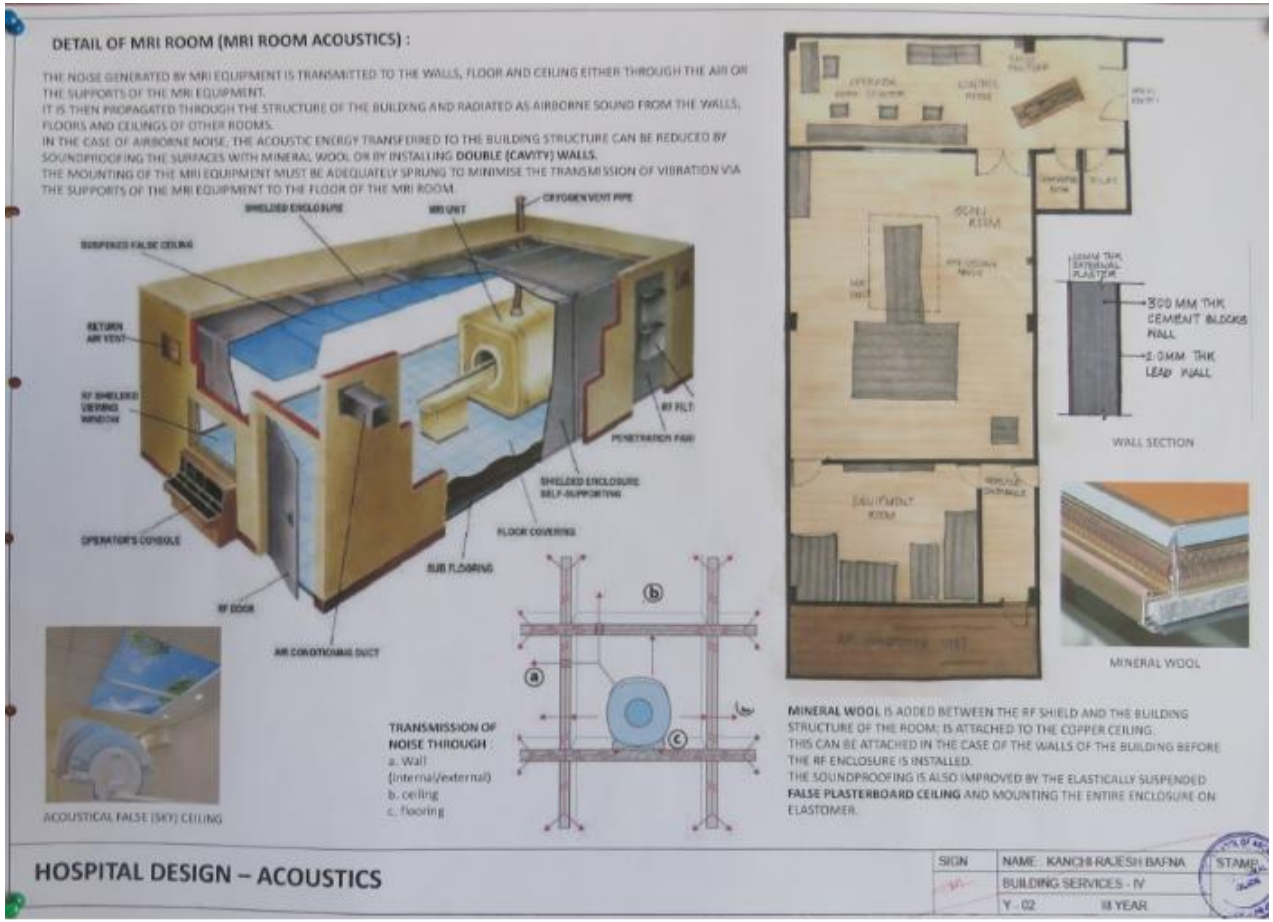

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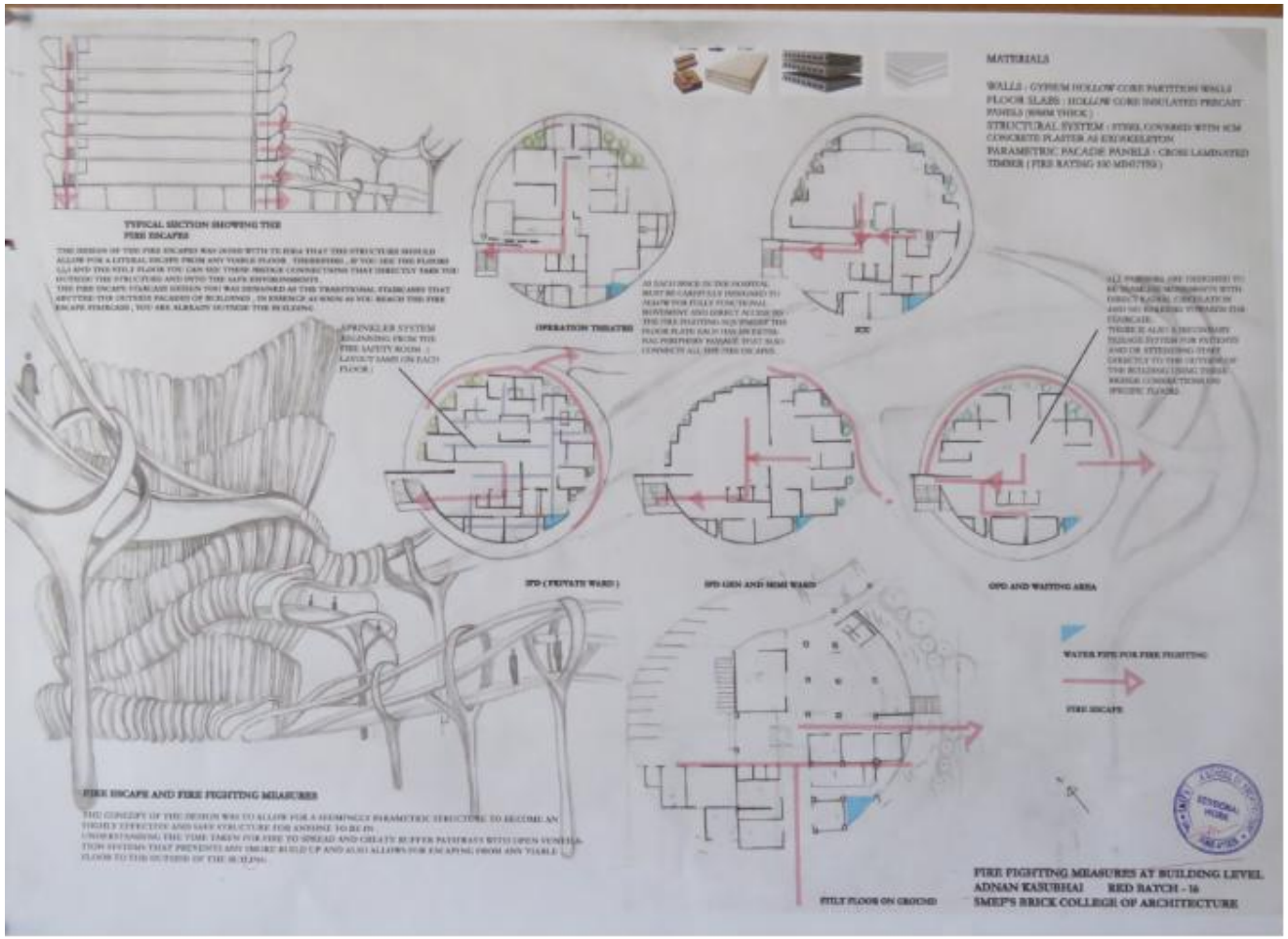

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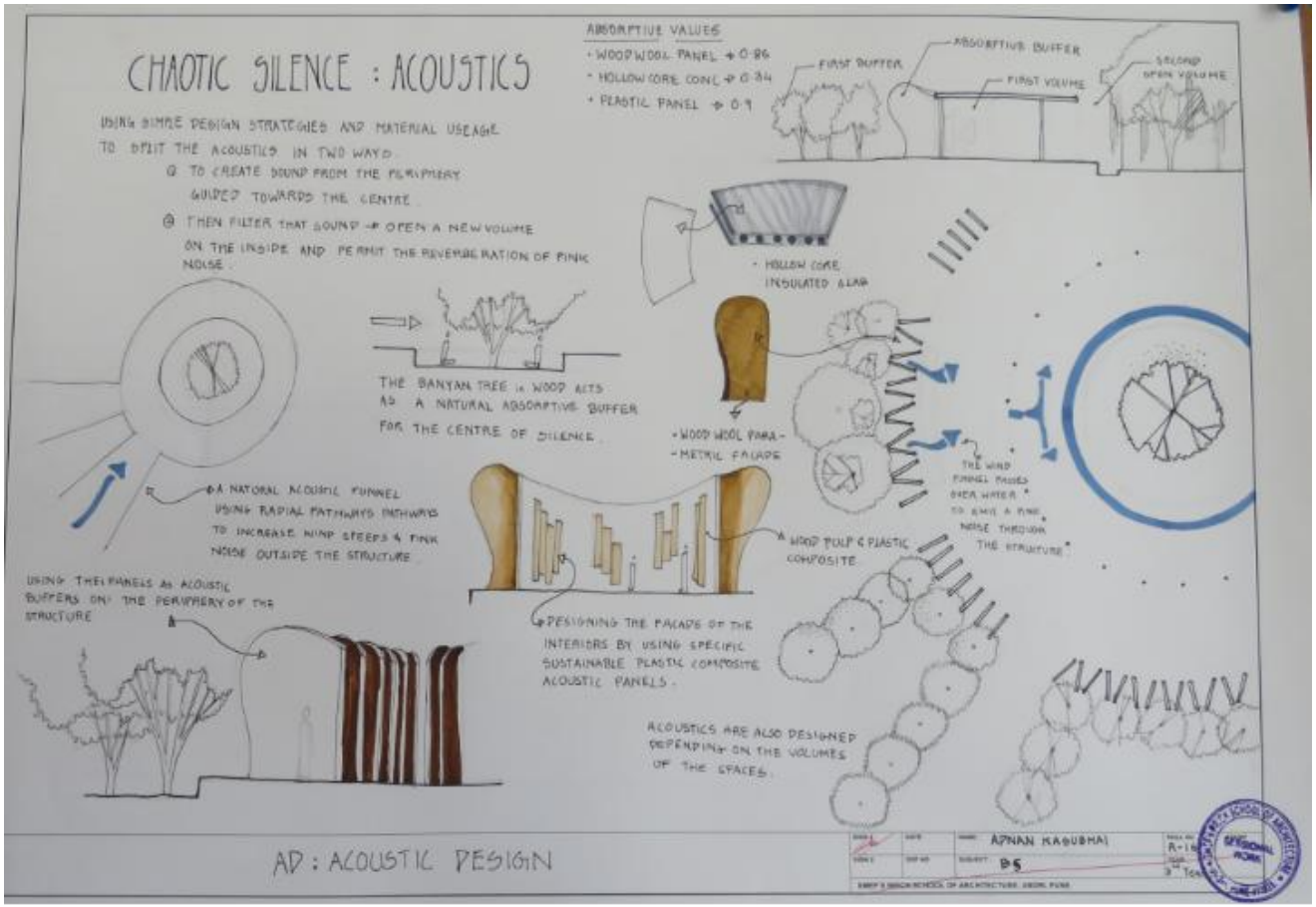

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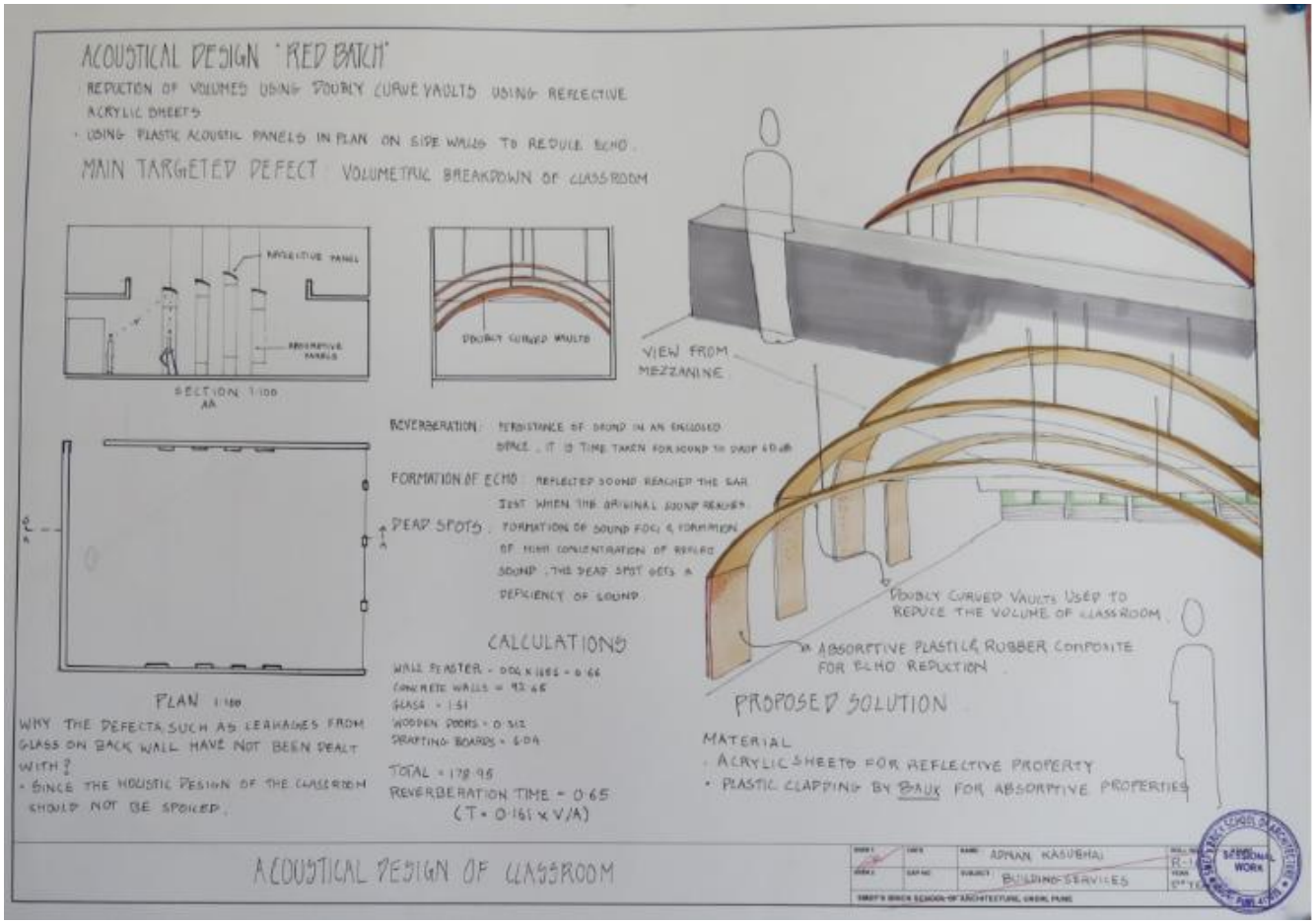

Students' front

1. The attendance always remained more than 75%
2. Students remained enthusiastic and curious. Working with smart phone apps remained a joyful event for students
3. Drawings and calculations were co-ordinated.
4. Results remained more than 80% for last four years

THANK YOU