

NOISE CONTROL IN BUILDING

¹Ajinkya Jitendra Rajput, ²Aniruddha Dubal

^{1,2}U.G. Student, Construction Engineering and Management, SSPU School of Construction Engineering and Infrastructure Management, Kiwale, Pune, India

² Assistant Professor, SSPU School of Construction Engineering and Infrastructure Management Kiwale, Pune, India

Abstract: This study has been undertaken to understand the technique used to control noise in a building. As we know there is an increase in growth of population in developing and developed society, have aggravated many environmental issues. One of the problems is noise, which can be reduced with the help of some natural products. Sound absorption material absorb most of the noise coming through the source. Therefore, sound absorbing materials are found to very useful to reduce noise to enter building. The architectural design for noise control and the barrier used to reduce noise control is important.

Index Terms – Sound absorption, Noise reduction, Barriers

I. INTRODUCTION

Noise is an unwanted sound which can cause some serious health and mental issues, such as loss in hearing, disturbance in communication. Therefore, it becomes necessary to use some sound absorption materials and barriers to reduce this sound from entering buildings. There are few sound absorbing materials used while construction of buildings which give sound insulation to building.

The sound absorbing materials are passive mediums that reduce noise by dispersing energy and turning it into heat. Few Architectural designs are to be done to control the noise which includes walls, windows, doors, ceiling and floors. In this study, sound absorbing material, construction technique in acoustic planning and barrier used will be discussed.

A. RESEARCH OBJECTIVE

- To study about Sound Absorption material.
- To understand architectural design for noise control.
- To study about Barrier used to reduce the noise.

II. METHODOLOGY

A. SOUND ABSORBING MATERIALS

Sound absorption is the loss of sound energy when sound waves come into contact with an absorbent material such as ceiling, walls, floors and other objects, as a result the sound does not get reflected back.

1. Mineral Wool:

Basically, mineral wool is an insulator which is frequently used in construction sector. Mineral wool is used as an acoustic dampener to reduce the noise from entering the building. Mineral wool is also call as stone wool. Mineral wool is used in buildings and various structures for various reason. Mineral wool is the acoustic material specially used during construction to fit in between the vertical studs of the wall or ceiling.

As we all know that the noise travels by vibrating the air particles however, mineral wool is structured in the form of a mat of fibers which prevent the movement of air and in result reduction of noise. In the recent days most of the partition walls are made up of dry walls, which is not efficient to block the noise coming from other side of room, so by using mineral wool you can improve the STC Score of the wall as it reflects back most of the sound waves. Rockwool acoustic mineral wool is the most recommended mineral wool for insulation purpose due to its high NRC rate.

2. Acoustic Foam:

Acoustic foam which is also known as an acoustic foam panel is specially designed for acoustic treatment. Its main job is to reduce the amplitude of the soundwaves and disperse the energy in the heat form. Noise waves travel in the air and reflect from every surface which has a low noise reduction co-efficient (NCR) or less absorption capacity, which causes many reflections from different elements like walls, doors, ceilings and floor.

To overcome this amplification and to reduce reflection of sound waves, we need material on top of all these reflective surfaces which absorb the sound waves and reduce the reflection and the best material is Acoustic foam panel. Few acoustic foam panels are made up of fiber glass which is having ability to friction against the soundwaves and more dispersion of the sound vibration into the heat energy.

B. ARCHITECTURAL DESIGN FOR NOISE CONTROL

The architectural design of a building is very important in noise control. It deals with proper placement of the elements like walls, doors, windows, ceiling and floor, in order to reduce the unwanted and excessive noise and provide ambient environment.

Construction Techniques for Various Elements

For the noise reduction and acoustic wellness of building, the building elements should be constructed with proper planning. Some of which we will discuss below:

Walls: Walls are the most essential component in noise reduction for any building. They are responsible for blocking most of the sources of noise and keeping it away. We shall discuss some method which will improve their abilities:

- If we increase the thickness of wall, it increases the mass of the wall which in turn increases sound insulation and helps to reduce the noise.
- In between two layers of the wall we can provide airspace. The air in between the layers helps to insulate the noise and it is economical.
- The studs which are used in walls, it is advisable to increase the spacing between them to provide more insulation to the noise.
- Finally, the wall should be made free of cracks and the edges should be sealed completely to make the most of its insulation capacity.

Windows: Windows are the most at risk element in noise control. Many noises occur outside the building like traffic, aircraft mostly travels through windows. Thus, proper construction techniques and plans must be done to ensure the windows do not degrade the insulation of wall.

- A proper thought must be given for placement of windows. They should be avoided from the main source of noising is coming.
- The size of window also plays vital role in sound reduction. The larger size allows more noise to pass through, so the window must be made of optimum size.
- Also, the glass used in window should have good sound insulation. The use of double-glazed glass or thicker glass can improve the sound insulation of a window.

Doors:

- Solid soundproof doors, are the best choice for noise control regarding doors.
- Use of gasket stop can be done to ensure the doors are properly sealed and the noise is not let in.
- Door should be placed far from the source of noise.

Ceilings and Floors: On buildings where the noise sources may come from overhead or beneath the building, some steps may have to be taken.

- Use of thick concrete slabs in ceilings or floors must be done to reduce the noise.
- Also, false ceiling and false floors can be put to practice.

C. BARRIERS

Barriers are the obstruction places between the source and the receiver. To be effective, barrier height must cover the line of sight between them. The most commonly used barriers are earth berms and solid walls.

Earth Berms: In this type of barrier, earth is piled up against exterior walls and heaped to incline downwards away from building. It is a sloped structure build adjacent to the source like highways or roads. Its height mostly ranges from 5 inch to 50 inch depending on the noise disturbance. Earth berm reflect and absorb sound waves, as it is inclined and not vertical, the sound gets deflected upwards and there are no chances of echo.

Solid Walls: Thin, vertical structures which are made of rigid particles like steel and concrete can be used to reduce direct transmission of sound to buildings. Generally, walls work by reflecting sound waves. Walls of absorptive nature can also be constructed with grooves on walls or walls with vegetation.

III. SCOPE OF RESEARCH

- To help understand the absorption materials used in building for reduction of noise.
- To understand the architectural design to do for improving sound insulation of structural elements.
- To understand how barriers are used to reduce the noise.

IV. DATA COLLECTION

The data was acquired with the help of Google Research and some reference papers.

V. RESULTS

Through this research a lot of things have become clear. Following are the points that are our opinions and views on the basis of the research and we concluded –

- If positioning of structural elements is proper then there are more chances of reduction of noise.
- Sound absorption materials gives good sound insulation and they should be used more by everyone to reduce the noise in building.
- We are moving towards a new future where humans will be able to live without any noise pollution.

VI. CONCLUSION

Noise control in buildings is very important as now the population is increasing and due to which there is more traffic and main source of noise is due to traffic. So, as we studied in this paper, use of sound absorption material is very efficient to reduce the noise and there are many more materials which are used in construction sector which can be used for noise reduction. Barriers also act as an important element to reduce the sound.

In the future, noise is going to become more hazardous for the environment and humans. So, we should take in account about this and make more use of the products which helps in reduction of noise.

