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# Study of Noise Pollution Due To Railway and Vehicular Traffic at Level Crossing and Its Remedial Measures

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***Abstract:*** Amravati is second largest and very important city in Vidarbha region. As Amravati is developing area and a good education centre there is a rapid urbanization and alarming growth of population is causing serious environmental problems. Noise is one of the environmental problem that uncomforts in daily life. Noise pollution has become major concern for communities living within the city. Considering the sudden increase in the number of trains from Amravati railway station, rapid growth and illness effect due to noise pollution, there is need to study noise pollution in Amravati. In this study an attempt is made to monitor the noise pollution due to railway and vehicular traffic at one of the major intersection Rajapeth using digital sound meter along with the collection of traffic volume data and train frequency. The variation in the noise level due to railway crossing, traffic flow and traffic volume data in the peak hours are studied and presented in the graphical form for the selected location. The study also includes the remedies which can be provided for minimizing the noise pollution.

***Keywords:*** *Noise Pollution, Railways, Traffic noise*

## I. INTRODUCTION

Amravati is the seventh most populated metropolitan city in Maharashtra located at 200 56' North latitude 770 47' East longitude. The total area of the Municipal Corporation is about 121.56 Sq. Km. and the population as per 2011 census record is 899,579 souls. Amravati has good road, rail connectivity with almost all important cities like Nagpur, Mumbai, Kolkata, and Chennai. Noise is an inevitable part of everyday life. Mild noise can be annoying, excessive noise can destroy a person's hearing. The slightest unwanted sound can become very annoying if it continues for any length of time. The vehicular traffic and railways are the major sources of noise. Railways are noisy, it contributes a high concentration of noise in a very less time period, which is very dangerous for human health. The major factors influencing the generation of noise due to railways are Frequency of Trains, Speed of Trains, Nature of Railway Track, Intensity of Horn and many more.

Rajapeth is one of the important intersection in Amravati. From this intersection one of the major road goes towards Badnera and another one go towards Ambadevi, Rajkamal and Dasturnagar. Also a railway route from Amravati railway station to Badnera railway station passes through this intersection. The various Educational institutes, vegetable market, religious places, temples, commercial market, marriage hall, bus stop, auto stop etc., are connected by this intersection. Recently due to sudden increase in the number of train from Amravati railway station the railway gate at Rajapeth railway crossing is closed for almost 2:30 hours a day which causes traffic conjunction, which causes great inconvenience to the road users and nearby locality. Roadway noise is the collective sound energy emanating from motor vehicles. It contributes more to environmental noise exposure than any other noise source, and is constituted chiefly of engine, tire, aerodynamic and braking elements. According to C.C. Bhattacharya, et al. (2001), the major factors which influence the generation of road traffic noise are Traffic flow, Traffic speed, Proportion of heavy vehicles, Gradient of the road, Nature of the road surface, Obstruction due to noise barriers, etc.

## II. AMBIENT AIR QUALITY NOISE STANDARDS (AAQNS)

Most of the countries, keeping in view the alarming increase in environmental noise pollution, have given the permissible noise standards. These are depending on the location and period of day. Industrial areas obviously have somewhat higher acceptable sound levels than those prescribed for residential areas. The collected night standards are stringent than the daytime standards.

### 2.1 Standards by Law in India

Noise has been recognized as ambient air pollutant. Standards in this regard are laid down under Environment (Protection) Rules, 1986 and under the Model Rules of the Factories Act, 1948. The Central Pollution Control Board constituted a Committee on Noise Pollution Control. The Committee recommended noise standards for ambient air and for automobiles, domestic appliances and construction equipment, which were later notified in Environment (Protection) Rules, 1986 as given below in Table.

Table 1: Noise Standards for Different Category of Area

| Area Code | Category of Area | Limits in dB | |
|---|---|---|---|
| | | Day time | Night time |
| A | Industrial area | 75 | 70 |
| B | Commercial area | 65 | 55 |
| C | Residential area | 55 | 45 |
| D | Silence Zone | 50 | 40 |

### 2.2 Recommended noise levels by the Bureau of Indian Standards (BIS)

Bureau of Indian Standards has recommended acceptable noise levels in residential areas, injury range and safe range are as given in Table below.

Table2: Acceptable noise levels in Residential Areas

| Sr. No. | Location | Acceptable Noise Level in Residential Areas, dB |
|---|---|---|
| 1 | Rural | 25-35 |
| 2 | Suburban | 30-40 |
| 3 | Residential (urban) | 35-45 |
| 4 | Urban (Residential and Business) | 40-45 |
| 5 | City | 45-50 |
| 6 | Industrial Areas | 50-60 |

## III. MATERIALS AND METHODS

Studies have mentioned that periodical noise study is most appropriate and less expensive of course continuous noise study is desirable but not necessary and is more expensive.The study was carried out using the Digital sound level meter (TES-1350A).In the present study, a noise sample size of 5 minute in each hour was taken at the selected location. Noise sample were collected in dB (A) scale at every 30 second interval (i.e. 2 counts per minute) or total 10 reading in one sample size. The observations were taken at a distance 1.2 meter from the edge of road and at right angle to the centerline of road and the railway track. The continuous monitoring of noise level was observed from morning 8:00 am to 08:00 pm daily for the span of 3 months generally when the train used to pass from the route.

## IV. RESULTS

All the days the recorded values are very-very high than the permissible levels. The maximum noise pollution is recorded is during the passage of train through level crossing which is notable. The effects of noise pollution are auditory and non-auditory. Deafness, heart attack, increase in cholesterol, high blood pressure, hyper tension, causes emotional disturbance, constriction of blood vessels such sever adverse effects are recorded due to the noise pollution.

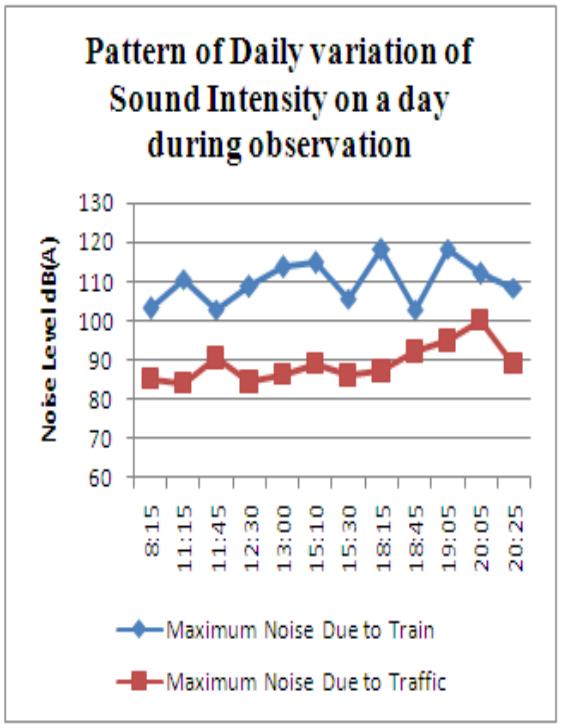



Fig 1: Pattern of variation of sound Intensity on a day during observation

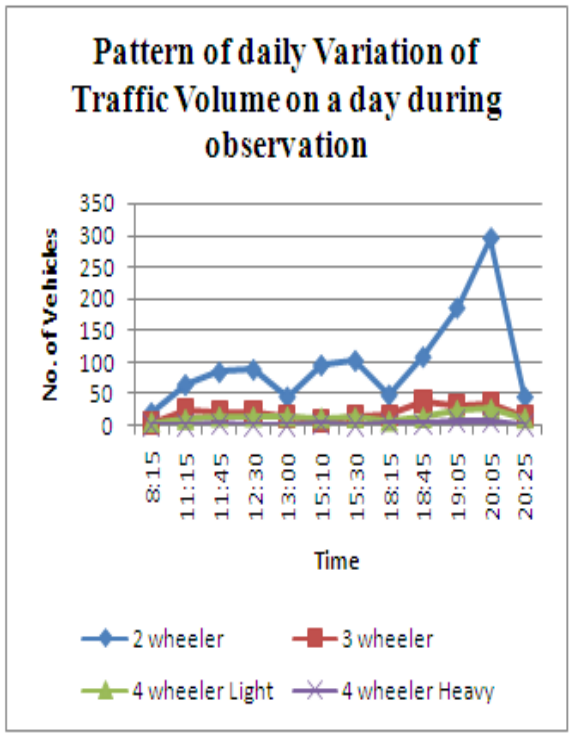
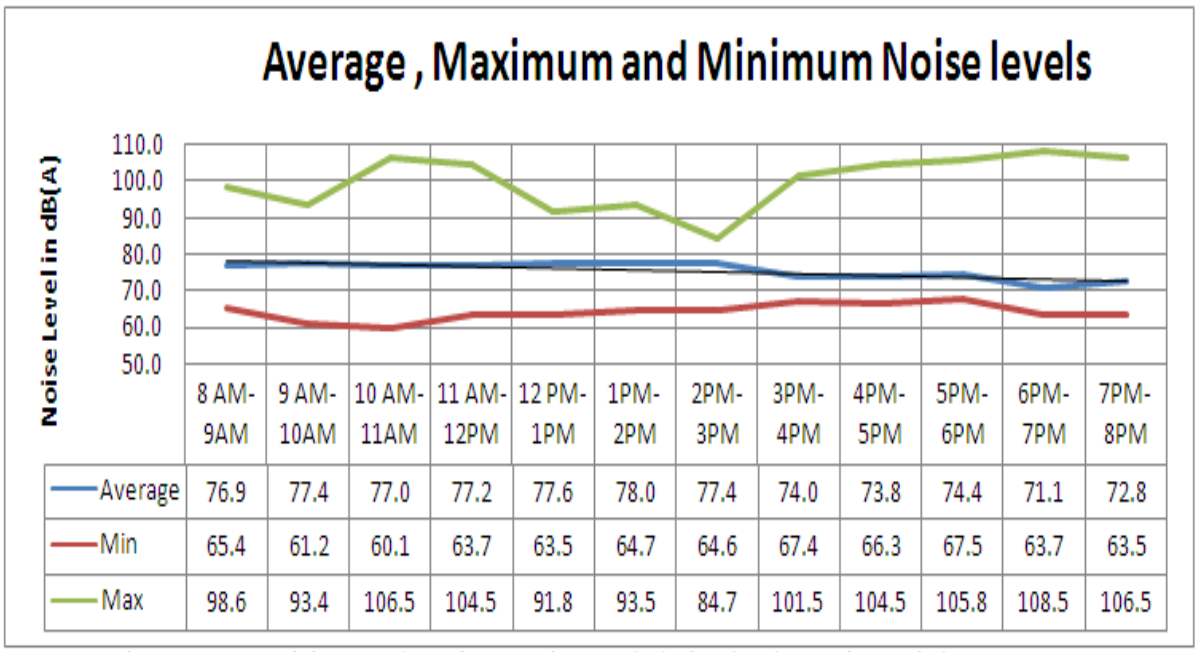



Fig 2: Pattern of variation of Traffic volume on a day during observation




| | 8 AM-9AM | 9 AM-10AM | 10 AM-11AM | 11 AM-12PM | 12 PM-1PM | 1PM-2PM | 2PM-3PM | 3PM-4PM | 4PM-5PM | 5PM-6PM | 6PM-7PM | 7PM-8PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average | 76.9 | 77.4 | 77.0 | 77.2 | 77.6 | 78.0 | 77.4 | 74.0 | 73.8 | 74.4 | 71.1 | 72.8 |
| Min | 65.4 | 61.2 | 60.1 | 63.7 | 63.5 | 64.7 | 64.6 | 67.4 | 66.3 | 67.5 | 63.7 | 63.5 |
| Max | 98.6 | 93.4 | 106.5 | 104.5 | 91.8 | 93.5 | 84.7 | 101.5 | 104.5 | 105.8 | 108.5 | 106.5 |

Fig 3: Average, Minimum and Maximum Noise Levels during the observation period

## V. REMEDIAL MEASURES

Since the fact that public health has been matter of great concern for us control of noise pollution is necessary. The remedial measure for noise pollution can be broadly classified as control at source, control in the transmission path, using protective equipment. The noise pollution can be controlled at the source of generation itself by reducing the noise levels from domestic sectors, Maintenance of automobiles, Control over vibrations, Low voice speaking, Prohibition on usage of loud speakers and optimum selection of machinery, tools or equipment reduces excess noise levels. The change in the transmission path will increase the length of travel for the wave and get absorbed/refracted/radiated in the surrounding environment. The noise pollution can be

reduced during transmission path by Vegetation, Installation of barriers and design of the building incorporating the use of suitable noise absorbing material for wall/door/window/ceiling will reduce the noise levels. Protective equipment usage is the ultimate step in noise control technology i.e., after noise reduction at source and after diversion or engineer control of transmission path of road.The usage of protective equipment and the worker's exposure to the high noise levels can be minimized by Job rotation, Exposure reduction, Hearing protection, use of Equipment like earmuffs, ear plugs etc. are the commonly used devices for hearing protection. Attenuation provided by ear-muffs varies widely in respect to their size, shape, seal material etc. Literature survey shows that, average noise attenuation up to 32 dB can be achieved using earmuffs. Also Strict enforcement of existing law to prohibit air horns inside the town, Proper maintenance of the vehicles, Laying good roads and their maintenance, Strict enforcement of the existing law to remove the encroachments on road sides, Plantation of trees like Neem and Coconut and other vegetation inside the town on road sides and around the silence zone, Highly noise producing machines can be kept in isolated buildings and glass cabin can be provided, Educating people about the hazards of loud sound and restriction on the use of pressure horns, loud speakers and fire crackers shall play an important role in mitigating sound will reduce the noise levels.

## VI. CONCLUSION

From the observations taken at the selected station, it was found that the sound exceeds permissible limit of 55 dB for residential and 65dB for commercial area. On all study at the selected location the maximum noise limits were ranging between 70 dB to 110 dB which was almost 1.5 times the permissible limits for commercial zone. This variation of sound from 70dB to 120dB may have moderate to very sewear effects on human health such as, poor concentrations, stress, cardiovascular illness and many more. It is very essential to control noise at source, along the transmission path and at receivers end by using the remedial measures.

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