ECOTONE SYSTEMS PVT. LTD.

NOISE BARRIER

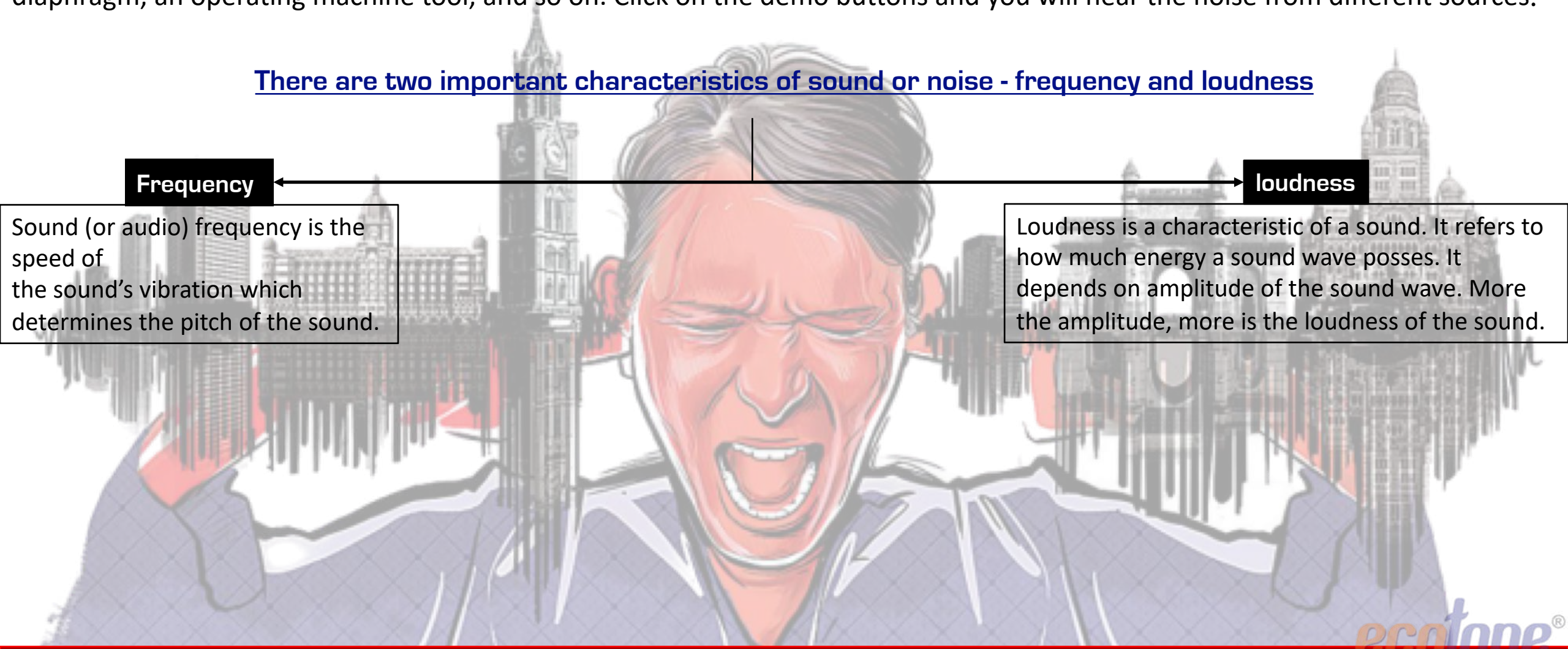
Indian Green Building Council
MEMBER

Office: Plot No.8, Ecotech-12, Greater Noida, Uttar Pradesh-201306
Contact: +91-9810319823 | +91-9891320678
E-mail: Info@ecotone.in
Website: www.noisebarrier.in

ecotone®
Redefining Technology
An ISO 9001 : 2015 Certified Company

What is “NOISE”

Noise is unwanted sound. Noise can be produced by many sources - man's vocal cord, a running engine, a vibrating loudspeaker diaphragm, an operating machine tool, and so on. Click on the demo buttons and you will hear the noise from different sources.



There are two important characteristics of sound or noise - frequency and loudness

Frequency

Sound (or audio) frequency is the speed of
the sound’s vibration which
determines the pitch of the sound.

loudness

Loudness is a characteristic of a sound. It refers to how much energy a sound wave posses. It depends on amplitude of the sound wave. More the amplitude, more is the loudness of the sound.

NOTE: The human ear has peak response around 2,500 to 3,000 Hz and has a relatively low response at low frequencies.

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WHAT IS NOISE POLLUTION?

Not all sound is considered noise pollution. **The World Health Organization (WHO) defines noise above 65 decibels (dB) as noise pollution.** To be precise, noise becomes harmful when it exceeds 75 decibels (dB) and is painful above 120 dB. As a consequence, it is recommended noise levels be kept below 65 dB during the day and indicates that restful sleep is impossible with night-time ambient noise levels in excess of 30 dB.

CAUSES OF NOISE POLLUTION

- **Traffic noise**

Traffic noise accounts for most polluting noise in cities. For example, a car horn produces 90 dB and a bus produces 100 dB.

- **Air traffic noise**

There are fewer aircraft flying over cities than there are cars on the roads, but the impact is greater: a single aircraft produces 130 dB.

- **Construction sites**

Building and car park construction and road and pavement resurfacing works are very noisy. For example, a pneumatic drill produces 110 dB.

- **Catering and night life**

Bars, restaurants and terraces that spill outside when the weather is good can produce more than 100 dB. This includes noise from pubs and clubs.

- **Animals**

Noise made by animals can go unnoticed, but a howling or barking dog, for example, can produce around 60-80 dB.

EFFECTS OF NOISE POLLUTION

As well as damaging our hearing by causing — tinnitus or deafness —, constant loud noise can damage human health in many ways, particularly in the very young and the very old. Here are some of the main ones:

- **Physical**

Respiratory agitation, racing pulse, high blood pressure, headaches and, in case of extremely loud, constant noise, gastritis, colitis and even heart attacks.

- **Psychological**

Noise can cause attacks of stress, fatigue, depression, anxiety and hysteria in both humans and animals.

- **Sleep and behavioral disorders**

Noise above 45 dB stops you from falling asleep or sleeping properly. Remember that according to the World Health Organization it should be no more than 30 dB. Loud noise can have latent effects on our behavior, causing aggressive behavior and irritability.

- **Memory and concentration**

Noise may affect people's ability to focus, which can lead to low performance over time. It is also bad for the memory, making it hard to study.
Interestingly, our ears need more than 16 hours' rest to make up for two hours of exposure to 100 dB.

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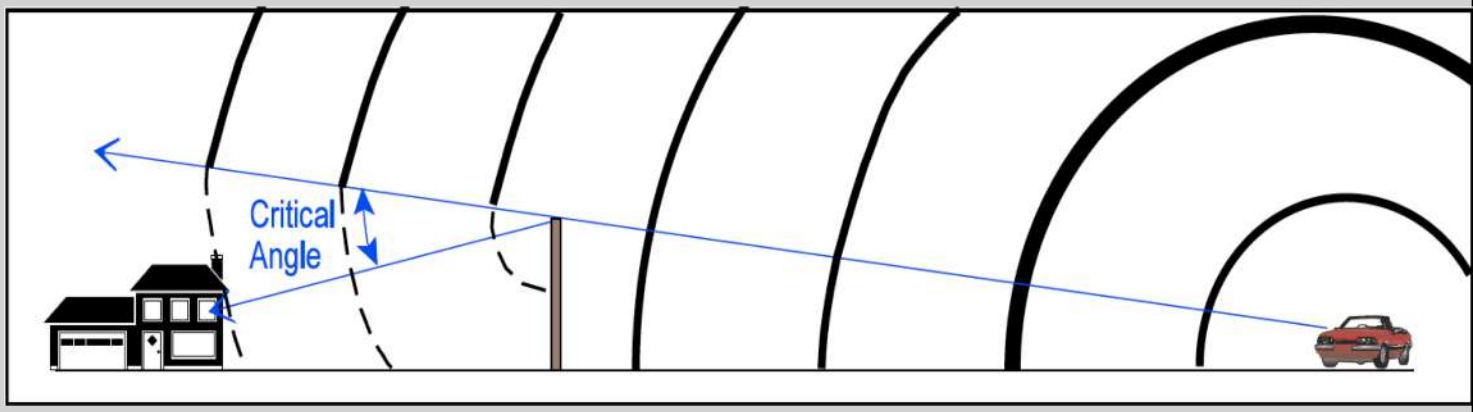
What is Noise Barrier

A **noise barrier** also called a **sound wall**, **noise wall**, **sound berm**, **sound barrier**, or **acoustical barrier** is an exterior structure designed to protect inhabitants of sensitive land use areas from noise pollution. Noise barriers are the most effective method of mitigating roadway, railway, and industrial noise sources – other than cessation of the source activity or use of source controls.

NOISE BARRIERS: HOW DO THEY WORK?

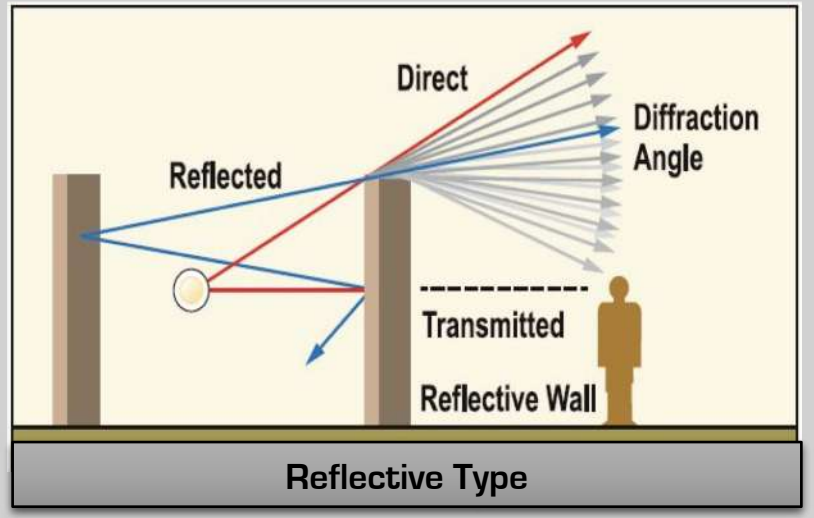
Outdoor noise barriers can effectively reduce the transmission of noise from source to receiver. When placed between source and receiver, the barrier diffracts the sound transmitted to the receiver. This reduction is frequency dependent: Noise barriers block high frequencies more effectively than low frequencies.



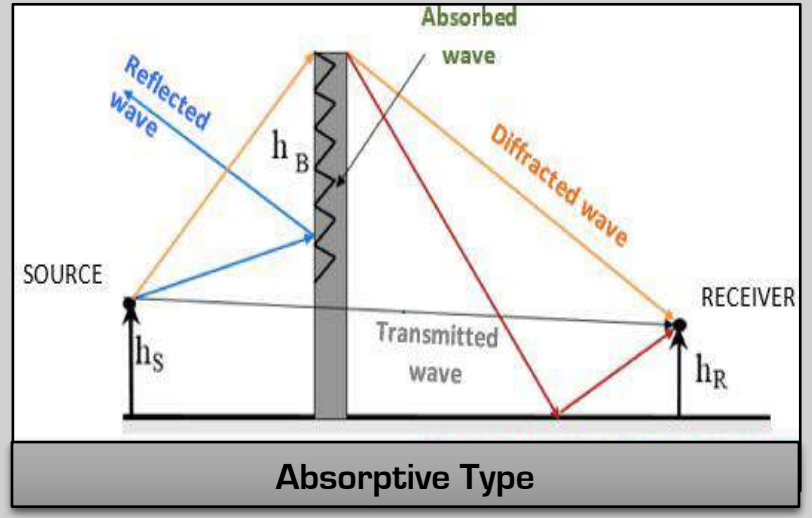
Typical noise barrier positioning

There are mainly two types of Noise Barriers:

1. **Absorptive Type (sound absorbent materials and possible finishes of absorptive panels)**
2. **Reflective Type (Transparent & Non-transparent)**



Reflective Type



Absorptive Type

HISTORY

Noise barriers have been built in the United States since the mid-twentieth century, when vehicular traffic burgeoned. I-680 in Milpitas, California was the first noise barrier. In the late 1960s, analytic acoustical technology emerged to mathematically evaluate the efficacy of a noise barrier design adjacent to a specific roadway. By the 1990s, noise barriers that included use of transparent materials were being designed in Denmark and other western European countries. Below, a researcher collects data to calibrate a roadway noise model for Foothill Expressway.

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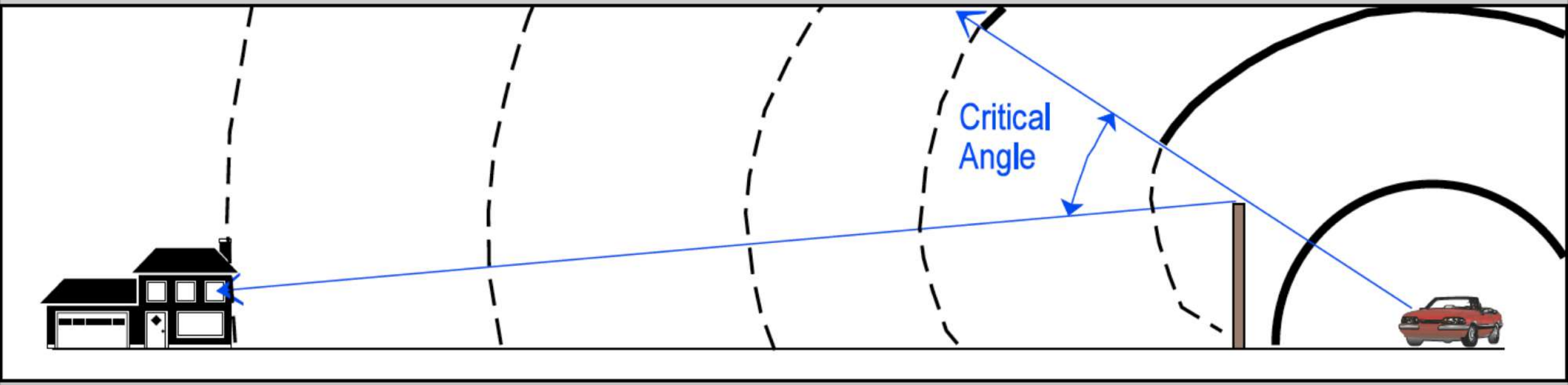
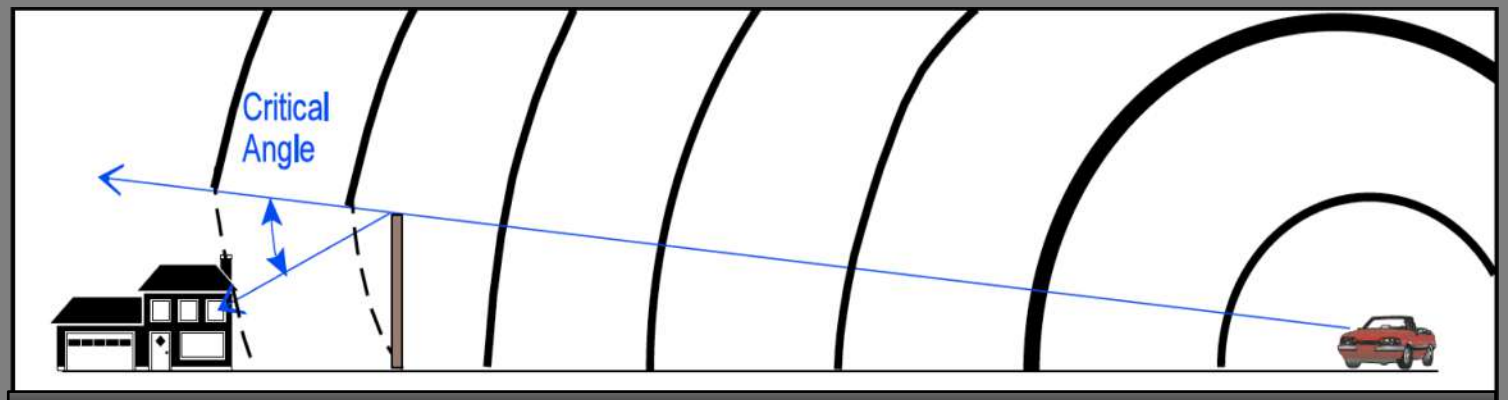
WHAT DETERMINES THE EFFECTIVENESS OF A NOISE BARRIER?

A noise barrier's effectiveness is determined by the degree to which it forces sound to bend to reach the receiver. The following sketches show the general principles involved and how changing the barrier height and location effects this critical angle.
As long as the barrier interrupts the straight line path from source to receiver, noise will attenuate as it diffracts around the barrier (shown as dotted lines).
There are a number of ways to increase the effectiveness of a barrier. The first is to construct the barrier close to the source. This is one of the best methods as it benefits all locations past the barrier.



Critical angle increases when the barrier is near the source

If the barrier can't be located near the source, the next best location is near the receiver. This is equally effective for that receiver, but the benefit diminishes for receivers at a greater distance. When a noise barrier is close to the receiver, the critical angle also increases.



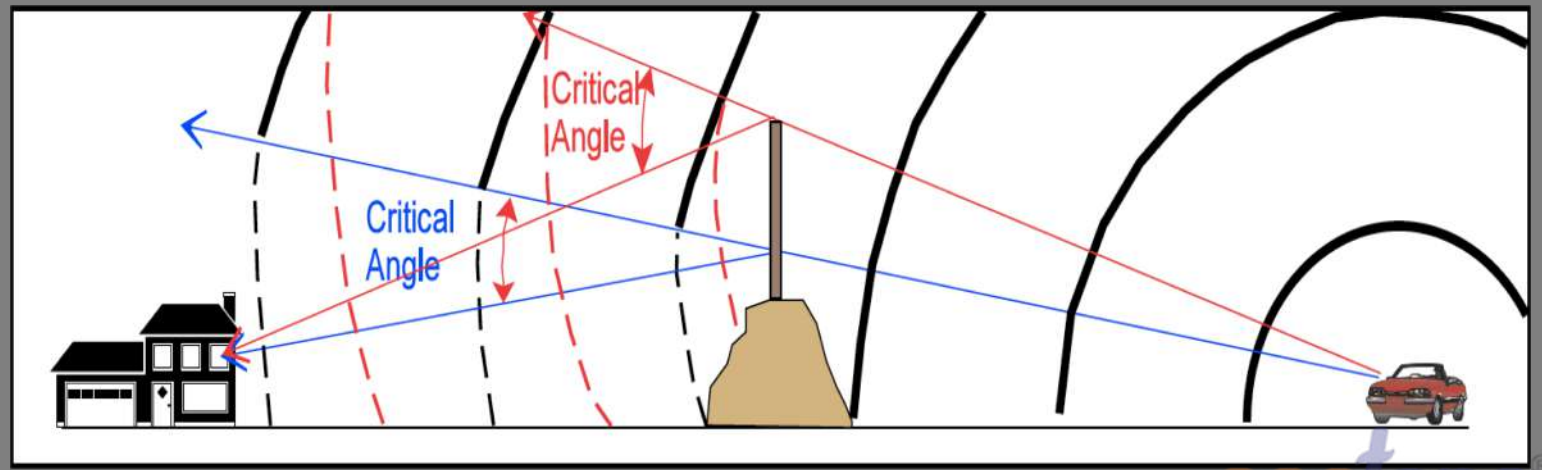
Increasing barrier height increases the critical angle

What is critical angle?

The arrival angle at which a sound wave traveling from one medium to another medium will be refracted along the interface of the two media. If a wave traveling from one medium to another medium with a higher speed of sound hits the interface between the two media at an arrival angle less than the critical angle, only reflection will occur, at an arrival angle above the critical angle, some of the sound will be reflected and some will be refracted into the faster medium.

Generally, the least effective location for a barrier is midway between source and receiver. Yet regardless of location, a barrier's acoustical benefit improves when the barrier height is increased.

The mass of the barrier is usually not a critical element. The barrier should be constructed so sound that penetrates through the barrier is sufficiently lower than the sound that diffracts over the top. For example, the sound transmission loss of the barrier should be at least 10 decibels lower than the attenuation planned for above the barrier. A solid barrier that supports itself and withstands wind loading will often provide more than adequate sound transmission loss.



When a noise barrier is close to the receiver, the critical angle increases

Ecotone Noise Barrier

ECOTONE® offers the perfect Noise abatement solutions and provides complete range of certified, high performance noise barriers to solve the noise problems. Standing barrier systems are sound absorptive/ reflective on one or both sides and offer excellent sound transmission loss characteristics and are easily assembled from prefabricated components.

Ecotone offers guaranteed, proven, sound reduction:

- Sound absorptive surfaces minimize reflected noise
- Rugged, abuse-resistant, long-lasting steel construction
- Weather resistant and almost maintenance free
- Wide choice of finishes to blend with individual landscapes

Types of noise Barriers we offer:

1. **Transparent Noise Barrier - Polycarbonate / Acrylic Sheet Noise Barrier (up to 36 STC Rating)**
2. **Metallic Noise barrier (Aluminum or galvanized) (up to 45 STC Rating)**
3. **Metallic Noise barrier with Transparent Element (metallic + polycarbonate or Acrylic)**
4. **Temporary noise barrier**

Suitable for an extensive range of applications including:

- Screening Mechanical Plant
- Roads & Railways
- Aircrafts Pens & Airport Boundaries
- Such as generators, Compressors and Chillers

Application:

- Highways, Flyovers & Railway track
- To cover Industrial Premises
- Construction Sites
- Stadium & Clubs
- Residential / Farm House Premises

Metallic Noise Barrier

Polycarbonate Noise Barrier

Metallic Noise barrier with Transparent Element

Temporary noise barrier

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Transparent Noise Barrier - Polycarbonate / Acrylic Sheet Noise Barrier (up to 36 STC Rating)

ECOTONE® offers a comprehensive range of Polycarbonate Solid Sheets, Polycarbonate Embossed Sheets and Acrylic Sheets which are made of high quality raw materials. Our range offers maximum levels of glazing performance where transparency or tailored light transmission along with high impact strength is of vital importance. The transparent barriers are made of PMMA (polymethyl meth acrylate) OR polycarbonate Sheets, placed between support railings. Moreover, these Polycarbonate Embossed Sheets, Polycarbonate Compact Sheets, and Acrylic Sheets are clear in color and available in various thickness, length and colors to opt for. These barriers are solely for isolation and meet the strictest criteria of the European standards EN 1793 regarding devices for the reduction of road traffic noise. **On demand, they are colored, translucent, inclined or wrapped around. They perfectly integrate with other types of barriers.**

Key features:

- Highest Performance in Transparency/light transmission makes Ecotone polycarbonate sheet, energy saver.
- With High Impact strength, safety is the prime importance of Ecotone Polycarbonate sheet.
- Break resistance, Low handling loss and installation charges makes Ecotone sheets, as economical.
- Because of U.V. Resistance, Ecotone sheets prevent transmission of Harmful Ultra Virus raises.

Ecotone Polycarbonate Sheets and Polycarbonate Compact Sheets are Weather Resistance

- Durable
- Running Long Life
- Uniform quality
- Light weight
- Sound Insulation
- Because of Limited Oxygen Index, do not help /contribute in growing of fire/flame spread.
- Helps in reducing inside Temperature
- Chemical Resistance
- Easy to install and clean
- Easy Thermoforming and Machining.

Compact Polycarbonate / Acrylic Sheets (Available in Different Colours)

We are engaged in offering a wide range of building construction material which includes compact polycarbonate sheets. We offer compact sheets as per the needs and demands by the society of architects, engineers and builders. These compact polycarbonate sheets help in providing a smart way of minimizing the consumption of energy for artificial electrical lighting in several application areas. These are highly durable and provide longer service time. Our clients can avail these from us at very nominal prices.

Acoustic isolation according to EN 1793-2 | DLR, 1793 > 24 dB | Category: B3

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Technical Specification of Polycarbonate Sheet

- Thickness :10 /12/15 mm
- STC Rating : 32 / 34/36
- Both side UV coated
- Light Transmittance : 90% for clear and 80: for Colored ones
- Tensile Strength : At least 60 N/m2
- Modulus of Elasticity: At least 2000 N/mm2
- Fire Retardant: As per EN 1794-2, Annex. A Class 2
- Stone Impact Resistance: As per EN 1794-1 Annex. C
- Fire Spread of Frame: BS 476, Part 7 , Class 1 or 2
- Yellowing index shall be less than 10 as per ASTM D 1925 or equivalent
- No mottling
- The above properties shall not vary by about 5-10% of the original values over a 10-year period

Technical Specification of Acrylic Sheet

Product properties	Test Results	test method
Tensile Strength	min 70 MPa	ISO 527-2/1B/5
Elongation at break	5%	ISO 527-2/1B/5
Flexural Strength	min. 98 MPa	ISO 178
Elastic Modulus	min 3.300 MPa	ISO 527-2/1B/5
Density	1,19 g/cm³	ISO 1183
Thermal Expansion coefficient 0…50 °C	70 x 10^{-6} 1/K	DIN 53752-A
Max. permanent service temperature	70 °C	
Vicat softening temperature	102 °C / 110 °C	ISO 306 / B50
Light transmission of clear sheets	min. 90 %	DIN 5036
Weighted sound reduction index DL_R	30 / 32 / 33 dB	EN 1793-2 /
15 mm / 20 mm / 25 mm		ZTV-LSW 06

Salient Features of Ecotone's Polycarbonate/ Acrylic Sheet Noise barrier:

- The Ecotone® Polycarbonate / Acrylic Sheet Noise barrier will fulfill both acoustic and non acoustic aspects & properties. The noise barrier is designed complete ecofriendly, aesthetically good /as per location / Finish & Shapes.
- Noise Barrier Structure is designed according to wind Pressure in Particular area and it is Firm & Stiff Structure to fulfill Safety Norms. And it is designed aesthetically to create Positive Atmosphere and to reduce potentiality of Negative effects.
- Noise Barrier shields the Noise generated from the noise source.
- Noise Barrier is designed vertically and is slightly parabolic shape for good aesthetic, and to diverse the noise from the Origin.
- The Noise Barrier is designed up to 36 dB (A) Transmission loss.
- Noise Barrier joints are designed with rubber gasket to block the Noise Leakage.
- The Height of Noise barrier will be as per design / site requirement.
- The Polycarbonate / Acrylic Sheet Noise barrier having plain surface means minimum maintenance & easy to clean.

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Metallic Noise barrier (Aluminum or galvanized) (up to 45 STC Rating)

ECOTONE® Metallic Noise Barrier are made of acoustic elements placed horizontally or vertically between the supports railings. They allow a large architectural flexibility (colors, motifs, structures…). Their lightness allows producing them quickly, which is economical. These barriers are isolating and absorbent and meet the strictest criteria of the European standard EN 1793 regarding devices for the reduction of road traffic noise.

Acoustic absorption according to EN 1793-1	Acoustic isolation according to EN 1793-2
ΔLA,α,1793 > 12 dB(A)	ΔLA,R,1793> 24 dB(A)
Category: A4	Category: B3

Elements are made in aluminum or galvanized steel (Z275 or Z600). They contain a mineral wool protected by a non defibering geotextile that will eventually be neoprene. A perforated grill in aluminum insures the mechanical protection of the absorbent material.
Metallic noise barrier which comprise the great majority of noise barriers are generally located at the edge of the road to reflect traffic noise. Some noise is transmitted through the barrier, but is slightly less intense than the noise level on the other side of the barrier. The height of these barriers is usually greater than other types. Often traffic noise levels increase for vehicle occupant.

Acoustic Performance	Laboratory measurement of airborne sound as per IS-9901(Part III) -1981, DIN 52210 part IV - 1984, ISO: 140 (Part III) – 1995 , 45 STC rating
Wind Load	Designed as per IS 875 Part-III, 1987
Sound Proofing	Class -A4
Sound Deadening	Class -B2
Type of Wall	Double skin insulated wall
Outside Sheet	Plain aluminium alloy sheet / GI sheet , 1.3 /1.5 mm thick
Inside Sheet	(Traffic/ Source Side) skin- 1.2mm thick aluminium alloy/GI Perforated sheet with 22% open area
Joint	Each panel having tong & groove to joint perfectly with each other
Gasket	The panel and structure having neoprene rubber gaskets at the joint to block noise leakage.
Vertical Post/ Structure	The structure is of 'H' profile in which acoustic panel slides longitudinally.
Top Cover	All acoustic panel covered at top with top cover riveted to panel. Finish -All metallic surface/parts are powder coated / painted in desire shade.

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Metallic Noise barrier with Transparent Element (metallic + polycarbonate or Acrylic)

ECOTONE® manufactures supplies and installs different types of metallic noise barriers to combat noise pollution coming from linear infrastructures (roads and railways, etc.). Our Metal noise barriers with transparent element are made of galvanized aluminium or steel panels in between polycarbonate or acrylic sheets, that make up a sound-proof casing inside them along with aesthetic properties and being transparent allows people to view the sceneries of other side. The panels overlap vertically between studs made from steel profiles. The addition of an absorbent crest increases the acoustic performances. The barriers can be bi-absorbent and can include transparent parts.

CONSTITUENTS

ABSORBENT FACE oriented to the focus of noise: The absorbing face is a multi-perforated metallic element. The design of the perforations allow to the sound wave to enter in the panel and being scattered into the absorbent material.

SOUND INSULATION: Rockwool achieves a reduction in noise level due to its fibrous and elastic nature, which dissipates the energy of sound waves that penetrate them.

REFLECTIVE FACE: The reflective face leaves a space with Rockwool creating an acoustic chamber, so that the sound waves reflect on it into the absorbent material.

Supporting structure: consists of MS Steel beams hot dip galvanized and painted with polyester powder paint.

The profiles are conveniently sized and arranged with a distance inter-axis depending on structural requirements.

The beams are placed in holes already made in the concrete or they have a base plate anchored to the foundation by galvanized steel screws.

Features

- Lightweight
- Durable
- Galvanized, aluminium, or stainless steel along with polycarbonate / acrylic sheet
- Two, four, or five-inch thicknesses
- Easy installation and removal
- Horizontal or vertical installation
- Self-draining
- Maximum acoustical performance
- All products independently tested (STC 37 above, NRC 0.95 above)
- 5 years warranty
- Weather resistant
- Graffiti resistant
- Different colours selection

ecotone® Redefining Technology™
An ISO 9001 : 2015 Certified Company

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Temporary noise barrier

ECOTONE® Temporary Noise Barrier is the new temporary and transportable LSE® Absorptive Noise Barrier Walls are an effective mitigation tool for reducing unwanted noise in temporary or changing applications.

Ideal for noisy sites

These fully-mobile noise walls reduce unwanted noises that cause complaints by the general public and nearby residents, and can be configured to work on any application.

Why absorptive noise walls are better?

Absorptive sound walls actually absorb the sound waves that hit them, thus providing noise elimination. Reflective sound walls, (like concrete, block or metal), merely reflect the sound waves in a different direction, and can actually create new and unexpected noise problems as a result.

Mobility = flexibility + cost savings

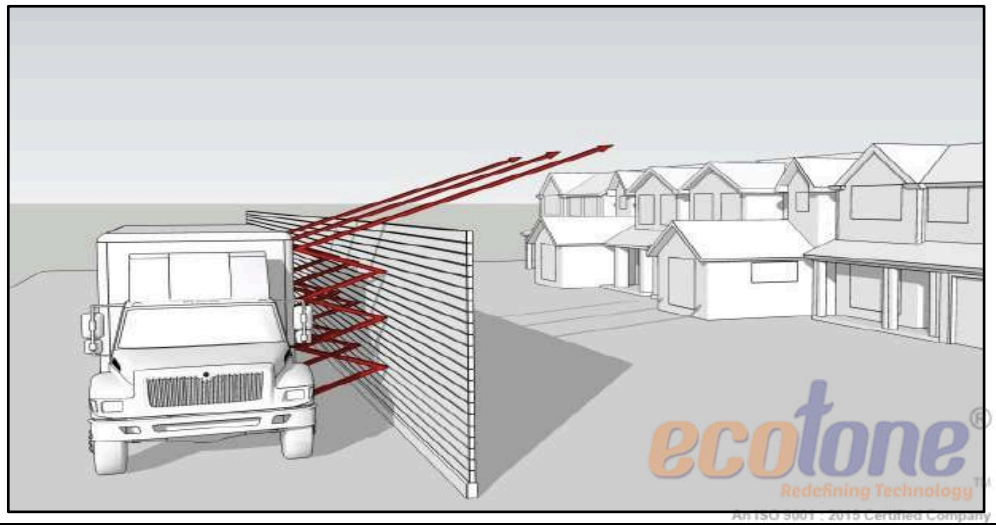
The Ecotone temporary Noise Barrier can be positioned to isolate any noise source and left there as long as necessary. Once the need at that location is over, the walls can be relocated to a different site. This mobility can provide years of cost-effective noise abatement service.

The Ecotone temporary Sound Barrier Wall is simply the most effective portable noise abatement solution available – outperforming, outlasting and out manoeuvring all other temporary noise barrier walls in its class. If you are facing problems caused by unwanted noise generated by temporary or changing sources, Ecotone Systems can immediately provide an effective abatement solution for you with its innovative Mobile Noise Barrier System.

Distinguishing Features of the Ecotone Mobile Noise Barrier Panels Include:

- Lightweight
- Easy to assemble and disassemble
- Modular Design
- Fully Absorptive
- Choose any colour
- Water/Moisture resistant

- Non-corrosive
- Will not rust, rot, or stain
- Strong and durable
- Impervious to rain, snow, ice & sleet
- Impervious to most chemicals Graffiti resistant



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Some of are completed projects

Polycarbonate Transparent Noise Barrier installed at Gurgaon, Haryana (India)

ecotone®
Redefining Technology™
An ISO 9001 : 2015 Certified Company

Polycarbonate Noise Barrier work at Anand Group Farm House

Metallic Noise barrier at NHAI Chandigarh

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Noise Barrier for N.H.A.I

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
सड़क परिवहन और राजमार्ग मंत्रालय, भारत सरकार
NATIONAL HIGHWAYS AUTHORITY OF INDIA
(Ministry of Road Transport and Highways, Govt. of India)
परियोजना कार्यान्वयन इकाई/Project Implementation Unit -Ambala.
17-L, Model Town, Ambala City -134003, Haryana

दूरभाष :– 0171–2521361
फैक्स :– 0171–2520361
ई–मेल :- amb@nhai.org
& :- piuambala@gmail.com

11147/NHAI/AMB/2359 30.10.2019

To

The Authorised Signatory
M/s Ecotone Systems Pvt. Ltd.,
Plot No. 08, Ecotech-XII,
Greater Noida (West), Gautam Budh Nagar,
Uttar Pradesh – 201308

Sub: Six laning of Panipat-Jalandhar section of NH-1 (New NH-44) from Km. 96.000 to Km. 387.100 (length 291.100 Km.) in the state of Haryana & Punjab on BOT (Toll) basis on DBFOT pattern under NHDP Phase-V - **Sound Barrier at Pipali Zoo- Letter to Proceed**

Ref:- (i) Agreement dated 14.09.2019
(ii) RO-NHAI, Chandigarh letter no- NHAI/RO/CHD/11011/PD-AMB/Pani-Jal/NH-1/REF/38-2390 dated 14.08.2019.
(iii) This office letter no- 11147/NHAI/AMB/2177 dated 11.10.2019
(iv) Your letter dated 16.10.2019

Sir,

This has with reference to your letter cited at Sr. No. (iv) above, whereby certain documents as requested by this office vide letter cited at Sr. No. (iii), has been submitted to this office.

2. The submitted documents has been scrutinized and it was found that insurance policy as envisaged in Contract Agreement clause 13 of section V of Conditions of Contract has not been submitted by you. In this regard, this office vide email dated 22.10.2019 has requested you to submit the insurance policy as per Contract Agreement kindly Expedite.

3. You are hereby directed to mobilize your team and proceed to start the work of Sound Barrier at Pipli Zoo as per Terms & Conditions of Contract Agreement and in confirmation to the specifications of Drawings and Designs as mentioned in Contract Agreement.

Yours sincerely,

(Col. Yogesh Chandra)
General Manager (Tech) &
Project Director

Copy to:
(iii) The Chief General Manager (Tech) & RO-Chandigarh, Panchkula- **for information please.**
(iv) The Team Leader L.N. Malviya Infra Project Pvt. Ltd, Ambala City, Haryana, Pin Code-134003- **for information please.**

Completion Certificate

Page-1

L.N. MALVIYA INFRA PROJECTS PVT. LTD.

T-10,IIIrd Floor, City Centre, Press Complex, Plot No. -1, M.P.Nagar Zone –I, Bhopal (M.P.), 462011
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Email: lnmalviya@rediffmail com, website www lninfra com
CIN No. U45201MP2010PTC024316

6201
9.320

Ref No.: LNM/IE/SB/NH-1/Amb/2020/05 09th March 2020

To,
The Authorized Signatory
M/s Ecotone Systems Pvt. Ltd
Plot no. 08, Ecotech –XII,
Greater Noida (West)-201306
Email: sanjeev@ecotone.in/Sales@ecotone.in

Subject: Six laning of Panipat – Jalandhar section of NH-1 (New NH-44) from Km. 96.000 to Km. 387.100 (Length 291.100Km including balance work of about 10 Kms) in the State of Haryana & Punjab on BOT (Toll) basis on DBFOT pattern under NHDP Phase – V:**Providing Sound Barrier at Pipli-Zoo GT Road-"Issuance of Completion Certificate"-Reg.**

Ref.:
(i) Contractor letter no.Nil dated 14.02.2020
(ii) Authority Engineer letter no. LNM/IE/SB/NH-1/Amb/2020/03 dated 30.01.2020
(iii) Contractor letter no.NIL dated 29.01.2020
(iv)Authority Engineer letter no. LNM/IE/SB/NH-1/Amb/2020/02 dated 25.01.2020.
(v)NHAI PIU Ambala letter no.11147/NHAI/Amb/2359 dated 30.10.2019
(vi) Contract Agreement dated 14.09.2019
(vii) RO-NHAI Chandigarh letter no.NHAI/RO/CHD/11011/PD-AMB/Pani-Jal/NH-1/REF/38-2390 dated 14.08.2019
(viii)Contractor letter no.NIL dated 29.01.2020
(ix) Authority Engineer letter no. LNM/IE/SB/NH-1/Amb/2020/04 dated 24.02.2020
(x) NHAI PIU Ambala letter no.11147/NHAI/Amb/4190 dated 09.03.2020

Respected Sir,

1. Contractor vide above cited reference at Sr.No.(i) has apprise the Authority Engineer that the subject works has been completed as per provisions of Contract Agreement and has requested the Authority Engineer to issue the Completion Certificate accordingly.

2. In this context, subsequent to site visit on 30.01.2020, a joint visit with representative of contractor and NHAI was carried out on 08.03.2020 wherein it has been observed that Contractor has completed the works as per provisions set forth in Contract Agreement.

3. Please refer clause 49 (Page no.122) of contract agreement regards to Completion which may be read as ***"When the whole of the works has been completed as per provisions of the contract, the Contractor shall request the Engineer to issue a certificate of Completion of the Works. The Engineer shall within 14 days of the date of receipt of such request either issue to the Contractor with a copy to the Employer a completion certificate stating the date on which the works were completed in accordance with the contract or give instructions in writing to the Contractor specifying all the work which in the Engineer's opinion is required to be done by the Contractor before the issue of such certificate".***

Project Office: -82 Model Town Ambala City, Near Euro Kids School Haryana
Email: - lnpanijal@gmail.comPhone -- 9424450121
Corporate Office: - Plot No. 31 2nd Floor, Sector 12A, Dwarka New Delhi (110078)
Email --delhilnm@gmail.com, corp@lninfra.com

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L.N. MALVIYA INFRA PROJECTS PVT. LTD.

T-10,IIIrd Floor, City Centre, Press Complex, Plot No. -1, M.P.Nagar Zone –I, Bhopal (M.P.), 462011
Tel. /Fax: 0755-4295421, Mob. 09826452711,09977004686,9926050707
Email: lnmalviya@rediffmail com, website www lninfra com
CIN No. U45201MP2010PTC024316

4. Authority Engineer has carried out the required tests as per clause 32 of contract agreement and found the works as per specifications. The details of various tests regards to Civil Works, Noise Level Test of Sound Barrier Material etc.have been enclosed herewith for your ready reference.

5. Accordingly, Authority Engineer hereby issues completion certificate for the subject work i accordance with provisions of CA.

This is for your kind information and necessary action please.

Yours Sincerely
For L. N. Malviya Infra Projects Pvt. Ltd.

Ashok Mittal
(Team Leader)

Encl: As above.

CC.:PD PIU Ambala NHAI -for information please.

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COMPLETION CERTIFICATE

I, Ashok Mittal (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated 14th September 2019 (the "**Agreement**"), for Providing Sound Barrior at Pipli Zoo on NH 44 (Old NH 1) in the State of Haryana (the "**Project Highway**") through M/s Ecotone Systems Pvt.Ltd hereby certify that the Tests in accordance with clause 32 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safety and reliably placed in service of the users thereof.

2. It is certified that, in terms of the aforesaid Agreement, all works forming part of Project; have been completed, and the Project Work is hereby declared fit for entry into operation on 30.01.2020

SIGNED,SEALED AND DELIVERED

For and on behalf of

The Independent Engineer (acting as AE) by:

(Ashok Mittal)
(Team Leader, Independent Engineer)
(T-10, IIIrd Floor, City Centre,
Press Complex, Plot No.-1, M.P.Nagar, Zone-1, Bhopal (M.P)

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Test Certificates

सी एस आई आर – राष्ट्रीय भौतिक प्रयोगशाला
CSIR–NATIONAL PHYSICAL LABORATORY
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)
(Council of Scientific and Industrial Research)
डॉ. के. एस. कृष्णन् मार्ग, नई दिल्ली–110012, भारत
Dr. K.S. Krishnan Marg, New Delhi-110012, INDIA
दूरभाष/Phone: 91-11- 4560 8441,8589,8610,9447, फैक्स/Fax : 91-11-4560 8448
ई–मेल/ E-mail: cfct@nplindia.org वेबसाईट / website: www.nplindia.org

परीक्षण रिपोर्ट
TEST REPORT

Sound Transmission Loss

दिनांक/Date	परीक्षण रिपोर्ट संख्या/Test Report No.	पृष्ठ / Page	पृष्ठों की संख्या / No. of Pages
30-05-2016	16050143/D5.07/A/T-009	1	2

1. Tested for : M/s. Ecotone Systems Pvt. Ltd.,
   A-612/613, Shyam Colony,
   Budh Vihar, Phase-II,
   New Delhi – 110 086 (India)
   Customer Ref. No.: ESPL/SS/5011
   dated 11/05/2016

2. Description and Identification of Items : 100 mm thick Steel Acoustic Panel consisting of 16 Swg CRCA sheet on Front face and other side face laminated with GI perforated sheet, Acoustic insulation material (sound dampening & absorbing) filled in between.
   (Sample size - 93 cm x 63 cm)

3. Environmental Conditions : Room Temperature: 28.5 ^{0}C
   Relative Humidity: 50.6 %RH

4. Standards used and Associated Uncertainty : Working Standard Microphone,
   ± 0.2 dB

5. Traceability of Standard Used : The standards used for testing are traceable to National Standards

6. Principle/Methodology of Testing and Test Procedure No. : IS:9901 (Part III)-1981, DIN:52210 Part VI-1989
   IS0: 140 (Part III) – 1995,
   "Measurement of Sound Insulation in Building and of Building Elements"
   Part III: Laboratory Measurements of Airborne Sound Insulation in Building and of Building Elements
   Sub-Div # 5.07/A/Doc. 3/ TP # 15

7. Results:

As requested by the party, the acoustical material was tested for its airborne sound insulation by using two reverberation chambers under existing environmental conditions. The sample was fixed in the common opening between the two chambers. The volume of the source room was 257 m^3 and that of the receiver room was 271 m^3. Adequate diffusion excited in both the chambers.

परीक्षणकर्ता: Tested by: (Dr. Kirti Soni)
जाँचकर्ता: Cheked by: (Dr. Mahavir Singh)
प्रभारी वैज्ञानिक: Scientist-in-charge: (Dr. Mahavir Singh)
जारीकर्ता: Issued by: Dr. V. K. Gumber

Indian Green Building Council
MEMBER

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CSIR–NATIONAL PHYSICAL LABORATORY
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)
(Council of Scientific and Industrial Research)
डॉ. के. एस. कृष्णन् मार्ग, नई दिल्ली–110012, भारत
Dr. K.S. Krishnan Marg, New Delhi-110012, INDIA
दूरभाष/Phone: 91-11- 4560 8441,8589,8610,9447, फैक्स/Fax : 91-11-4560 8448
ई–मेल/ E-mail: cfct@nplindia.org वेबसाईट / website: www.nplindia.org

परीक्षण रिपोर्ट
TEST REPORT

Sound Transmission Loss

दिनांक/Date	परीक्षण रिपोर्ट संख्या/Test Report No.	पृष्ठ / Page	पृष्ठों की संख्या / No. of Pages
30-05-2016	16050143/D5.07/A/T-009	2	2

Using filtered noise in 1/3-octave band, the airborne sound insulation index was evaluated by measuring the average sound pressure levels generated in the source room and the receiver room and by measuring the equivalent absorption in the receiver room. The results are given below:

1/3-Octave Band Center Frequency (Hz)	Airborne Sound Insulation Index (dB)
100	38
125	36
160	34
200	34
250	37
315	39
400	43
500	48
630	49
800	53
1000	53
1250	55
1600	57
2000	60
2500	59
3150	60
4000	61

Using the standard reference curve, the sound transmission class (STC) was found to be 50.

The evaluated uncertainty in measurement is ± 1.0 dB which is at a coverage factor k = 2 and which corresponds to a coverage probability of approximately 95% for normal distribution.

8. Date of Testing : 23-05-2016

9. Remarks : Nil

परीक्षणकर्ता: Tested by: (Dr. Kirti Soni)
जाँचकर्ता: Cheked by: (Dr. Mahavir Singh)
प्रभारी वैज्ञानिक: Scientist-in-charge: (Dr. Mahavir Singh)
जारीकर्ता: Issued by: Dr. V. K. Gumber

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