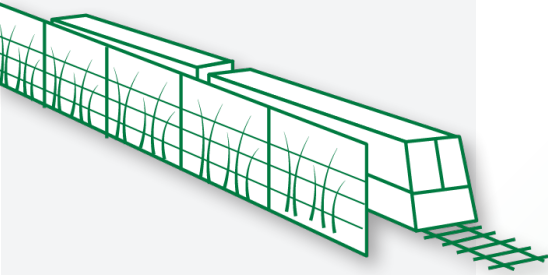


*Durisol*<sup>®</sup>



# DESIGN WITH DURISOL

Transit Noise Wall Design Guide



**NOISE & RETAINING WALL  
SOLUTIONS THAT KEEP  
PROJECTS ON TRACK**

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# introduction

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**The purpose of our design guide is to provide guidance to our partners in transit to achieve the best possible outcome for an individual project.**



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Our design guide outlines the many noise and retaining wall possibilities based on our intimate knowledge and field experience.

As a leader in the industry, we make it our job to be on the forefront of technology and trends. Come to us with a concept, and we will design it.

Throughout the design guide, we confront the sensitivities that surround noise wall projects. We acknowledge the intersection with community, and the strain this can have on a project. As part of compiling this guide, we hope to alleviate these relationships by working with the varying stakeholder groups to provide mutually-beneficial solutions.

We understand that not every solution is viable or cost-effective from project to project, which is why we take a customized approach to every project we design, supply and install, providing consultation on the entire life cycle of a structure.

From conceptualization to maintenance, we consider:

- Overall project goals and objectives
- Brand consistency and visual representation
- Aesthetics and sustainability
- Noise requirements
- Structural requirements (including height restrictions, wind impacts)
- Safety, security, and accessibility
- Past noise wall practices employed
- Site specific noise mitigation strategies
- Applicable regulations, such as MTO/MOE policies, or municipal and city by-laws.

# our story

## Who We Are

Durisol leads the industry, as it has, for more than 68 years. We model the highest standards of noise & retaining wall systems. We collaborate and innovate for the robust needs of the transportation, building and energy sectors across North America.



## Our History

From our earliest roots in North America over 68 years ago, our story began as the pioneers of absorptive noise barriers. Durisol has enjoyed continuous growth and incredible opportunity since. And with each step forward, we've been at the forefront of the industry.

It is through the years of collaboration, discovery, achievements, and challenges overcome, that we gained the insight we have today.

Allowing us to question the predictable, anticipate trends, and propose innovative noise and retaining solutions unlike any other company.

## Durisol Today

As we extend our footprint into new sectors, grow our team and expand our geographical reach, we remain steadfast in our vision to solve even the toughest of problems.

In advance of urban development, we are working to simplify noise issues, road safety and earth retainment.

As partners, we help clients beyond their needs of today with long-lasting solutions that account for what is ahead with **future-ready noise and retaining walls**.



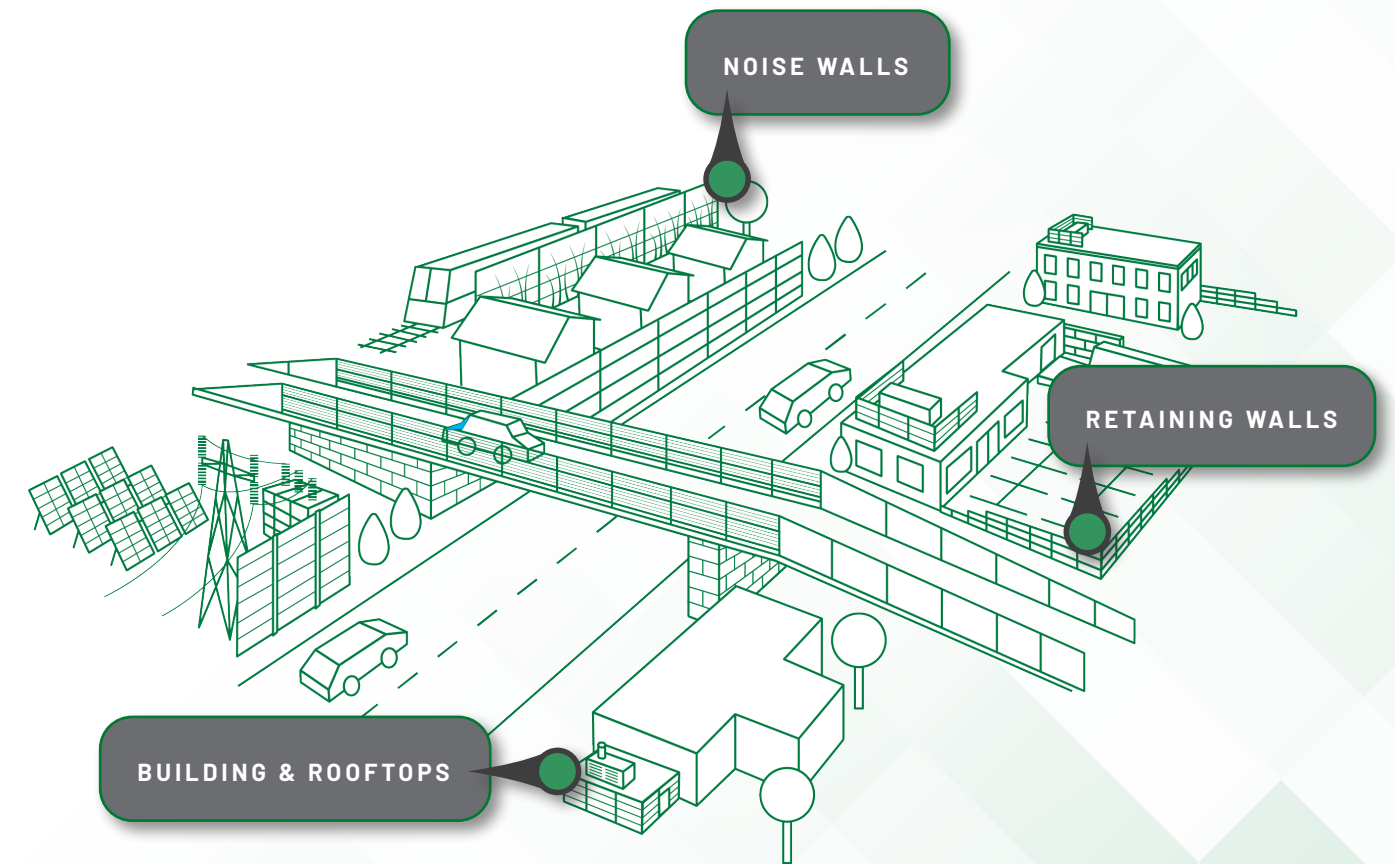
## The Durisol Way

### FUTURE-READY NOISE AND RETAINING WALLS

Durisol models the highest standards of noise and retaining wall systems. We collaborate and innovate for the robust needs of the transportation, building and energy sectors across North America.

As partners, we help clients beyond their needs of today with long-lasting solutions for what's ahead.

Bring us your challenges. We'll help solve them.



68  
years  
making  
connections

200+  
active  
projects

3000+  
completed  
projects

300  
employees

# public education

**Our clients know that education and communication will get a project off on the right foot. Lean on us for support and information.**

## Why is a noise wall needed?

Noise walls are required when a noise assessment has been performed and it is determined that residences and businesses will be negatively impacted by noise from trains, tracks, and/or stations. As part of ongoing development of transit networks across the country, noise walls are becoming a more critical piece of expanding infrastructure.



## Understanding Sound (Noise)

### Noise is:

#### HUMAN-CREATED

Noise has been called “the natural by-product of expanding human technology.” In other words, disagreeable sounds are mostly the fruits of our own creation. Automotive and truck traffic, airplanes, generators, air conditioning units, and trains are all common sounds often described as noise.

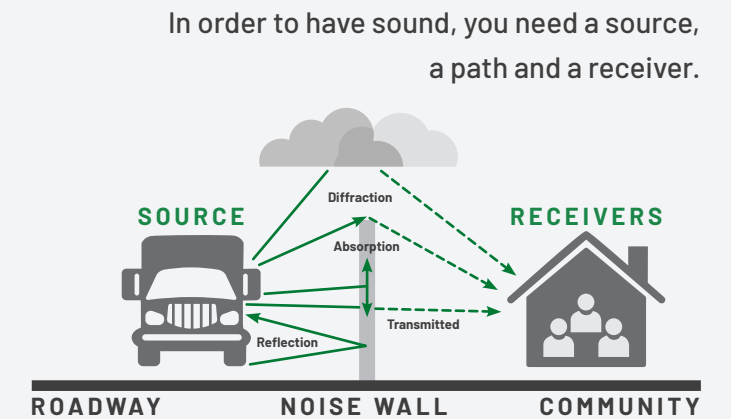
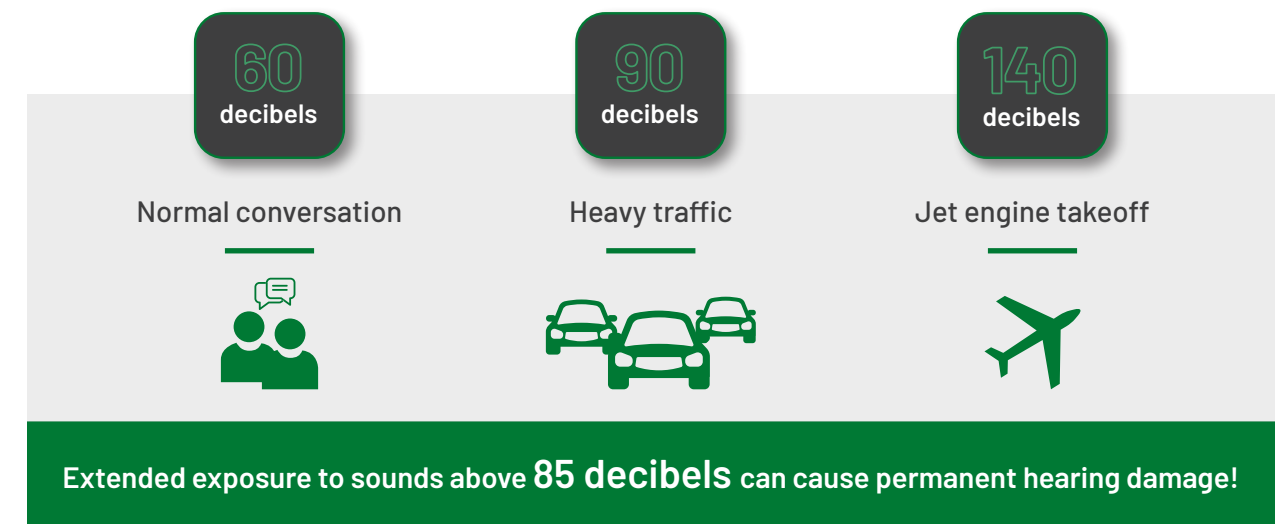
#### A HEALTH CONCERN

According to the World Health Organization (WHO), sounds above 60 decibels (such as background noise within a city) is enough to raise blood pressure and heart rate. This is the environmental noise that we live with everyday and can cause distraction, disturb sleep and create anxiety. With the noise make-up changing and increasing, we expose our communities to more risks.

#### CHANGING

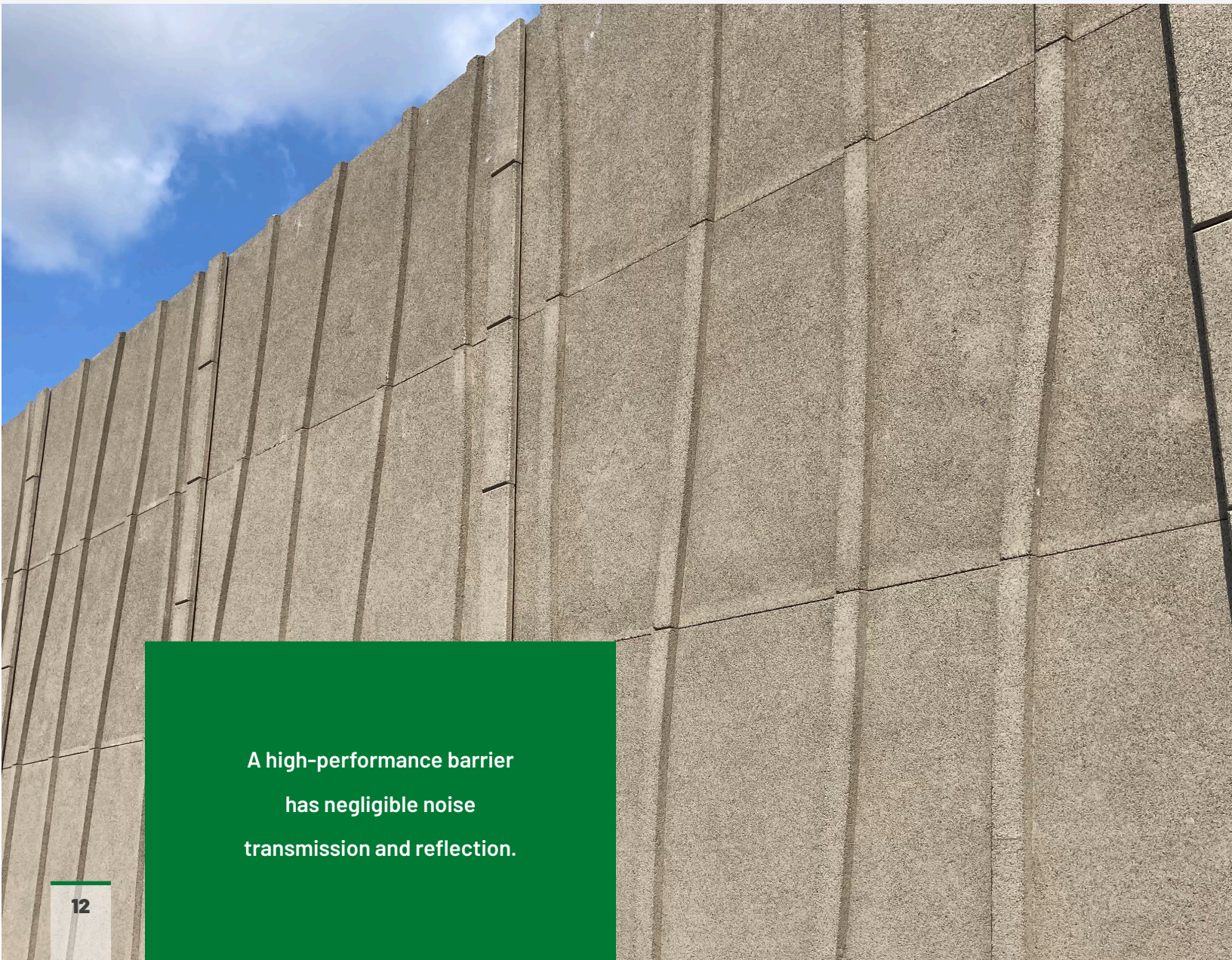
With the changing city landscape due to the pandemic, noise levels went down, but noise complaints have increased considerably. Noise at home has become even more apparent as people spend more time there.

#### DECIBELS OF COMMON SOUND



## What is a noise wall?

Noise barriers reduce the noise that enters a community by interrupting the direct noise path. The effectiveness of a barrier depends on how well it diffracts and absorbs the noise.



A high-performance barrier has negligible noise transmission and reflection.

## How a noise wall works

### REMOVES SOUND ENERGY

The goal is to remove reflected sound energy as soon as possible. The most practical method is to replace reflective surfaces with absorptive surfaces so that they cannot turn into reverberations. Reverberations become new sources and add to the original noise source.

### NRC + STC

Noise wall performance is rated by two coefficients: Noise Reduction Coefficient (NRC) and Sound Transmission Class (STC). The STC determines the amount of noise energy transmitted through the wall material. The NRC determines the amount of energy absorbed by the way material and the amount of energy reflected back towards the source.

### HEIGHT & LENGTH

The height, location and orientation of the sound wall play a significant role in the wall's effectiveness. Sound walls are most effective when built close to the source or close to the receiver.

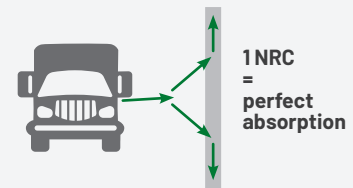
**Height** - A noise barrier can achieve a 5 dB noise level reduction when it is tall enough to break the line-of-sight.



**Length** - To effectively reduce the noise coming around its ends, a barrier should be at least eight times as long as the distance from the home or receiver to the barrier. Openings in noise barriers for driveway connections or intersecting streets lose their effectiveness.

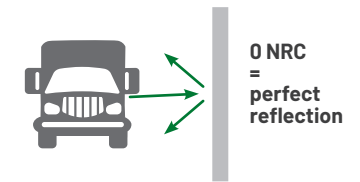
## ABSORPTIVE

- Absorbs the noise that strikes the wall.
- For absorptive noise walls with an NRC >0.80, means the wall can absorb 80% of the noise that strikes the barrier.
- Prevents unwanted reflections or potential “echo chambers” in parallel barrier scenarios.
- Reduces the noise reflections from the community side of the wall as well.



## REFLECTIVE

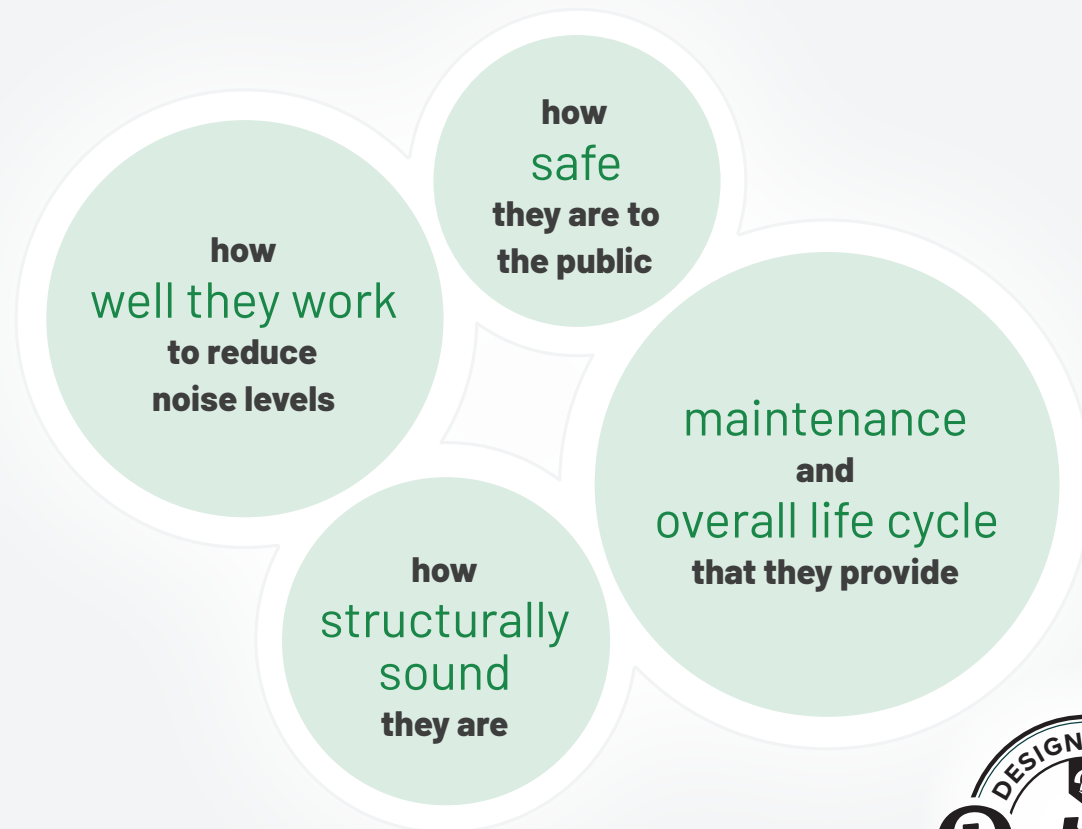
- Reflects (bounces) noise that strikes the wall.
- Acoustic performance is based on the geometry of all (height & length) and material density.
- Does not account for noise levels increased due to reflections from wall back to multiple surfaces.
- In some cases, can increase noise levels higher than without a noise wall.





## What is the best noise wall for a project?

A noise wall becomes a part of a community and so it is important to design a wall that takes all factors into account, including:



Design is not just what it looks like and feels like. Design is how it works.



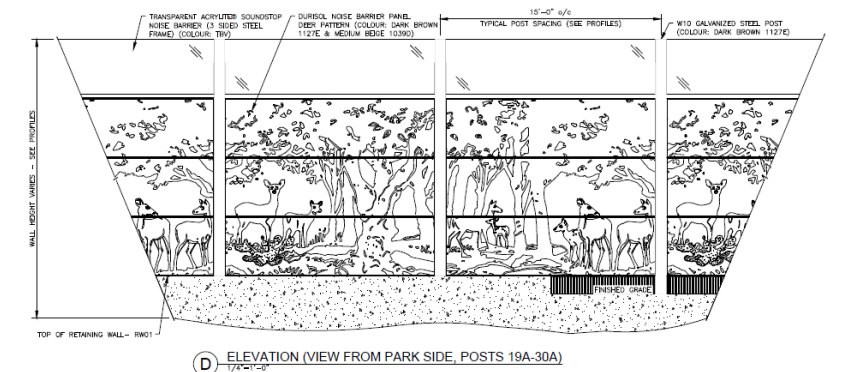
Steve Jobs

## From concept to completion (and everything in between).

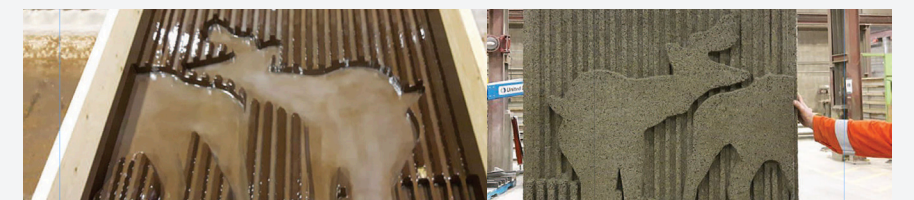
Every client that we encounter has a vision, and we are honored when we get to be a part in it.

'Concept to completion' can mean something different, depending on the project needs and requirements. Even within each individual design, there can be multi-phased approaches shared through visual renderings, prototype building, samples and shop drawings created so that we get it exactly right. We get involved where ever we can help most.

FROM DESIGN



TO PROTOTYPE



TO COMPLETION



# community engagement

Noise walls are an important part of a transit project that requires a particular sensitivity to the communities in which they directly impact.



WE SUPPORT A COMMUNITY-LED DESIGN PROCESS TO...

## Engage through artwork

- Captures essence of the community
- Heritage preservation and awareness
- Animate walls with vibrance that creates a new sense of community
- Showcase local artists
- Support local, non-profits
- Reduce infrastructure maintenance costs when used as graffiti diversion

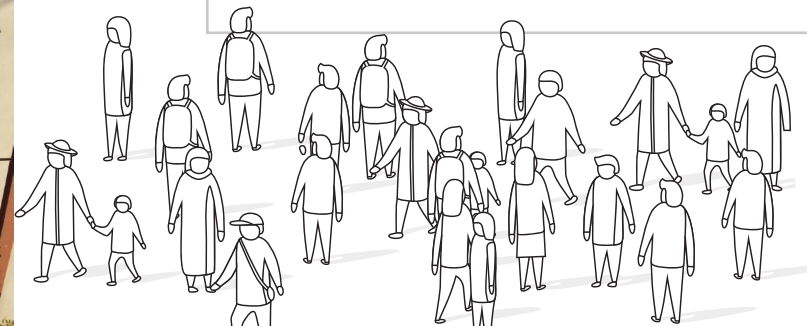
**ANIMATE** walls with vibrance that creates a new sense of community

Fortunately, when you **Design with Durisol**, you have a limitless portfolio to draw from for community input, a design and engineering team at your disposal, and no shortage of exceptional people ready to find exceptional solutions.

Together, we build the best possible structure to integrate the transportation facility into the fabric of the community it serves.

The result?

A noise wall that tells a story to the traveler. A more livable community that reflects the people a part of it, and elevated transportation that connects us all.



Humberwood Murals  
@artsetobicoke  
@women\_paint  
@start\_streetartoronto

**WE TELL A DESIGN  
NARRATIVE THROUGH...**

### **Custom Noise Wall Graphics**

- Complete customization with precast concrete and Durisol
- Architectural patterns and colour-matching available
- Integrate lighting, solar panels and our other line of products together
- Graphic imagery imprinted into concrete panels
- Icon panels for entranceway signs

**WE CREATE HEALTHIER  
SPACES WITH...**

### **Living Walls**

- Integrates noise walls into natural surroundings
- Nature-inspired, low-maintenance plant life determined by the project plant zone
- Environmental benefits such as pollution filtration, head island effect reduction and soil stabilization
- Achieve desired noise reduction
- Natural graffiti protection

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**Complete  
CUSTOMIZATION  
for communities**

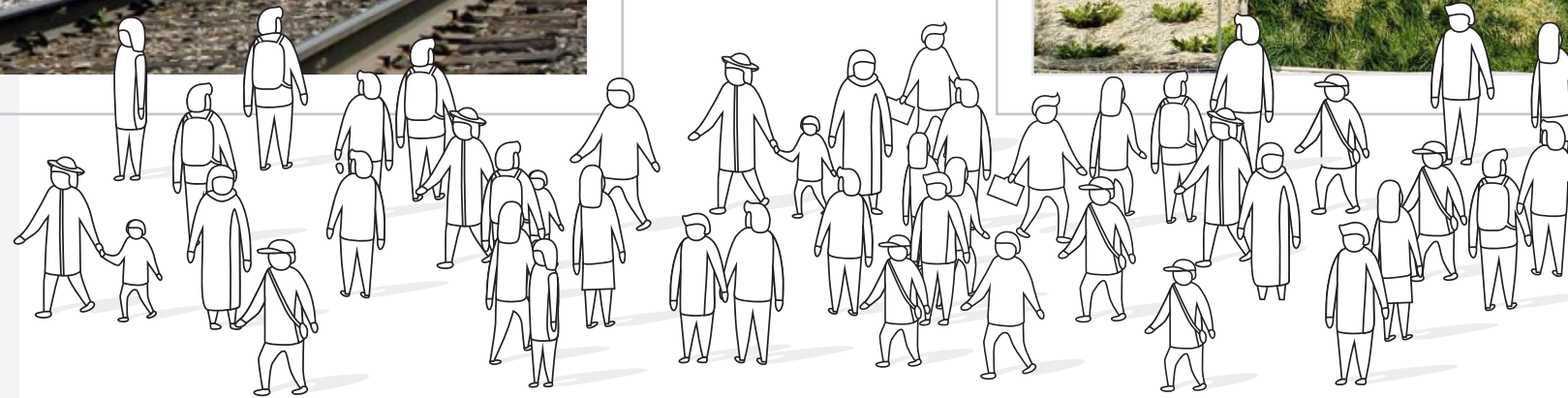
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**INTEGRATES  
noise walls into  
natural surroundings**



Mount Dennis Bus Garage, Toronto, TTC

City of Montreal

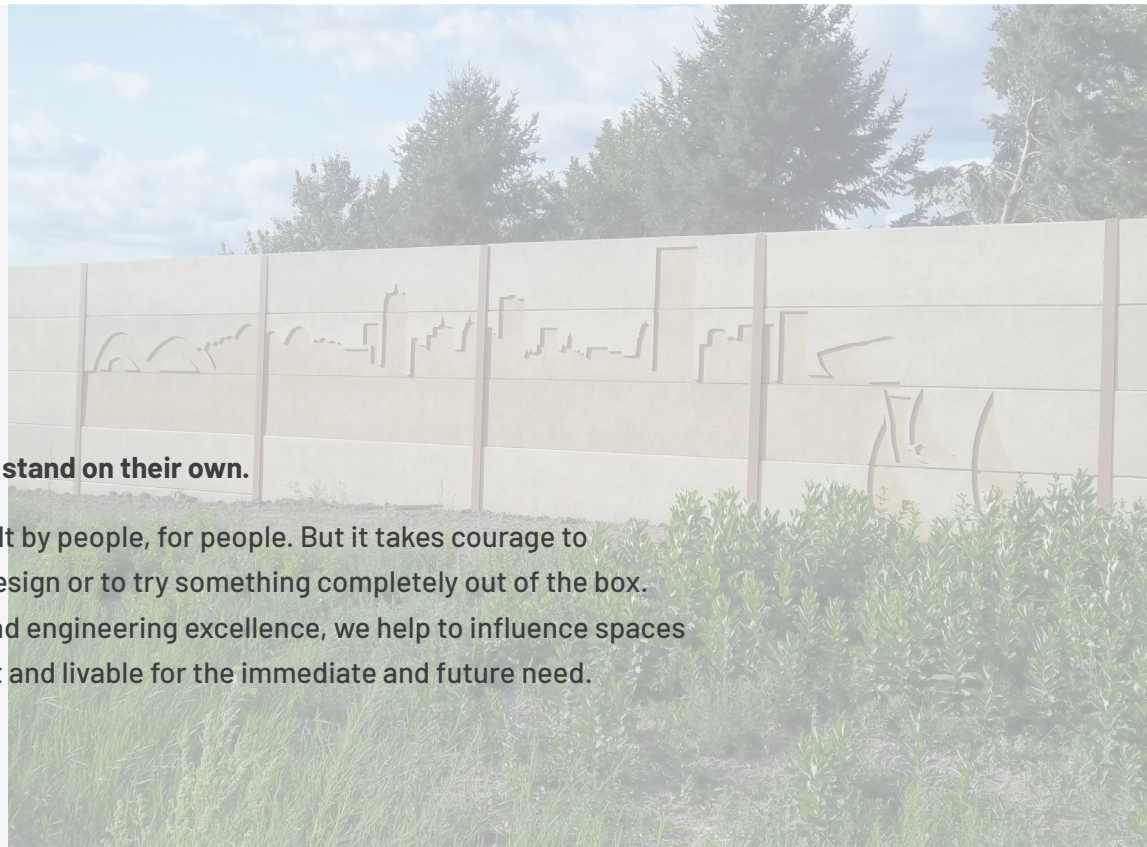


# our portfolio

**At the forefront of community sensitive design, we work with stakeholders to promote an acoustic environment that brings citizens and project designs together.**

**Our structures do not stand on their own.**

Our structures are built by people, for people. But it takes courage to recognize flaws in a design or to try something completely out of the box. Through our design and engineering excellence, we help to influence spaces that are more resilient and livable for the immediate and future need.










Creativity takes courage.



Henry Matisse

## We have a solution for...

	NOISE MITIGATION
	LIGHT & VISIBILITY
	AESTHETICS
	MATERIAL WEIGHT
	SUSTAINABILITY
	GRAFFITI MANAGEMENT
	RETAINING WALLS

**Bring us your challenge, and we will help solve it.**

## Noise Mitigation

We know noise walls better than anyone. Humbled by the reputation earned over the years, we don't stop there. We are in continuous pursuit of long-term, cost-effective solutions that promote a better quality of life.

**As long as there is unwanted noise, there is work to be done.**

As with many of our transit projects, the goal is not only to reduce noise levels, but that our walls blend seamlessly into the surroundings.



### OUR SOLUTIONS:



Our series of acrylic panels are mounted onto an engineered steel post system, with limitless wall customizations.

- > **Transparent noise barriers**
- > **Ready-fit framed transparent panels**
- > **BirdGuard protection markings**



### OUR SOLUTIONS:



Where it all began, our noise walls are anchored by our Durisol-branded absorptive wall system, but our line-up doesn't end there:

- > **Durisol Single and Double-sided Absorptive Wall Systems**
- > **Precast Reflective Walls**
- > **Aluminum Absorptive and Reflective Walls**
- > **PVC Absorptive and Reflective Walls**
- > **Acoustic Facings**
- > **Nexcem Rail Silencers**
- > **Integrated Noise and Retaining walls**

## Light & Visibility

Transparent acrylic panels offer an alternative to typical noise wall systems in areas where added visibility is a design requirement, achieving noise reduction without closing in a space.

The panels allow for views on either side of the structure and the passage of natural light to adjacent properties or public spaces.

## Aesthetics

Whether simple or dramatic, the topic of aesthetics can dominate the noise wall discussion. Not only must stakeholders agree upon “the look”, but that visual must remain relevant over time.

### Let our past projects inspire future work.

Work along side a team of trendsetters and design masterminds, with the manufacturing capabilities at our disposal to deliver complete design flexibility. Using custom moulds, transparent panels, lighting, vegetation and even etched or painted designs. In addition to the wide range of standard colours and patterns, and the many piers, caps, and post facing options available, our wall systems service many functional requirements too.

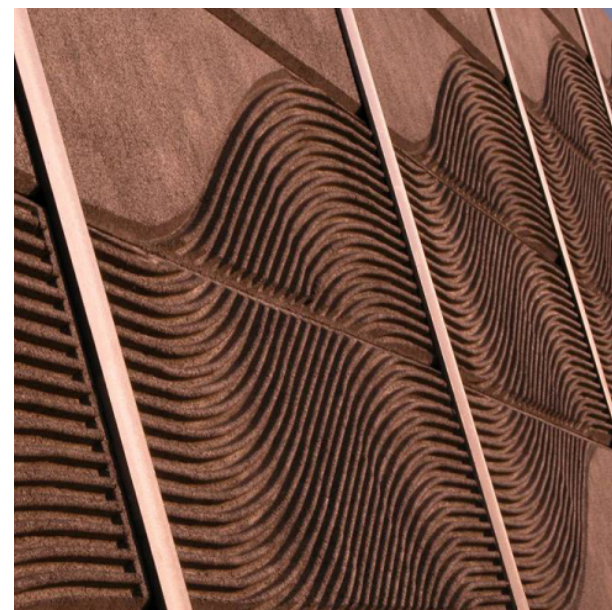


#### OUR SOLUTIONS:



Function can be seamlessly integrated into the design without taking away from the vision. We do:

- > Vehicle access gates & man doors
- > Drainage openings, grates & flood control panels
- > Pedestrian walkway entrances
- > Directional signage



Lightweight absorptive, reflected and crash-tested noise wall solutions include:

- > PVC
- > Aluminum
- > Transparent

## Material Weight Reduction

A new class of lightweight noise walls is here. Our PVC or Aluminum noise wall systems are versatile wall systems providing low dead load for bridges or other structure-mounted applications. Also recommended in areas where soil conditions are compromised, the Durisol panel is a middleweight option when compared with traditional precast or cast-in-place concrete walls.

In transit corridors or bus stations, lightweight transparent panels are recommended to help preserve light transmission, visibility and safety.

## Sustainability

Change the way a landscape or neighbourhood interacts with nature through the use of a welded-wire trellis system that provides a natural visual screen and helps to reduce heat island effect in the city.

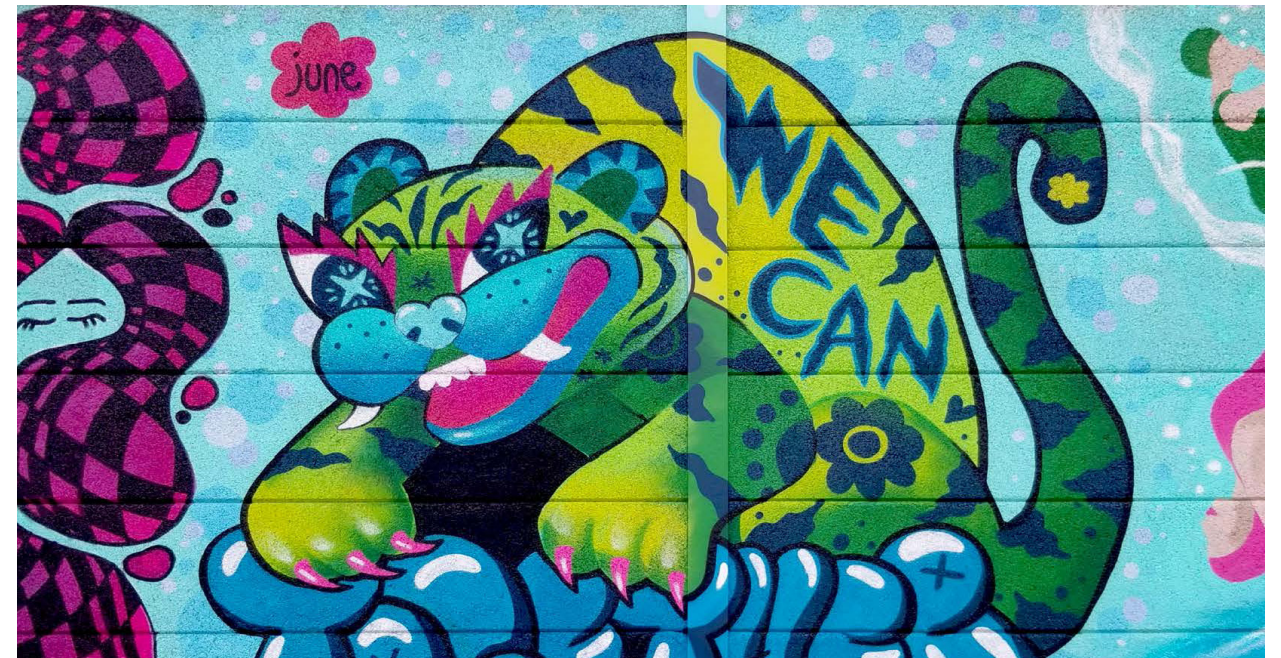
Couple that with the longevity and quality of precast concrete, the Durisol product is known for its contribution to sustainable construction. Made of upwards of 95% RECYCLED MATERIAL, it utilizes mineralized wood shavings instead of virgin aggregates and reduced cement content to achieve a lighter footprint (and lighter panel weight for delivery).



### OUR SOLUTIONS:



- > **Durisol Noise Walls**
- > Trellis wires anchored to the wall
- > **Living walls that grow directly on noise walls**



## Graffiti Management

Put a proactive plan in place to manage graffiti on noise wall surfaces with a multi-pronged approach.

In efforts to reduce graffiti vandalism on noise wall surfaces, plan to incorporate vibrant community-led street art. Our noise walls make for a perfect canvas and this methodology has been proven to deter vandalism.

Green walls follow the same theory, by reducing the surface area available or can cover existing tagging.

Where precast walls are required, mitigation techniques such as the use of patterned versus flat surfaces and thoughtful landscaping.

## Retaining Walls

As engineers, we fully understand the complexities of retaining wall projects. Our goal is to simplify your earth retaining project, giving you a solid foundation to build on as efficiently as possible.

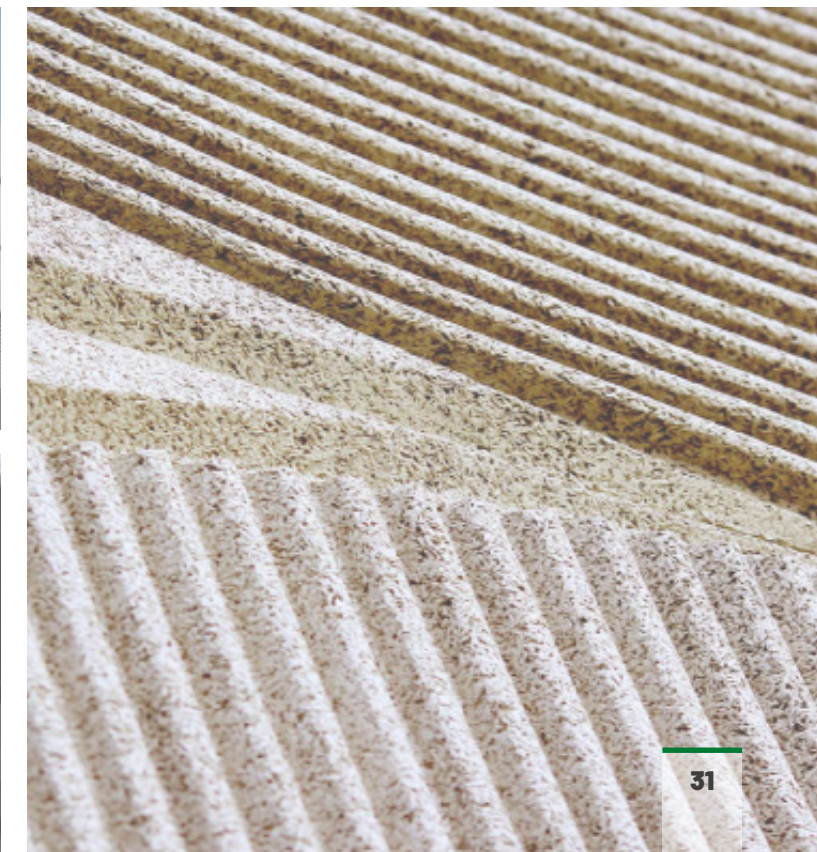
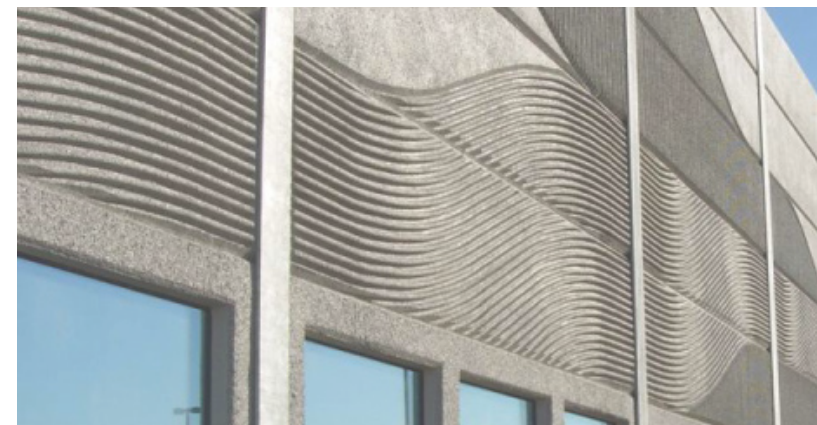
Whether you have a fully integrated noise and retaining wall or you're designing a standalone retaining structure, we have a long history delivering precast retaining wall solutions using our trusted post and panel system for transit stations and rail corridor applications.



### OUR SOLUTIONS:



- > Hybrid MSE
- > Gravity segmental Blocks
- > Cantilevered and Narrow footprint
- > MSE
- > Lagging panels





# *Durisol*<sup>®</sup>



As industry leaders,  
Durisol<sup>®</sup> models the  
highest standards of  
noise & retaining wall systems  
to serve the robust needs  
of the transportation,  
building and energy sectors  
across North America.

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