

# American Repertory Theatre at Harvard University Allston, MA



## Case Study



**Property Owner**  
Harvard University



**Main Contractor**  
Shamut Design & Construction



**CLT Contractor**  
Nordic Structures



**Acoustic Consultant**  
Charcoal Blue



**Structural Engineer**  
Le Messurier

### Stravibase Fix

A discreet elastomeric bearing system designed to acoustically decouple structural connections through tuned stiffness, reducing structure-borne noise while meeting defined load and deflection requirements.

### OVERVIEW

As part of an ambitious redevelopment project, the American Repertory Theater at Harvard University was designed as a multi-use performance and academic facility constructed almost entirely from CLT mass timber. The building integrates theaters, rehearsal spaces, dance studios, classrooms, offices, and public areas within a vertically stacked program, creating exceptionally demanding acoustic conditions.

While performance venues inherently require strict control of vibration and structure-borne sound, this project introduced an added layer of complexity. Several building volumes required high levels of acoustic separation but could not be structurally isolated due to load paths, lateral stability requirements, and the realities of large-scale timber construction.

Acoustic performance criteria developed by Charcoal Blue and structural stiffness requirements defined by LeMessurier introduced competing demands.



both structural continuity and limited vibration transmission. The resulting solution addressed both performance objectives and construction realities in one of the most technically demanding timber performance buildings executed to date.

## AT A GLANCE

### CHALLENGES

- Vertically stacked performance, teaching, and public spaces required high levels of acoustic separation.
- Structural elements had to remain continuous for load transfer and lateral stability
- Structure-borne noise risk through columns, walls, and vertical elements in a fully timber building
- Conflicting acoustic flexibility and structural stiffness requirements
- Tight construction tolerances and fast-track installation sequencing for large CLT elements

### BENEFITS

- Reduced structure-borne noise while maintaining required structural load paths
- Controlled acoustic performance under normal operating conditions with predictable structural behavior
- Tuned elastomeric bearings matched to project-specific load and frequency requirements
- Improved constructability through validated details and full-scale mockups
- Streamlined coordination across acoustic, structural, and construction teams

Nordic Structures, the CLT design-build contractor, was challenged to construct a building that balanced these two competing performance criteria.

Large timber panels had to be crane-set with tight tolerances, loads had to be transferred safely, and construction sequencing had to remain efficient, all while preventing vibration and noise transmission between acoustically sensitive spaces.

In a fully timber building, structure-borne sound can easily transmit through columns, beams, and other vertical elements. This risk was particularly critical where high-impact uses such as dance studios were located above public spaces and offices.

Giuseppe Cenci, Project Manager at Nordic Structures, oversaw the CLT design-build scope for the project.

“This was not a typical timber building. It was a very complex structure with multiple uses stacked on top of each other. The challenge was that these elements had to be structurally connected, but acoustically disconnected.”

To resolve these conflicting requirements, Nordic engaged CDM Stravitec to develop an engineered acoustic-isolation strategy that maintained



“The collaboration with CDM Stravitec was excellent from a technical and practical standpoint. Full-scale mockups, open dialogue, and a strong focus on constructability helped refine the design and improve installation. That level of support was critical on a project of this complexity.”

Giuseppe Cenci,  
Project Manager  
Nordic Structures

## SOLUTION

CDM Stravitec collaborated closely with Nordic and the broader design team to engineer a project-specific acoustic isolation strategy based on its **Stravibase Fix** building base isolation technology. While Stravibase Fix systems are commonly used in building-base isolation and vibration-control applications, this project required significant adaptation to suit a fully timber structural system and highly sensitive performance spaces.

CDM Stravitec provided custom-engineered elastomeric bearings and isolation components for critical structural interfaces, including structural columns, façade fixations, and isolated CLT chimney wall panels:

The central challenge was balancing acoustic flexibility with strict limits on vertical deflection and lateral movement. Softer materials improved acoustic isolation but exceeded the allowable deformation limit, while stiffer materials met structural criteria but compromised acoustic performance.

“There was no standard solution that could satisfy both the acoustic and structural requirements at the same time.”

To address this, CDM Stravitec developed and evaluated multiple solution paths ranging from acoustically optimized configurations to structurally optimized alternatives. The selected approach was a hybrid system designed to respond differently under normal and extreme loading conditions.

Under typical building loads, the primary elastomeric bearing provides effective acoustic disconnection between building volumes.

Under rare extreme loading conditions, such as exceptional snow loads, a secondary, stiffer element engages to limit deflection and protect the structure. While this engagement temporarily reduces acoustic performance, Nordic accepted the trade-off, given the statistical rarity of such events.

To validate both performance and constructability, CDM Stravitec built full-scale mockups of critical connections to test performance and tested them before site installation.



“The mockups were extremely important. They helped us identify weaknesses in the design and improve installability.”

Throughout the process, CDM Stravitec provided calculation support, prototype systems, and installation guidance designed for execution by standard carpentry and steel erection crews. Solutions were refined with real site conditions in mind, including tight tolerances, fast-track sequencing, and mixed timber-steel interfaces.

“The approach was very practical. This was not just theory. It was about making something that could actually be built on site.”

Rather than supplying a preconfigured product, CDM Stravitec delivered a custom-engineered isolation strategy tailored to the project’s structural constraints, acoustic performance targets, and construction timeline.

6 m<sup>2</sup>  
Chimney Wall  
Panels  
Stravibase  
Fix

13  
Column  
Assemblies  
Stravibase  
Fix

840  
Facade  
Fixations  
Stravibase  
Fix