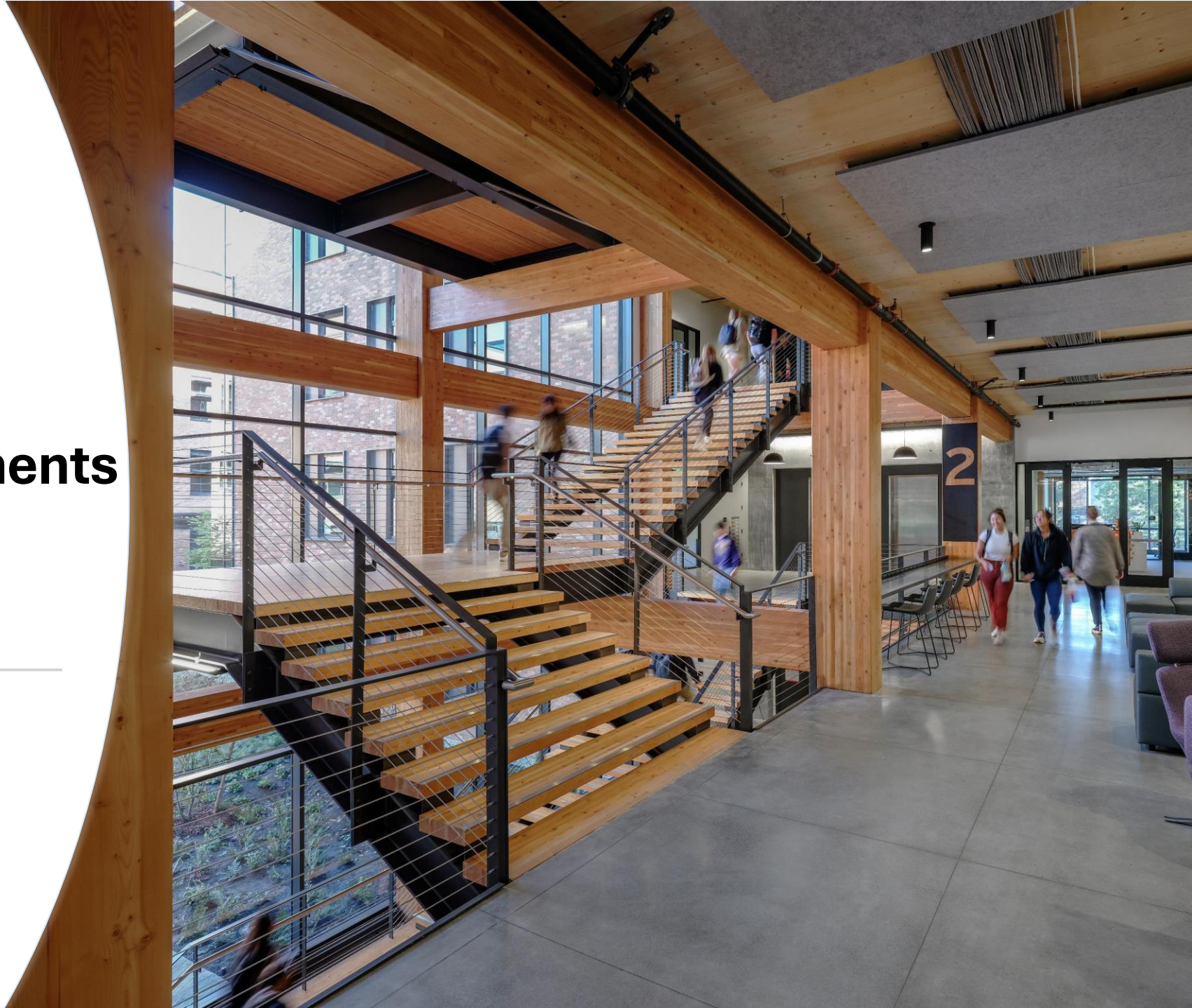


# Moving Beyond the Noise: Acoustical Environments and how they Affect Outcomes

Steve Robinson, INCE, Acoustical  
Designer, The Greenbusch Group

Adam C. Jenkins PE, INCE Bd. Cert.,  
CTS-D, Vice President – Acoustical,  
The Greenbusch Group



# Introduction

---

- Who are we?
- Services:
  - Acoustical
  - Noise & Vibration
  - Audio/Video
  - Mechanical
  - Vertical Transportation
  - Commissioning



# Thesis Statement

---

- Good acoustic design leads to better and more equitable outcomes.



# Learning Objectives

---

- Develop language for stakeholders to talk about acoustics.
- Understand how acoustic environments are created and experienced.
- Inspire advocacy for thoughtful acoustic design.



# Roadmap

---

- Who?
- What?
- Where?
- When?
- Why?
- How?
- Q&A



# Who?

---

- Community
- Users
- Ownership
- Design Team



# What?

---

- Separation
- Quality
- Quantity



# Where?

---

- Rooms
- Open Interior Spaces
- Outdoor Uses
- Neighborhood





# When?

---

- Conceptual
- SD / DD / CD
- Bidding / CA
- Post-Occupancy
- Project Lifetime



# Why?

---

- Privacy
- Safety
- Health
- Focus
- Comfort
- Inspiration
- Communication



# Why? Better Outcomes

---

- Administrators are more productive
- Teachers are less stressed, more relaxed.
- Students learn and achieve at higher levels.
- Schools are safer.



# Why? Better Outcomes

---

- Everyone can communicate more effectively.
- Performers and audiences experience more joy.



# Why? Equitable ~~Better~~ Outcomes

---

- ESL learners.
- Neuro diverse students.
- Physically diverse students.
- Culturally diverse students.
- Geographically diverse students.



# How?

---

- Who – Consult the stakeholders.
- What – Establish goals & criteria.
- Where – Understand impacts inside and outside.
- When – Inception, completion, and lifetime of a project.



# How?

---

- Metrics abound in acoustics
- Sound transmission
  - STC(c), CAC, IIC
- Absorption
  - NRC,  $\bar{\alpha}$ , SAA
- Noise
  - dB(A), NC



# How?

---

- IBC 1207 / ICC A117.1 Ch. 808 Enhanced Classroom Acoustics.
- ANSI S12.60 Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools.
- LEED Acoustic prerequisite and optional credit.
- State specific standards (WSSP).





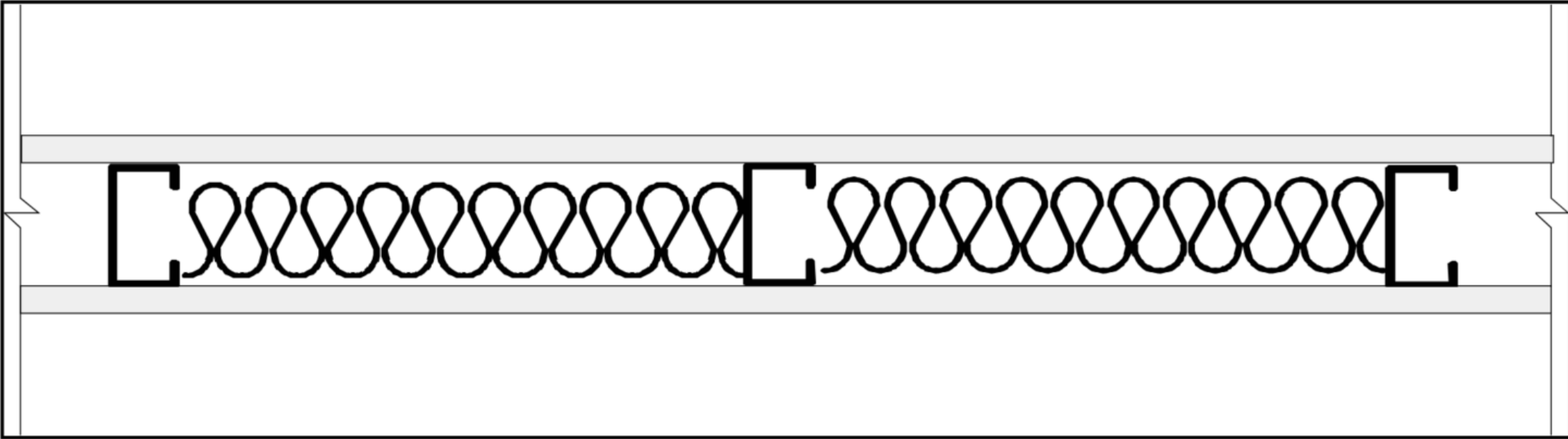
# How?

---

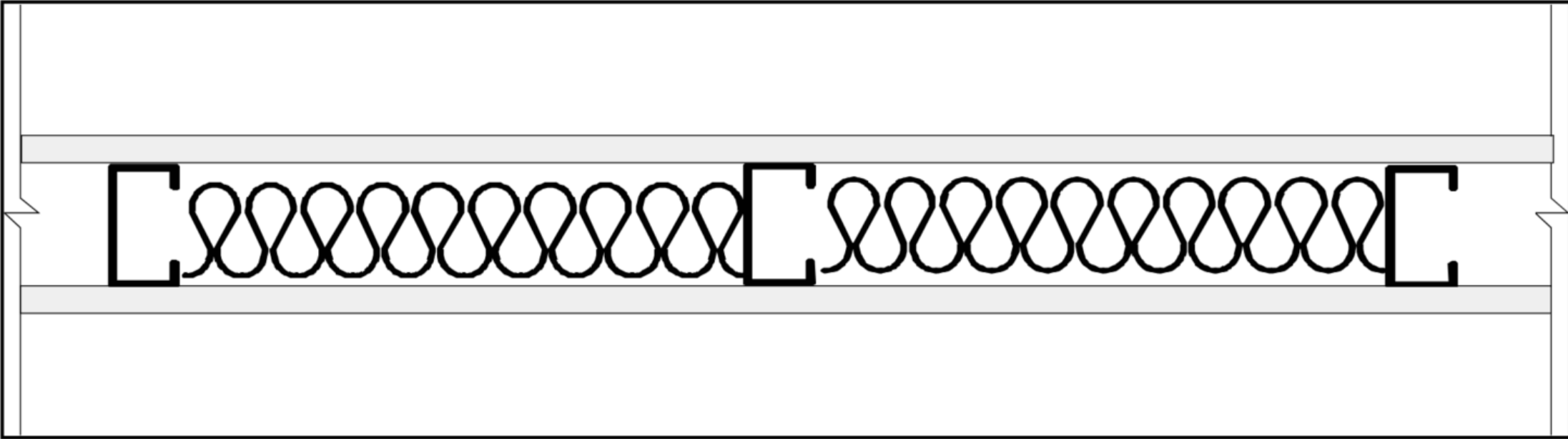
- Listen...



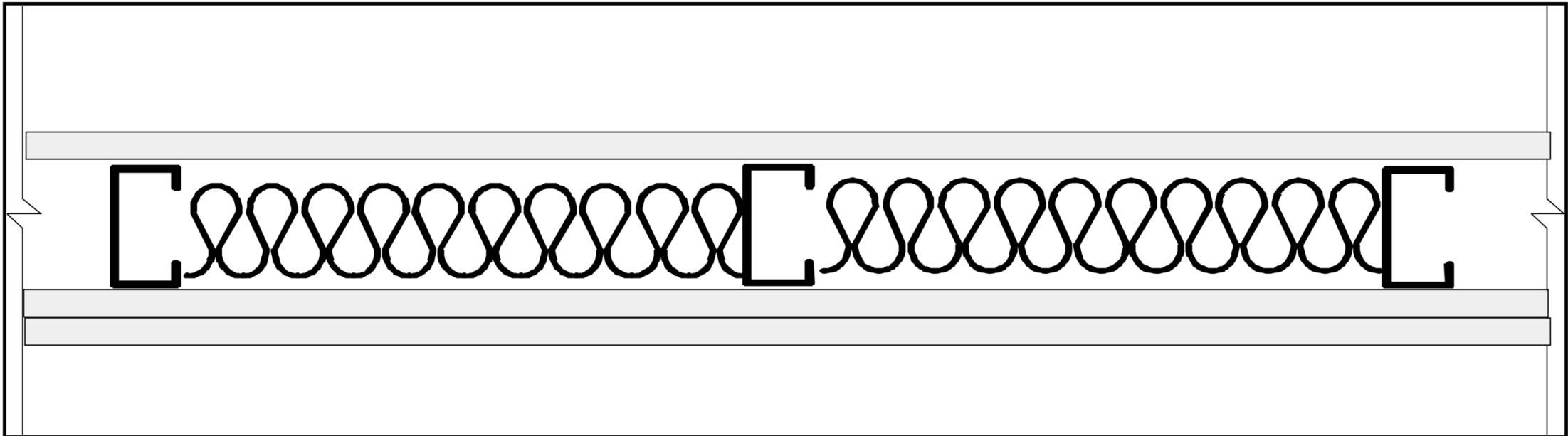
# STC 40



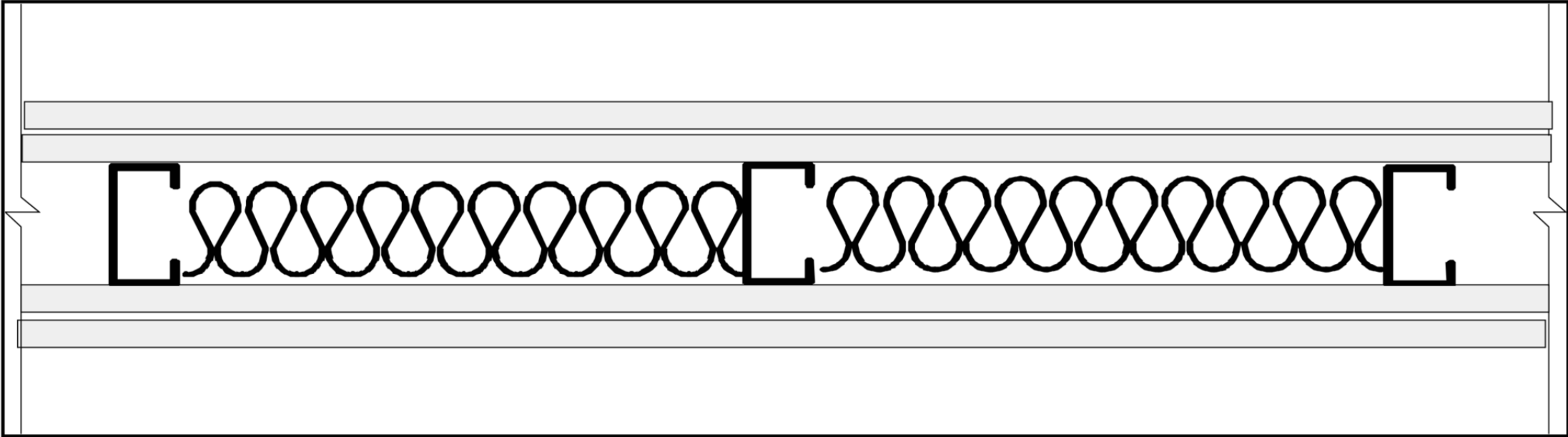
# STC 45



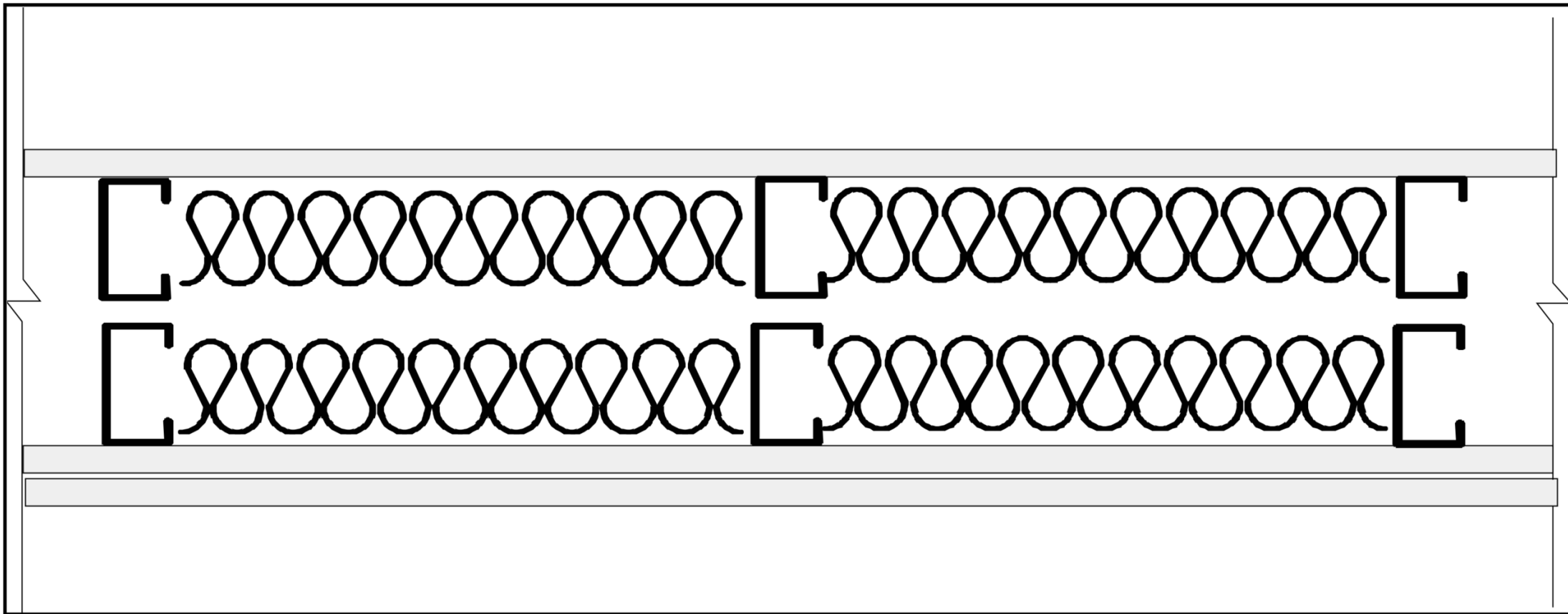
# STC 50



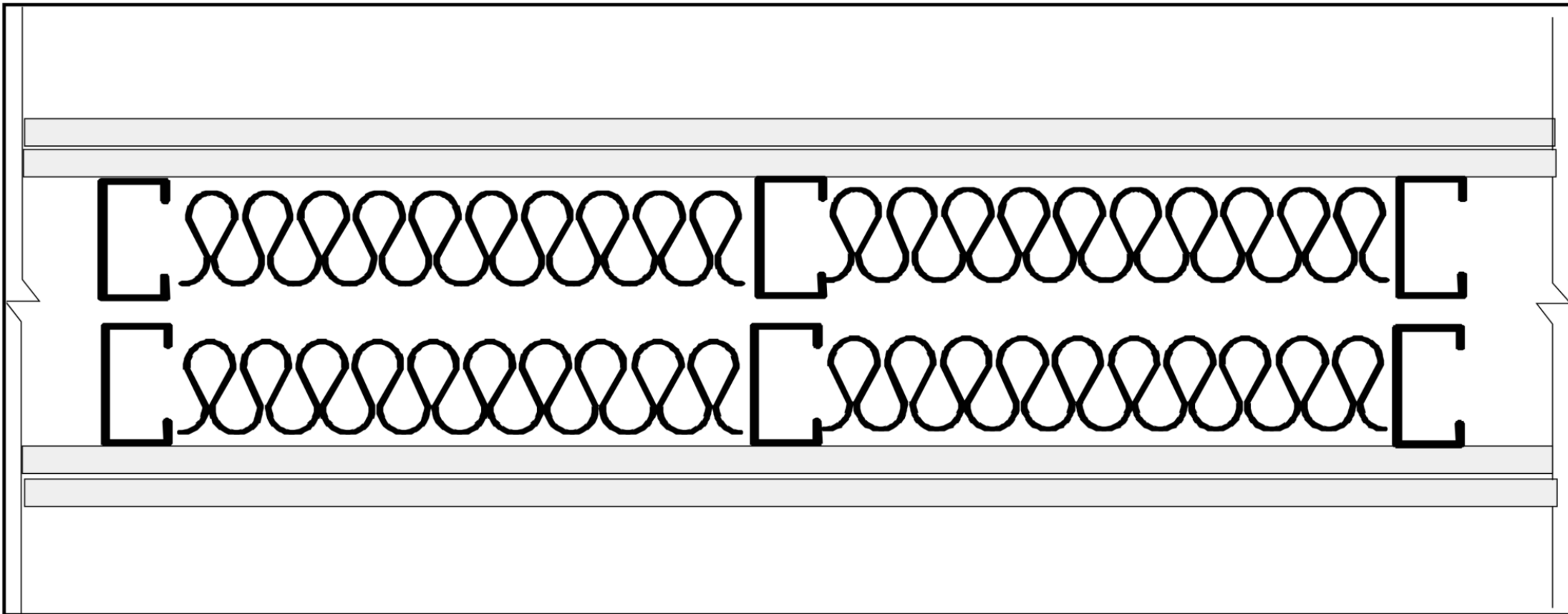
# STC 55



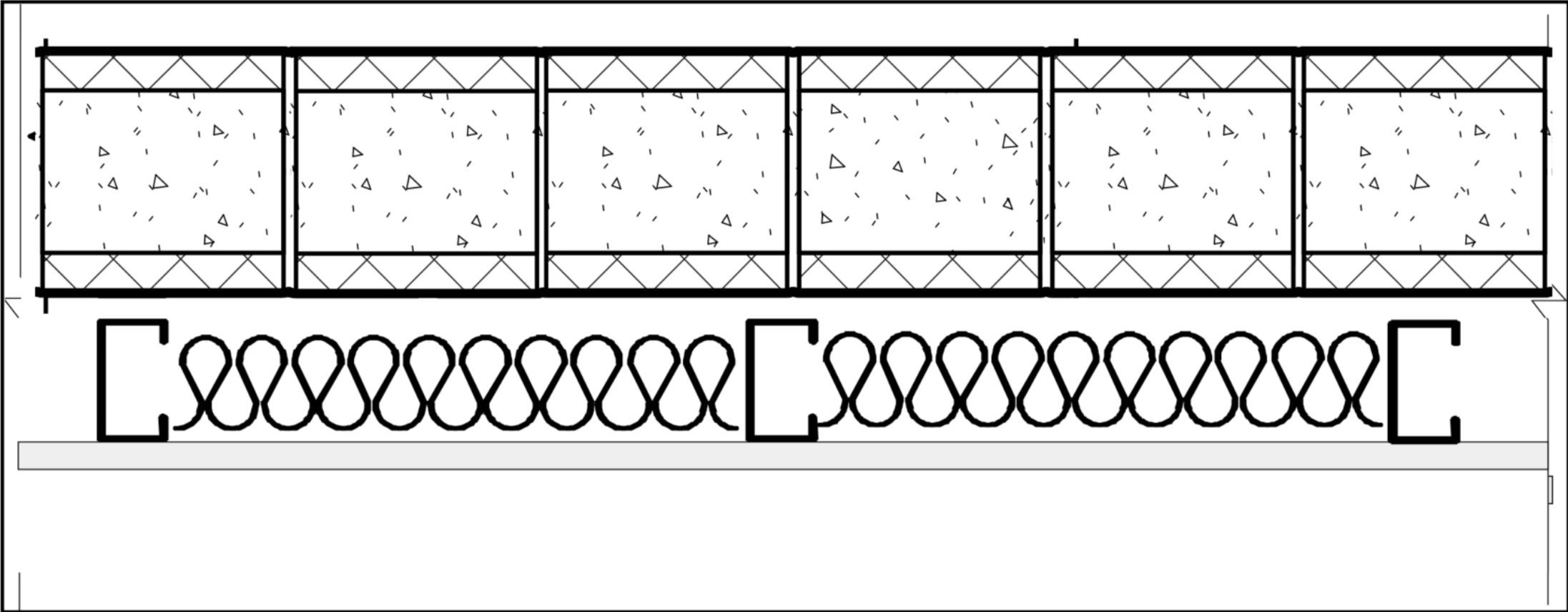
# STC 60



# STC 65

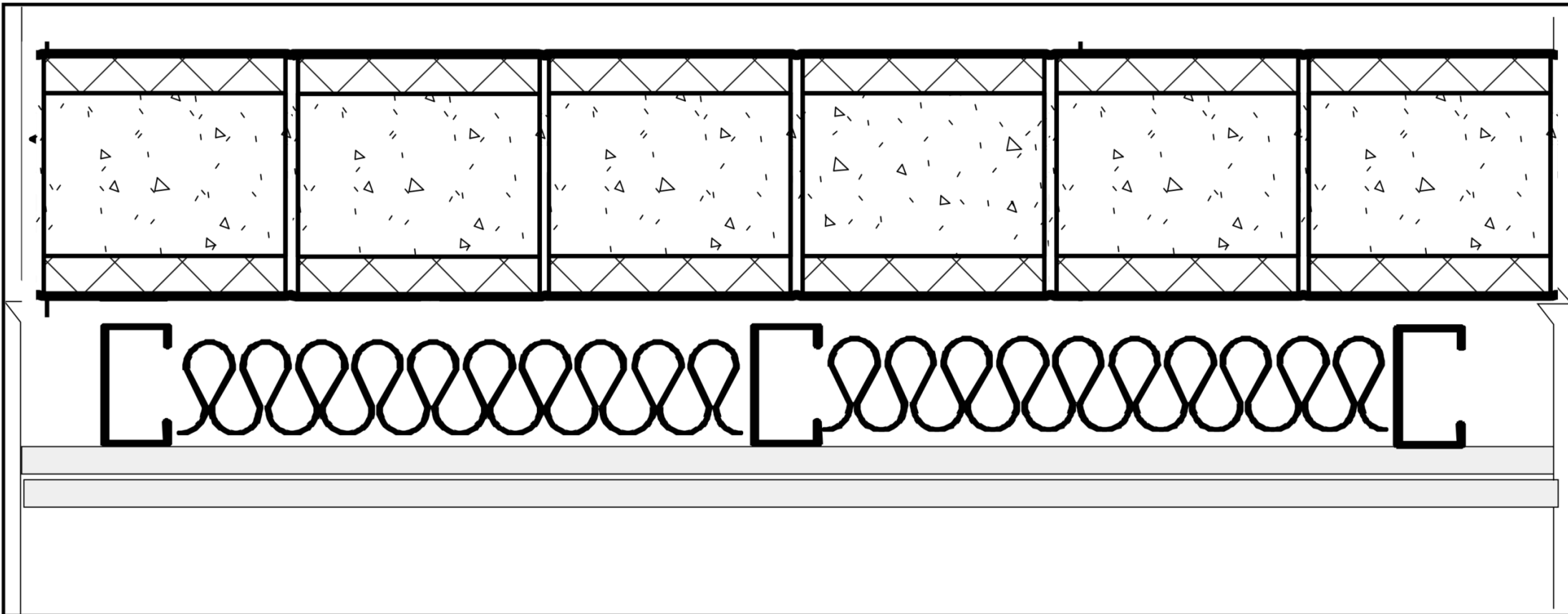


# STC 70





# STC 75



# A Tale of Two Classrooms

- Untreated – Painted ceiling and walls, vinyl flooring.
  - ~ 3 second reverberation time
- Treated – Acoustic tile ceiling, some wall panels, vinyl flooring.
  - ~ 0.6 second reverberation time
- Dead – All reverberation removed.

# Questions?

---

