Urban Acoustics

Urban Acoustics
The Building Code

Design Professionals

Acoustics
Room Acoustics
Sound Isolation
Mechanical Noise
Vibration Isolation
Environmental Noise

Technology
Audio Video Systems
Telepresence
Sound Masking/Paging
Structured Cabling
Security

Lighting
Lighting Design
Fixture Layout
Fixture Specification
Controls
Daylighting

Acoustical Expectations

Luxury?
Market Rate?
Enter Level?
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**HUD Rules of Thumb from 1962**

NOTE THIS IS NOT A CODE, IT HAS BECOME THE DE FACTO STANDARD BUT NOT CODE

Entry Level Housing  
**STC 50 / IIC 50**

Market Rate Housing  
**STC 55 / IIC 55**

Luxury Rate Housing  
**STC 60+ / IIC 60+**  
-- IIC 60+ very hard to achieve with wood or tile surfaces

**ICC G2 2010 Guideline for Acoustics**

STILL NOT A CODE, EVEN WORST IT IS FROM THE ICC –  
FROM WHAT APPEARS TO BE A RESEARCH PAPER FROM THE INTERNET!

Acceptable Performance  
“Grade B Performance”  
55 / 52  
(Laboratory / Field)  
Airborne - STC / NNIC

Preferred Performance  
“Grade A Performance”  
60 / 57  
(Laboratory / Field)  
Airborne - STC / NNIC

Impact - IIC / NISR

**Sound Ratings at Adjacencies - HUD 1974**

**Land Use Compatibility For Community Noise**

<table>
<thead>
<tr>
<th>Land Use Category</th>
<th>Exterior Day/Night Noise Levels (Ldn, dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family</td>
<td>55</td>
</tr>
<tr>
<td>Multi Family</td>
<td>60</td>
</tr>
<tr>
<td>Motel, Hotels</td>
<td>65</td>
</tr>
<tr>
<td>Outside Use</td>
<td>70</td>
</tr>
<tr>
<td>Normally Acceptable</td>
<td>Conditionally Acceptable</td>
</tr>
<tr>
<td>Normally Unacceptable</td>
<td>Clearly Unacceptable</td>
</tr>
</tbody>
</table>

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Exterior to Interior

Commercial to Residential
BEFORE
GET RID OF THE PROBLEM

Mixed Use - Buffalo Wild Wings

Commercial to Residential
Not Addressed by Building Code
- Implied at 45 dBA /Ldn
  (Interior Noise Criterion)
- Enforced as Nuisance Complaints
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Vocabulary

Terms (They Have Changed!)

- NR
- dBA
- Ldn
- CNEL
- OITC

Sound
- STC
- FSTC
- ASTC
- NIC
- NNIC

Impact
- IIC
- FIIC
- AIIC
- NISR

Urban Acoustics - Vocabulary

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Acoustical Wall Systems
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**Acoustical Detailing – The Givens**

- Walls are Full Height (Deck to Deck)
- Insulated (Unfaced Batt) In all Stud or Joist Cavities
- Sealed Air Tight
- Floor Sheeting Is Glued and Screwed

**Wall Progression**

- STC 50
- STC 63
- STC 49

**Wall Progression**

- STC 34
- STC 38
- STC 45

**Metal Channels**

- Hat Channels Are Not Acoustical Channels
- Resilient Channels Are Acoustical Channels
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Resilient Channel Comparison

Lot Line Wall

Puck Resilient Isolator

Lot Line Wall
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Acoustical
Floor / Ceiling Systems

Floor Systems
STC 43

Floor Systems
STC 37

Floor Systems
STC 49
Floor Systems – Topping Slab

Gypcrete or Light Weigh Concrete

Floor Systems

STC 62

STC 56

Floor Systems

Batt insulation not shown for clarity

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Floor Systems

Floor Systems

Floor Systems

Impact Noise

Batt insulation not show for clarity

Batt insulation not show for clarity

Batt insulation not show for clarity
Impact Isolation

- Impact noise changes as it travels in the building.
- Impact noise is best controlled at the source.

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Leaks - Doors and Windows

Effects of Floor Covering

Leaks: Where air can flow... ...so will sound.
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Air Tight Seal

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Other Issues to Consider

Insulation

Acoustical Fiction!
- Fiber Board

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Acoustical Fiction!

- Trapped Channel

Plumbing Isolation

This photograph shows where the builder has used excessively long screws to anchor the gypsum ceiling. This results in the resilient channel being anchored to the wood joist eliminating the vibration and sound isolation provided by resilient channels.
Thorburn Associates (TA) specializes in the design and consulting of acoustics, technology, and lighting systems. We are involved with multiple market sectors which help to facilitate cross pollination of solutions between markets. With experience on over 2600 projects, one of TA’s strengths is our ability to provide an integrated solution for these technical aspects of the design. TA is a Woman-owned Small Business Enterprise (WSBE) with offices located throughout the U.S. to serve your needs.

Acoustical design combines art and science to modify noise to achieve a desired auditory environment. At Thorburn Associates, we create acoustical environments tailored to the occupants of each space. We combine our expertise with extensive laboratory and electronic testing equipment to meet the unique sound sensitivities of each project.

Room Acoustics – Sound Isolation – Mechanical Noise – Vibration Isolation – Environmental Noise

Technology systems design is an ever-growing industry bolstered by the constant demand for multimedia communications. TA works with our clients to develop the system that will best meet their needs while planning for and understanding maintenance, upgrade, and expansion needs.

Audiovisual Systems – Telepresence – Sound Masking/Paging – Structured Cabling – Security

We specialize in illumination design, a term that describes aspects much broader than the standard overhead electric lighting system; illumination also includes direct natural light, indirect natural light, indirect artificial light and reflected light, as well as the control of all light sources. As solution providers, TA enhances an environment through innovative yet practical lighting schemes.

Lighting Design – Fixture Layout – Specifications – Control Systems – Daylighting
AREAS OF EXPERTISE

Mr. Thorburn practices acoustical consulting and technology system design in the following areas:
- Architectural acoustics
- Mechanical noise control
- Audiovisual, sound and control systems
- Video and teleconference systems
- Security
- Lighting

Mr. Thorburn as a founder of Thorburn Associates has been with the company for 21 years and has served as project manager and consultant on over 2600 different projects.

He is active in projects that require both acoustical engineering and technology system design services. His dual degrees from Michigan Technological University in theatre design and electrical engineering enable him to coordinate technical requirements involved in the construction bid process with practical issues required by the end-users.

His projects have included performing arts centers, recording facilities, entertainment facilities, presentation and conference facilities, government and university buildings, film and video studios, luxury hotels, libraries, churches, and medical facilities.

Mr. Thorburn was responsible for developing the International Communications Industries Association’s Design Consultant’s Council.

He regularly attends conferences, trade shows, and product exhibitions that allow him to recommend the most cost-effective yet functional products to meet his client’s needs. Manufacturers often ask for his input on the ‘next generation’ of system components.

PUBLICATIONS and LECTURES

Mr. Thorburn frequently teaches seminars and lectures on both acoustical consulting and technology system design. Recent topics include:
- Planning for Classroom Technology
- Surviving the Construction Process
- Acoustics in Architecture

PROFESSIONAL LICENSES and CERTIFICATIONS

Mr. Thorburn is a registered Engineer in the following states:
AL: P.E. 32355 E  KY: P.E. 28054 OR: P.E. 669501
AZ: P.E. 34990 MO: P.E. 2012000059 SC: P.E. 21186
CA: E.E. 13159 MI: P.E. 46612 TN: PE 00115638
DC: P.E. 906609 MN: P.E. 213389 VA: P.E. 0402050271
FL: P.E. 73362 NC: P.E. 25217 TX: P.E. 110805
GA: P.E. 036527 NM: P.E. 20904 WA: P.E. 37191
IL: 062-054816 NV: E.E. 021780 WV: P.E. 19443
IN: P.E. 11200082 OH: E.E. 65890

ICIA: Certified Technology Specialist, Design & Installation
USGBC: LEED AP

PROFESSIONAL SOCIETIES

Acoustical Society of America
American Institute of Architects
Audio Engineering Society
Institute of Electrical and Electronic Engineers
National Council Acoustical Consultants
National Society of Professional Engineers

EDUCATION

Michigan Technological University
B.S. Electrical Engineering, Major: Electroacoustics
B.S. Liberal Arts, Major: Theatre and Lighting Design

PROFESSIONAL EXPERIENCE

Projects he has managed and consulted on include:
- Alexander & Alexander Corp Offices, San Francisco, CA
- Alpha Natural Resources, Bristol, VA
- Biogen Idec Building 26, Durham, NC
- Cisco Systems Executive Briefing Center, Santa Clara, CA
- Cisco Systems, Vineyards Conf Center, San Jose, CA
- Department of Health and Human Services, Durham, NC
- Dollar Tree Headquarters, Chesapeake, VA
- Duke Energy Tryon Tower, Charlotte, NC
- General Services Administration Federal Building – Oakland, CA
- The General Services Administration, San Francisco, CA
- Green Square, Raleigh, NC
- Hewlett Packard PTP Campus, Sunnyvale, CA
- Hewlett Packard - Building 42, Cupertino, CA
- Lockheed Martin Aeronautics Company, Palmdale, CA
- Microsoft Westfield Center - 8th Floor, San Francisco, CA
- NC National Guard Joint Forces Headquarters Building, Raleigh, NC
- Nissan North America, Corporate Headquaters, Franklin, TN
- PG&E Pacific Energy Center, San Francisco, CA
- Quintiles Headquarters Building, Durham, NC
- RDU Airport Operation Center, Raleigh-Durham, NC
- SAS Executive Briefing Center, Cary, NC
- The Learning Company Headquarters, Fremont, CA
- Tandem Computers - Building 208, Cupertino, CA
- Wells Fargo Bank, Castro Valley, CA