Form # P 04

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK

CITY OF PORTLAND

BUILDING INSPECTION

PERMIT

Please Read Application And Notes, If Any, Attached

PERMIT ISSUED
Permit Number: 051773
FEB - 2 2006
CITY OF PORTLAND

This is to certify that SHALOM HOUSE INC /TE

has permission to Multi-Family- new 24 unit a ment bu ng w dergroun rking

AT 98 GILMAN ST L 065 D003001

provided that the person or persons rm or tion a epting this permit shall comply with all of the provisions of the Statutes of aine and of the O nances of the City of Portland regulating the construction, maintenance and e of buildings and uctures, and of the application on file in this department.

Apply to Public Works for street line and grade if nature of work requires such information.

ification of inspe on mus e en and w en perm on proc d ore this ilding o rt there s ed or herwi losed-in 4 UR NO REQUIRED.

A certificate of occupancy must be procured by owner before this building or part thereof is occupied.

OTHER REQUIRED APPROVALS

Fire Dept. Corey Cass 1-4-06

Health Dept. _____

Appeal Board _____

Other _____

Department Name

2/2/06

Director - Building & Inspection Services

PENALTY FOR REMOVING THIS CARD

ilding or

389 Congress Street, 04101 Tel: (207) 874 [illegible]

PERMIT ISSUED — CITY OF PORTLAND

Permit No:	Issue Date:	CBL:
05-1773		065 D003001

Location of Construction:	Owner Name:	Owner Address:	Phone:
98 GILMAN ST	SHALOM HOUSE INC	PO BOX 560	
Business Name:	**Contractor Name:**	**Contractor Address:**	**Phone**
	TBD		
Lessee/Buyer's Name	**Phone:**	**Permit Type:**	**Zone:**
		Multi Family	~~B~~ R-7

Past Use:	Proposed Use:	Permit Fee:	Cost of Work:	CEO District:
	Multi-Family- new 24 unit apartment building w/ underground parking	$24,396.00	$2,700,000.00	2

FIRE DEPT: ☑ Approved ☐ Denied

See conditions

Signature Greg Cross

INSPECTION:

Use Group: R-2 Type: 5-B

2/2/06

Signature

Proposed Project Description:

Multi-Family- new 24 unit apartment building w/ underground parking

PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)

Action: ☐ Approved ☐ Approved w/Conditions ☐ Denied

Signature: Date:

Permit Taken By:	Date Applied For:
ldobson	12/07/2005

1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
2. Building permits do not include plumbing, septic or electrical work.
3. Building permits are void if work is not started within **six** (6) months of the date of issuance. False information may invalidate a building permit and stop all work..

Zoning Approval

Special Zone or Reviews	Zoning Appeal	Historic Preservation
☐ Shoreland N/A	☐ Variance	☑ Not in District or **Landmark**
☐ Wetland	☐ Miscellaneous	☐ Does Not Require Review
☐ Flood Zone panel 13 zone C	☐ Conditional Use	☐ Requires Review
☒ Subdivision	☐ Interpretation	☐ Approved
☒ Site Plan #2005-0179	☐ Approved	☐ Approved w/Conditions
Maj ☒ Minor ☐ MM ☐ all with Cmdt	☐ Denied	☐ Denied
Date: 11/18/06	Date:	Date:

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT ADDRESS DATE PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE DATE PHONE

General Building Permit Application

If you or the property owner owes real estate or personal property taxes or user charges on any property within the City, payment arrangements must be made before permits of any kind are accepted.

Location/Address of Construction: **Valley Street Apartments, Gilman Street - Portland, ME**		
Total Square Footage of Proposed Structure **7,938 Sq. Ft.**	Square Footage of Lot **17,410 Sq. Ft.**	
Tax **Assessor's** Chart, Block & Lot Chart# 065 Block# D Lot# **3-9**	Owner: **315 Valley Street, L.P.** **PO Box 560** **Portland, ME 04112**	Telephone: **(207) 874-1087**
Lessee/Buyer's Name (If Applicable)	Applicant name, address & telephone: **315 Valley Street, L.P.** **PO Box 560** **Portland. ME 04112**	cost Of Work: $ 2 700.000 Fee: $ 24,321 C of O Fee: $ 1.800
Current Specific use: **Vacant Lot** Proposed Specific use: R-2 Apartment Building		**$26,121 -Total**
Project description: **24 Unit Apartment Building with Parking Below**		
Contractor's name, address & telephone: **To be determined** Who should we contact when the permit is ready: **Bill Floyd** Mailing address: Phone: **(207) 874-1087**		

24321
75
+
24396

DEPT. OF BUILDING INSPECTIONS
CITY OF PORTLAND

Please submit all of the information outlined in the Commercial Application Checklist. Failure to do so will result in the automatic denial of your permit.

In order to he sure the City fully understands the full scope of the project, the Planning and Development Department may request additional information prior to the issuance of a **permit.** For further information visit us on-line at www.portlandmaine.gov, stop by the Building Inspections office, room 315 City Hall or call 874-8703.

I hereby certify that I am the Owner of record of the named property, or that the owner of record authorizes the proposed work and that I have been authorized by the owner to make this application as his/her authorized agent. I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in this application is issued, I certify that the Code Official's authorized representative shall have the authority to enter all areas covered by this permit at any reasonable hour to enforce the provisions of the codes applicable to this permit.

Signature of applicant: David Lloyd, As Agent for Shalom House | **Date:** 1-7-05

This is not a permit; you may not commence ANY work until the permit is issued.

City of Portland, Maine - Building or Use Permit

389 Congress Street, 04101 Tel: (207) 874-8703, **Fax:** (207) 874-8716

Permit No:	Date Applied For:	CBL:
05-1773	12/07/2005	065 D003001

Location of Construction:	Owner Name:	Owner Address:	Phone:
98 GILMAN ST	SHALOM HOUSE INC	PO BOX 560	
Business Name:	**Contractor Name:**	**Contractor Address:**	**Phone**
	Ledgewood Inc.	PO Box 8107 Portland	(207) 767-1866
Lessee/Buyer's Name	**Phone:**	**Permit Type:**	
		Multi Family	

Proposed Use:	Proposed Project Description:
Multi-Family- new 24 unit apartment building w/ underground parking	Multi-Family- new 24 unit apartment building w/ underground parking

Dept: Zoning **-Status:** Approved with Conditions **Reviewer:** Marge Schmuckal **Approval Date:** 01/18/2006

Dept: Fire **Status:** -Approved with Conditions **Reviewer:** Cptn Greg Cass **Approval Date:** 01/04/2006

Note: **Ok to Issue:** ☑

Dept: Planning **Status:** Approved with Conditions **Reviewer:** Barbara Barhydt **Approval Date:** 01/25/2006

Note: **Ok to Issue:** ☐

1) The conditions contained in the review by Carrie Marsh, Urban Designer, dated 10/13/05, shall be addressed by the applicant and reviewed and approved by the Planning Authority prior to the issuance of a building permit.

2) The Planning Board approved the following waiver: Upon the recommendation of the City's Traffic Engineer and his finding that parking activity and trunover should be minimal, and therefore the Planning Board does waive the City's Technical Standards for parking lots to allow the proposed aisle widths of 20 feet and a 20 foot curb uct into the basement level parking area.

3) **A** construction mobilization plan must be submitted for review and approval by the City prior to the issuance of a building permit.

4) **A** copy of the sewer capacity letter from the Department of Public Wrlks shall be subnutted prior to the release of the recording plat.

Location of Construction:	Owner Name:	Owner Address:	Phone:
98 GILMAN ST	SHALOM HOUSE INC	PO BOX 560	
Business Name:	**Contractor Name:**	**Contractor Address:**	**Phone**
	Ledgewood Inc.	PO Box 8107 Portland	(207) 767-1866
Lessee/Buyer's Name	**Phone:**	**Permit Type:**	
		Multi Family	

8) The proposed Spectra III Area Luminaires shall be cut-off or full cut-off fixtures.

9) The grading and utility plan (Sheet 3) shall be revised showing the proposed underground electrical connection to the apartment building and a letter of capacity to serve from CMP shall be submitted prior to the release of the recording plat.
The conditions contained in the review by Steve Bushey, Development Review Coordinator, DeLuca-Hoffman, Inc. Dated October 14, 2005 shall be met prior to issuance of a building permit.

Comments:

12/12/2005-mes: I do not have a stamped approved site plan - Barbara Barhydt said that she can not release it yet - She will also get me documentation when the zone was changed to R-7 - on hold in Marge's area

1/3/2006-mjn: Need statement of Special Inspections/Geotech report emailed John Shields.

1/20/2006-mjn: Hold for various planning prepermitting issues. Code issues

less than 5 inches (127 mm) when measured (in a horizontal plane) from tread nosing to the next tread nosing (see Figure 1009.10). Applying the limiting dimensions stated above would result in a device with a very steep incline (approximately 4:1).

For alternating tread devices used as a means of egress from small-area mezzanines as prescribed in the exception, the treads must project at least $8^1/_2$ inches (216 mm) as compared to the 5 inches (127 mm) stated above; treads are to be at least $10^1/_2$ inches (267 mm) in depth [compared to $8^1/_2$ inches (216 mm)] and risers are not to exceed 8 inches (203 mm) in height [compared to $9^1/_2$ inches (341 mm)]. Applying these latter limiting dimensions would result in a device of lesser incline (approximate slope of 2:1) and a more comfortable and safer device to use for egress travel.

1009.11 Handrails. Stairways shall have handrails on each side. Handrails shall be adequate in strength and attachment in accordance with Section 1607.7. Handrails for ramps, where required by Section 1010.8, shall comply with this section.

Exceptions:

1. Aisle stairs complying with Section 1024 provided with a center handrail need not have additional handrails.
2. Stairways within dwelling units, spiral stairways and aisle stairs serving seating only on one side are permitted to have a handrail on one side only.
3. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require handrails.
4. In Group R-3 occupancies, a change in elevation consisting of a single riser at an entrance or egress door does not require handrails.
5. Changes in room elevations of only one riser within dwelling units and sleeping units in Group R-2 and R-3 occupancies do not require handrails.

❖ Falls are the leading cause of nonfatal injuries in the United States, exceeding even motor vehicle injuries. To protect the user from falls to surfaces below and to aid in the use of the stairway, guards and handrails are to be provided. In cases of fire where vision might be obscured by smoke, handrails serve as guides directing the user along the path of egress travel.

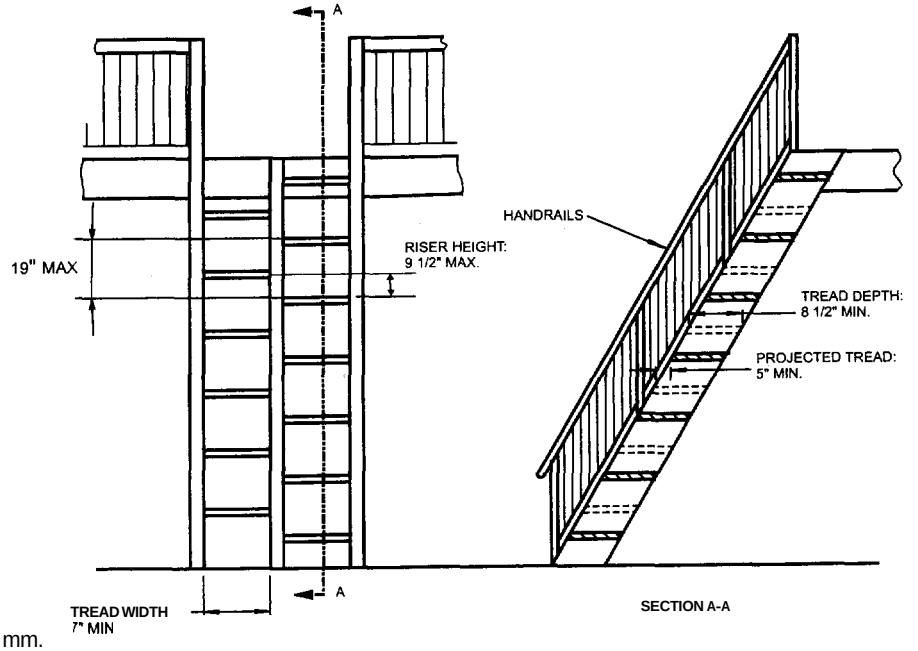
This section requires that handrails be continuous along, and be placed on both sides of, a stairway so that a mobility-impaired person can support his or her "strong side" in both ascent and descent [see Figures 1009.4(1) and 1009.4(2)].

This section is referenced when handrails are required on ramps. Handrails on ramps must comply with Sections 1009.11 through 1009.11.7.

The exceptions state conditions where handrails are only required on one side or are not needed at all.

1009.11.1 Height. Handrail height, measured above stair tread nosings, or finish surface of ramp slope, shall be uniform, not less than 34 inches (864 mm) and not more than **38** inches (965 mm).

❖ It has been demonstrated that for safe use, the height of handrails must not be less than 34 inches ***(864*** mm) nor more than 38 inches (965 mm) above the leading edge



For SI: 1 inch = 25.4 mm.

Figure 1009.10
TYPICAL ALTERNATING TREAD DEVICE

A R C H E T Y P E

January 31,2006

Mike Nugent
Inspection Department
City Hall
Portland, Maine **04101**

RE: Valley Street Apartments
Gilman Street
Portland, Maine

Dear Mike,

Enclosed are responses to the comments in your email of Friday, Wednesday, January 20, 2006.

UL and STC Ratings:

- Floor/Ceiling Type 1 (1) Hour – UL L528. See page 6 of TPI publication National Design Standard for Metal Plate Connected Wood Truss Constructions enclosed, STC 51.
- Floor/Ceiling Type 2 (2) Hour – UL J903. Per PCI Manual for the Design of Hollow Core Slabs, Table 7.4.1, Assembly No. 19, STC 52.
- Floor/Ceiling Type 3 (1) Hour - Gypsum Association File No. FC 5120, STC. 50-54.

IECC Compliance: provided at our January 30,2006 meeting.

Statement of Special Inspections: enclosed.

Parking Garage Exhaust Rate: provided at our January 30, 2006 meeting.

Area of Refuge: not required per 1007.3, exception 3.

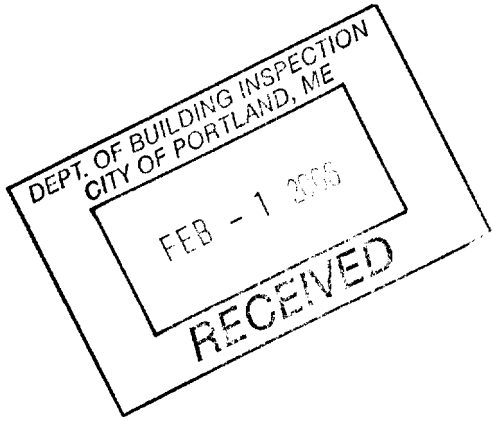
Alternating Tread Stair: see sketch attached and a letter from the ICC provided by the manufacturer.

Mechanical: Dryer venting, dampers, penetrations – I believe we settled these items at our January 30,2006 meeting.

Sincerely,

John Shields
Architect

Cc: Bill Floyd – Shalom House



48 Union Wharf, Portland, Maine 04101 (207) 772-6022 • Fax (207) 772-4056

COMMENTARY & APPENDICES

35th Anniversary

TO ANSI/TPI 1-1995

NATIONAL DESIGN STANDARD FOR METAL PLATE CONNECTED WOOD TRUSS CONSTRUCTION

TRUSS PLATE INSTITUTE

wide strips Nominal 2" wide strip tightly wrapped around pipe covering or tube insulation (foil side exposed), secured with two steel tie wires and slid into hole-sawed opening in flooring (Item 16) and in gypsum wallboard ceiling (Item 1D). Bottom edge of wrap strip to project 9/16" to 11/16" below bottom surface of flooring and below bottom (ceiling) surface of gypsum wallboard

Minnesota Mining & Manufacturing Co. - Type FS-195 F/R.

5. FILL, VOID, OR CAVITY MATERIALS - CAULK

Nominal 1/4" thickness of caulk to be applied to the exposed edge of the wrap strip layer (top of flooring and bottom of gypsum wallbaord ceiling). Generous application of caulk to be applied to fill all gaps at the wrap strip/flooring and wrap strip/gypsum wallboard ceiling interface.

Minnesota Mining & Manufacturing Co. - Type CP-25 W/B caulk.

E.3A COUSTICAL PERFORMANCE CRITERIA (SOUND/NOISE CONTROL)

E.3.1 GENERAL

Model building code requirements and occupant demands for a comfortable living environment are placing increasing emphasis on acoustical performance as a building design consideration. Building codes may specify acoustical performance criteria as either noise insulation criteria for the components used or noise isolation criteria for the complete construction.

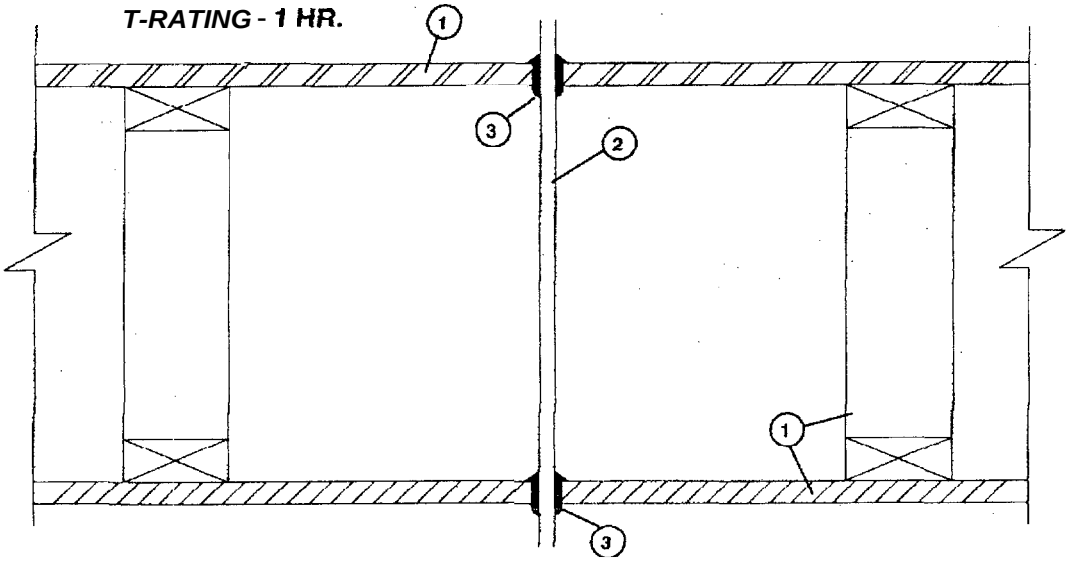
Noise insulation criteria specifies the performance of the components such as floor-ceiling assemblies. This eases the burden of design since performance testing of the completed building is not required. Airborne noise insulation is concerned with a structure's ability to attenuate sound incident upon and transmitting through a structure.

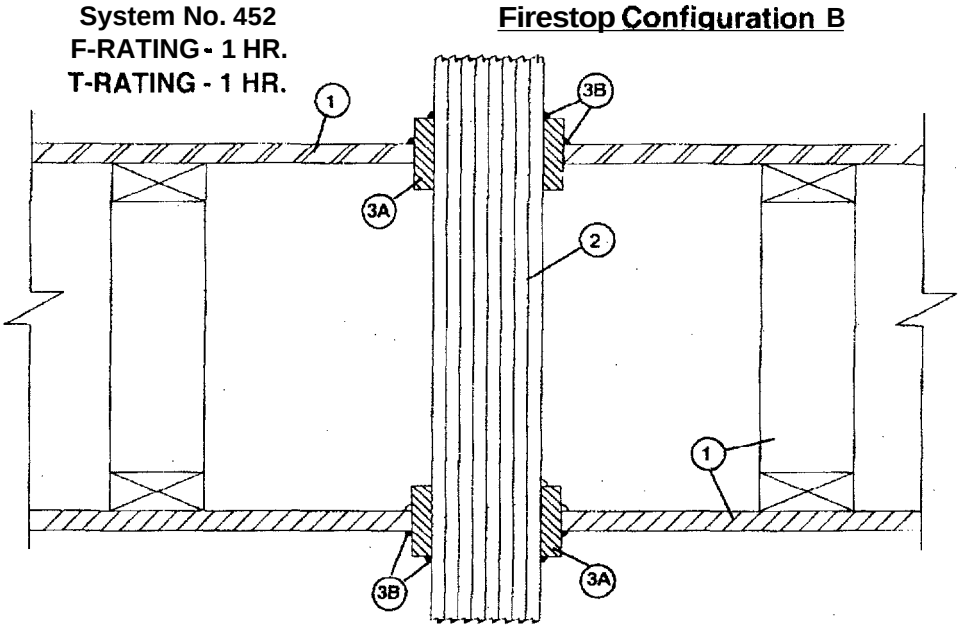
E.3.1.1 SOUND TRANSMISSION LOSS TESTS

Sound transmission loss is the quantity used to characterize airborne noise insulation. The sound transmission loss (TL) is a function of frequency. A larger value of TL denotes better noise insulation. One measure of sound transmission loss is the Sound Transmission Class (STC). The STC rating attempts to accomplish two objectives. First, it characterizes the

System No. 452
F-RATING - 1 HR.
T-RATING - 1 HR.

Firestop Configuration A





sound transmission loss data at various frequencies by a single number. Second, it attempts to provide a single number that correlates with an occupants subjective response to intruding noise. The rating is a relative scale based on the idealized TL curve of a 9" thick plastered brick wall that is assumed to provide occupants with an adequate degree of sound insulation. ASTM E413 "Determination of Sound Transmission Class," ASTM E90 "Recommended Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions" or ASTM E336 "Recommended Method for Measurement of Airborne Sound Insulation in Buildings" are the standard used to determine sound transmission loss. To satisfy building code requirements, the designer will usually have to specify an STC rating above 45.

E.3.1.2 IMPACT NOISE TEST

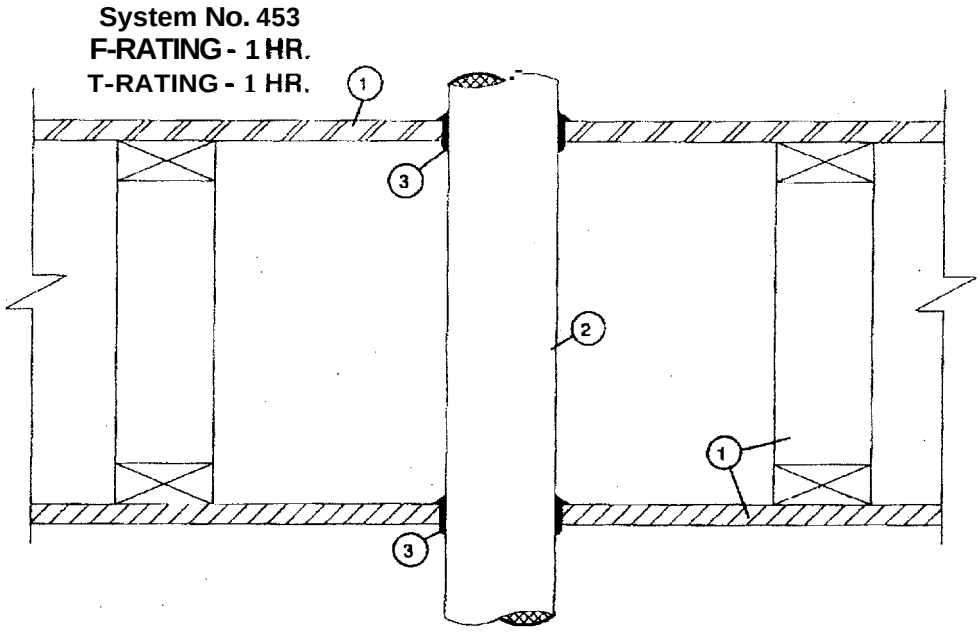
Another physical measure of noise insulation is impact noise testing. Impact noise is usually generated by footsteps or dropped objects that are transmitted through floor-ceiling assemblies to the room below. The design of floor-ceiling construction on the basis of impact noise insulation is a distinct consideration in addition to airborne noise insulation requirements (STC), since acceptable airborne noise insulation performance does not imply similar impact noise insulation using a single number classification called the Impact Insulation Class (IIC). The IIC ratings are obtained by fitting a *grading* curve to a plot of 1/3 octave band sound pressure level data. ASTM E492 "Method for Laboratory Measurement of impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine" is the standard to determine IIC ratings. Building code requirements usually specify an IIC rating above 45.

E.3.2 ASSEMBLY TYPES

E.3.2.1 UL L528 & L529

E.3.2.1.1 FLOOR-CEILING ASSEMBLY

The fire-rated metal plate connected wood truss assembly shall be constructed of the materials and in the manner specified in Design No. UL 528 (E.1.3.2).



E.3.2.1.2 RATINGS

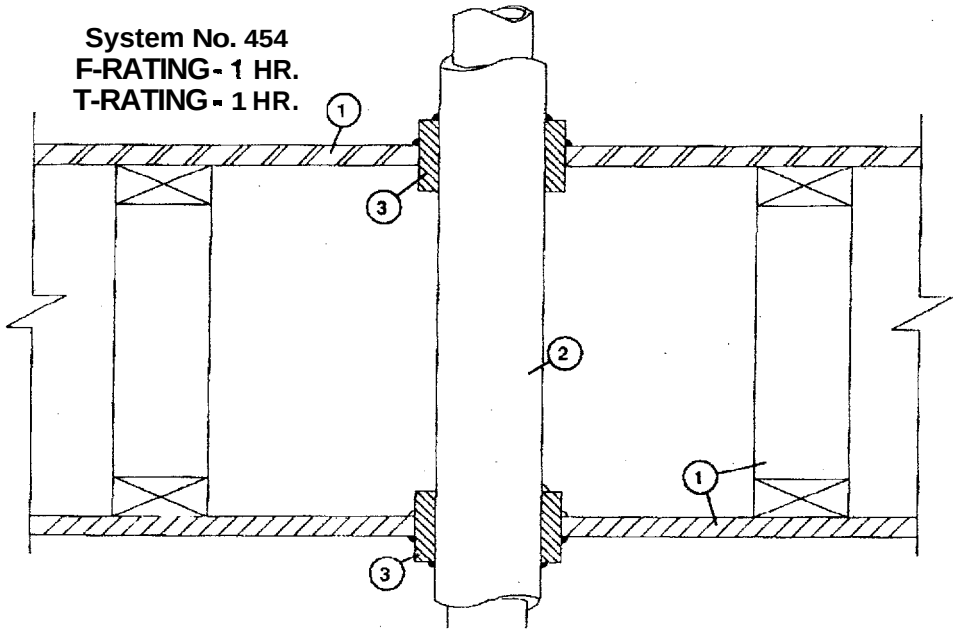
STC & IIC ratings for UL L528/L529 are listed in **Table** E.3.2-1.

E.3.2.2 FC-214

E.3.2.2.1 FLOOR-CEILING ASSEMBLY

The fire-rated metal **plate connected** wood **truss assembly** shalt be **constructed** *of* **the** materials and **in the** manner **specified in Design** No. **FC-214 (E.1.3.4).**

E.3.2.2.2 RATINGS STC & IIC ratings for FC-214 are **listed** in Table E.3.2-2.



FLOOR COVERING	STC	IIC	TEST NUMBER
Carpet & Pad	48	56	NRC 1039 & 1040
Vinyl	45	37	NRC 1041 & 1042
Lightweight, Carpet & Pad	57	72	NRC 1044 & 1045
Lightweight and Vinyl	57	70	NRC 1047 & 1048
Gypcrete & Cushioned Vinyl	--	53	6-442-2 Gypcrete
Gypcrete, Carpet & Pad	--	74	6-442-3 Gypcrete
Gypcrete	58	--	6-442-5 Gypcrete

FLOOR COVERING	STC	IIC	TEST NUMBER
Carpet & Pad	48	54	NRC 1059 & 1060
Vinyl	47	35	NRC 1063 & 1064
Lightweight, Carpet & Pad	56	72	NRC 1053 & 1054
Lightweight and Vinyl	56	48	NRC 1051 & 1052
Gypcrete, Carpet & Pad	52	63	NRC 1076 & 1077
Gypcrete	53	43	NRC 1085 & 1086

Gypcrete	¾"
Lightweight Concrete	1"
Carpet	2.63 Kg/M²
Pad	1.37 Kg/M²

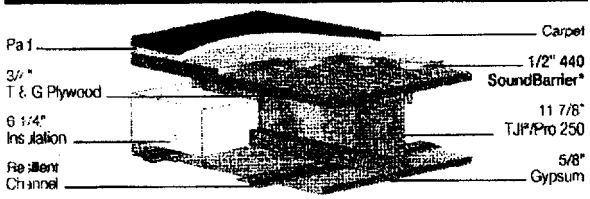
Table E.4-1 SUMMARY TABLE FOR ALL ASSEMBLIES

ASSEMBLY N P E	FIRE				ACOUSTICS	
	SEPARATION		PENETRATION			
	ASSEMBLY	FINISH	F	T	STC*	IIC*
FC-392	1-hr.	25-min.	1-hr.	1-hr.		
UL-L528/L529	1-hr.	22-min.	1-hr.	1-hr.	48	56
FC-214	1-hr.		1-hr.	1-hr.	48	54
	45-min. 45-min.				-	
FC-235 FC-249	1½-hr.	67-rnin.				
FC-426						

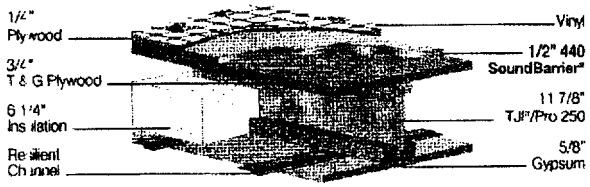
Flooring Applications

440 SoundBarrier® Floor-Ceiling Assemblies

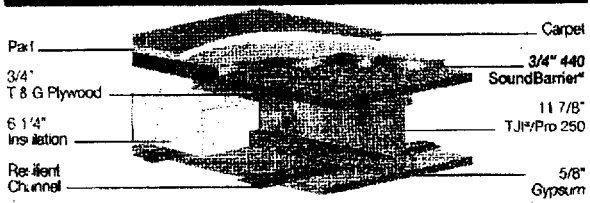
STC 51 IIC 75



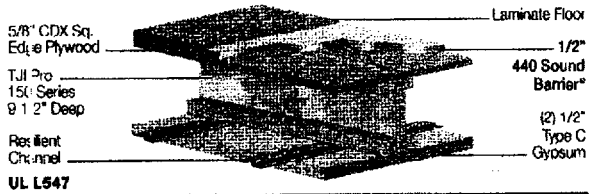
STC 52 IIC 50



STC 52 IIC 77

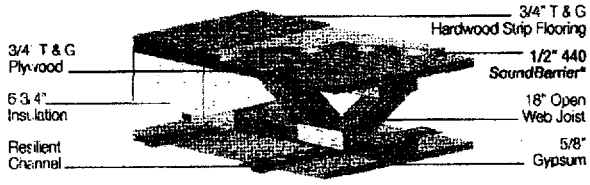


STC 52 IIC 47

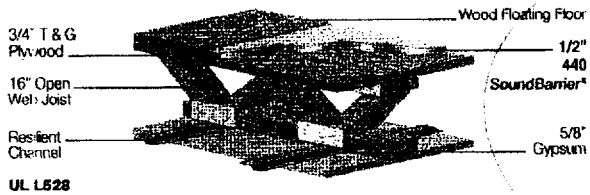


UL L547

STC 54 IIC 51

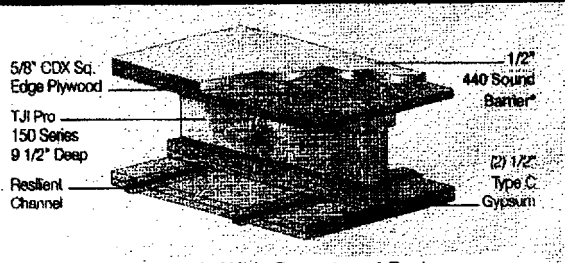


STC 52 IIC 51



UL L528

1 1/2 Hour Fire Assembly



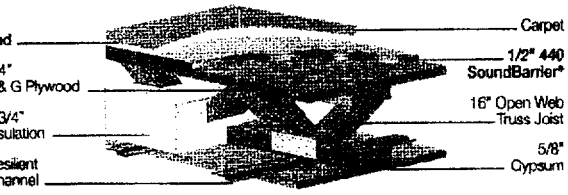
Assembly With Carpet and Pad
STC 50 IIC 71

Mineral and Fiber Boards Fire Resistance Classification Design No. L547. See UL Fire Resistance Directory

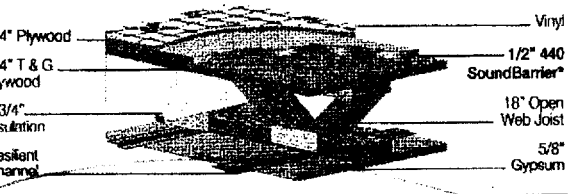
UL FIRE RESISTANCE RATING DESIGN NUMBERS

L501	L502	L503	L504	L505	L506	L507
L508	L509	L510	L511	L512	L513	L514
L515	L516	L517	L518	L519	L520	L521
L522	L523	L524	L525	1526	L527	L528
L529	L532	L533	L534	L535	L536	L537
L538	L539	L540	L541	L542	L543	L544
L545	L546	L547	L548	L549	L550	**L551**
L552	L553	L555	L556	L559		

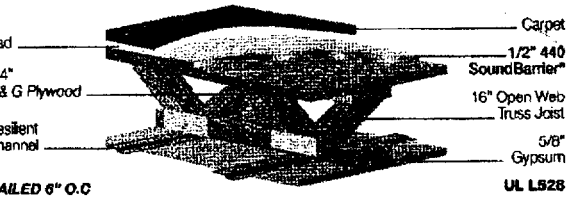
STC 55 IIC 82



STC 53 IIC 55



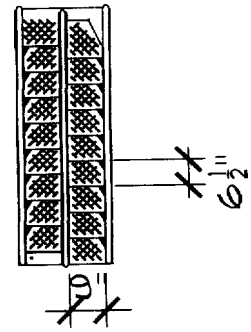
STC 51 IIC 72



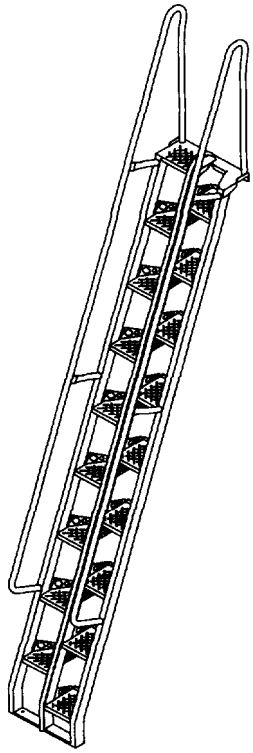
NAILED 6" O.C

UL L528

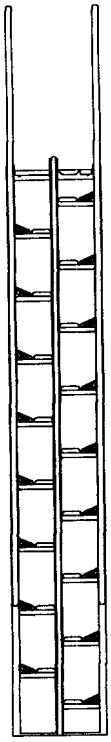
(See page 3 for an explanation of STC and IIC Ratings)



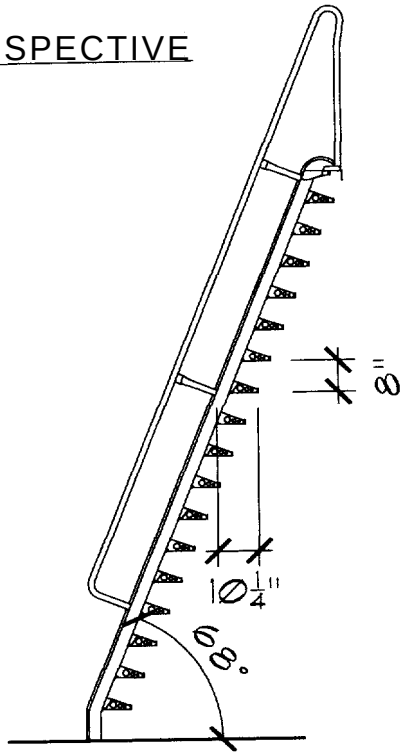
PLAN



PERSPECTIVE



ELEVATION



ELEVATION

PROJECT: VALLEY STREET APARTMENTS GILMAN STREET PORTLAND, MAINE	ARCHITECT: ARCHETYPE, P.A. PORTLAND, MAINE
DRAWING: ALTERNATING TREAD STAIRS	SCALE: ¼" = 1'-0" DATE: JAN. 31,2006

Lapeyre Stair, Inc.

P.O. BOX 50699 • NEW ORLEANS, LA 70150 • PHONE: 504-733-6009 • FAX 504-733-4393 • TOLL-FREE: 800-535-7631

FAX

To: John Shields From: Linda Ventline

Fax: Date:

Phone: Pages: 2

Project: Handrail Code Alternating Tread Stair

☐ Urgent ☑ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

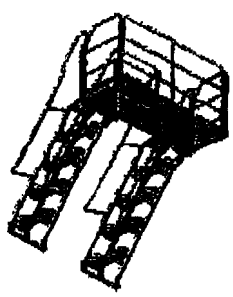
YOUR SALES REPRESENTATIVE IS:

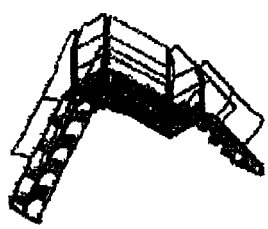
___LINDA ABATE VENTLINE ✓ EVELYN FINNEY ___SHERRY BUI

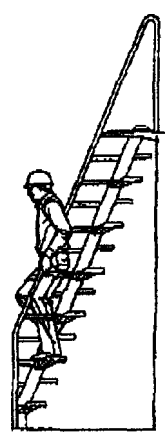
___SHANNON LEBLANC ___DICK SATNICK

COMMENTS: IBC Letter

Thank You,







ICC
INTERNATIONAL CODE COUNCIL

Setting the Standard for Building Safety™

Chicago District Office
4051 W. Flossmoor Road • Country Club Hills, IL 60478-5795 U.S.A.
Tel: +1 (708) 799-2300 • Fax: +1 (708) 799-4981
www.iccsafe.org

PRESIDENT
ARNIE E. [illegible], C.B.O.
Chief Building Official
Murray, Utah

VICE PRESIDENT
PHARR P. ROBBS, JR., C.B.O., DEAP
Director of Building and Fire Codes
Hilton Head Island, South Carolina

SECRETARY/TREASURER
HENRY L. GREEN
Executive Director
Department of Consumer & Industry Services
Lansing, Michigan

WALLY BAILEY, C.B.O.
Director, Development and Construction
Ft. Smith, Arkansas

EDWIN M. HERKEL, C.F.I.
Fire Marshal
Metropolitan Fire Protection District
St. Louis, Missouri

TERRENCE L. [illegible], C.B.O.
Director, Dept. of Codes Administration
Knoxville/Davidson County, Tennessee

NICK D'ANDREA, JR., C.B.O.
Manager, Commercial Development Services
Tampa, Florida

WILLIAM L. HUCK, JR., C.B.O.
Chief, Inspections and Code Enforcement Division
Columbus, Georgia

WILLIAM R. [illegible]
Building Official
Chesterfield, Virginia

GERALD D. GEORGE, C.B.O.
Chief Building Official
Boulder, Colorado

DOROTHY M. HARRIS
Deputy Secretary of State
Albany, New York

FRED HERMAN
Chief Building Official
Palo Alto, California

GREG JOHNSON
Building Inspector
Saint Paul, Minnesota

M. H. "BUBBA" ROBERTS, C.B.O.
Building Official
Phenix City, Alabama

JAMES T. RYAN, C.B.O
Codes Administrator
Overland Park, Kansas

STEVEN L. SHAPIRO, C.B.O.
Director of Codes Compliance
Hampton, Virginia

ADOLF A. ZUBIA
Fire Chief
Las Cruces, New Mexico

CHIEF EXECUTIVE OFFICER
JAMES LEE WITT

July 23,2004

Stephen J. Wilczynski, AIA
Fanning/Howey *Associates*, Inc.
P.O. Box 71
540 East Market Street
Celina, OH 45822

RE: Sections 1003.3.3.10.1 and **1003.3.3.11 of the 2000 International Building** Code

Dear Mr. Wilczynski:

This letter is in response to your request for a written code interpretation regarding alternating tread devices used for mechanical access. Your letter states that the mechanical area is permitted to be served by a ladder but in the interest of safety and convenience, a customized alternating tread device is proposed. You ask if it is necessary for alternating tread devices to comply with handrail height and handrail extension requirements.

The code criteria for alternating tread devices includes a blanket reference to Section 1003.3.3.11 (Handrails), which includes requirements for handrail height and handrail extensions applicable to normal stairs and ramps. Alternating tread devices are configured to suit specific locations. As an alternating tread device becomes steeper, standard handrail height and extension requirements become less sensible. An alternating tread device of a given slope and configuration likely has an ideal handrail height that may be inconsistent with code criteria. Furthermore, extensions on handrails at the bottom of the steeper designs appear to serve little purpose. In the case of alternate components, such as alternating tread devices, it is more important to satisfy the intent of code requirements than to satisfy those literal requirements that do not advance such intent.

Lastly, it is not the intent of the code to disallow the substitution of an alternate component (i.e., alternating tread device) judged to be safer than the minimum prescribed component (i.e., ladder) based on a technicality of the code when the safety of the alternate component is not adversely affected.

We are pleased to provide you with the opinions stated herein. They are based solely on information that you have provided. We have made no independent effort to verify the accuracy of this information nor have we conducted a review beyond the scope of your question. Understand that the final interpretation is always the legal responsibility of the authority having jurisdiction. As such, a review of these issues with the building official is recommended.

Sincerely,

Phillip Hahn, [illegible]
Senior Staff Architect

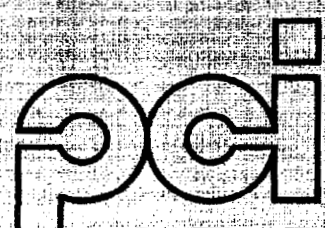
JOHN

MANUAL

For the Design of

HOLLOW CORE SLABS

2nd Edition



PRECAST/PRESTRESSED CONCRETE INSTITUTE

CHAPTER 7

ACOUSTICAL PROPERTIES OF HOLLOW CORE FLOOR SLABS

7.1 Glossary

Airborne Sound - sound that reaches the point of interest by propagation through air.

Background Level - the ambient sound pressure level existing in a space.

Decibel (dB) - a logarithmic unit of measure of sound pressure or sound power. Zero on the decibel scale corresponds to a standardized references pressure (20 μPa) or sound power (10^{-12} watt).

Flanking Transmission - transmission of sound by indirect paths other than through the primary barrier.

Frequency (Hz) - the numher of complete vibration cycles per second.

Impact Insulation Class (IIC) - a single figure rating of the overall impact sound insulation merits of floor-ceiling assemblies in terms of a reference contour (ASTM E989).

Impact Noise - the sound produced by one object striking another.

Noise - unwanted sound.

Noise Criteria (NC) - a series of curves, used as design goals to specify satisfactory background sound levels as they relate to particular use functions.

Noise Reduction (NR) - the difference in decibels between the space-time average sound pressure levels produced in two enclosed spaces by one or more sound sources in one of them.

Noise Reduction Coefficient (NRC) - the arithmetic average of the sound absorption coefficients at 250,500,1000 and 2000 Hz expressed to the nearest multiple of 0.05 (ASTM C423).

Reverberation - the persistence of sound in an enclosed or partially enclosed space after the source of sound has stopped.

Room Criteria (RC) Curves - a revision of the NC curves based on empirical studies of background sounds.

Sabin - the unit of measure of sound absorption (ASTM C423).

Sound Absorption Coefficient (α) - the fraction of randomly incident sound energy absorbed or otherwise not reflected off a surface (ASTM C423).

Sound Pressure Level (SPL) - ten times the common logarithm of the ratio of the square of the sound pressure to the square of the standard reference pressure of 20 μPa. Commonly measured with a sound level meter and microphone, this quantity is expressed in decibels.

Sound Transmission Class (STC) - the single number rating system used to give a preliininary estimate of the sound insulation properties of a partition system. This rating is derived from measured values of transmission loss (ASTM E413).

Sound Transmission Loss (TL) - ten times the common logarithm of the ratio, expressed in decibels, of the airborne sound power incident an the partition that is transmitted by the partition and radiated on the other side (ASTM E90).

Structureborne Sound - sound that reaches the point of interest over at least part of its path by vibration of a solid structure.

7.2 General

The basic purpose of architectural acoustics is to provide a satisfactory environment in which desired sounds are ctearly heard by the intended listeners and unwanted sounds (noise) are isolated or absorbed.

Under most conditions. the architect/ engineer can determine thc acoustical needs of the space and then design the building to satisfy those needs. Good acoustical design utilizes both absorptive and reflective surfaces, sound barriers

and vibration isolators. Some surfaces must reflect sound so that the loudness will be adequate in all areas where listeners are located. Other surfaces absorb sound to avoid echoes, sound distortion and long reverberation times. Sound is isolated from rooms where it is not wanted by selected wall and floor-ceiling constructions. Vibration generated by mechanical equipment must be isolated from the structural frame of the building.

Most acoustical situations can be described in terms of: (1) sound source, (2) sound transmission path, and (3) sound receiver. Sometimes the source strength and path can be controlled and the receiver made more attentive by removing distraction or made more tolerant of disturbance. Acoustical design must include consideration of these three elements.

7.3 Approaching the Design Process

Criteria must be established before the acoustical design of a building can begin. Basically a satisfactory acoustical environment is one in which the character and magnitude of all sounds are compatible with the intended space function.

Although a reasonable objective. it is not always easy to express these intentions in quantitative terms. In addition to the amplitude of sound, the properties such as spectral characteristics, continuity, reverberation and intelligibility must be specified.

People are highly adaptable to the sensations of heat, light, odor, sound, etc. with sensitivities varying widely. The human ear can detect a sound intensity of rustling leaves, 10 dB, and can tolerate, if even briefly, the powerful exhaust of a jet engine at 120 dB, 10^{12} times the intensity of the rustling sound.

7.3.1 Dealing with Sound Levels

The problems of sound insulation are usually considerably more complicated than those of sound absorption. The former involves reductions of sound level, which are of the greater orders of magnitude than can be achieved by absorption. These reductions of sound level from space to space can be achieved only by continuous, impervious barriers. If the problem also involves structure borne sound, it may be necessary tu introduce resilient layers or discontinuities into the barrier.

Sound absorbing inaterials and sound insulating materials are used for different purposes. There is not much sound absorption from an 8 in (200 mm) hollow core concrete slab; similarly, high sound insulation is not available from a porous lightweight material that may be applied to room surfaces. It is important to recognize that the basic mechanisms of sound absorption and sound insulation are quite different.

7.4 Sound Transmission Loss

Sound transmission loss measurements are made at I6 frequencies at one-third octave intervals covering the range from 125 to 4000 Hz. The testing procedure is ASTM Specification E90, Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions. To simplify specification of desired performance characteristics, the single number Sound Transmission Class (STC) was developed.

Airborne sound reaching a floor or ceiling produces vibration in the slab and is radiated with reduced intensity on the other side. Airborne sound transmission loss of a floor-ceiling assembly is a function of its weight, stiffness and vibration damping characteristics.

Weight is concrete's greatest asset when it is used as a sound insulator. For sections of similar design, but different weights, the STC increases approximately 6 units Cor each doubling of weight as shown in Figure 7.4.1.

Fig. 7.4.1 Sound Transmission Class as a function of weight of floor

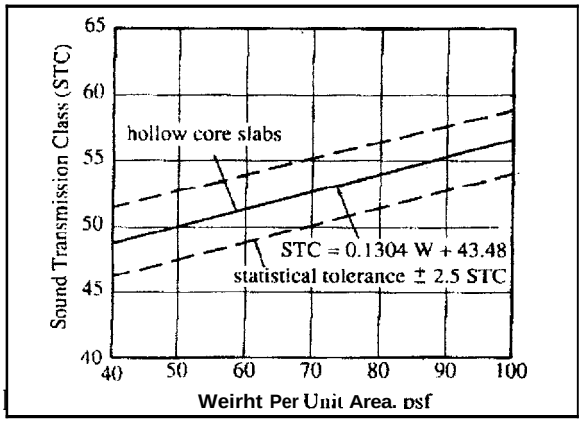
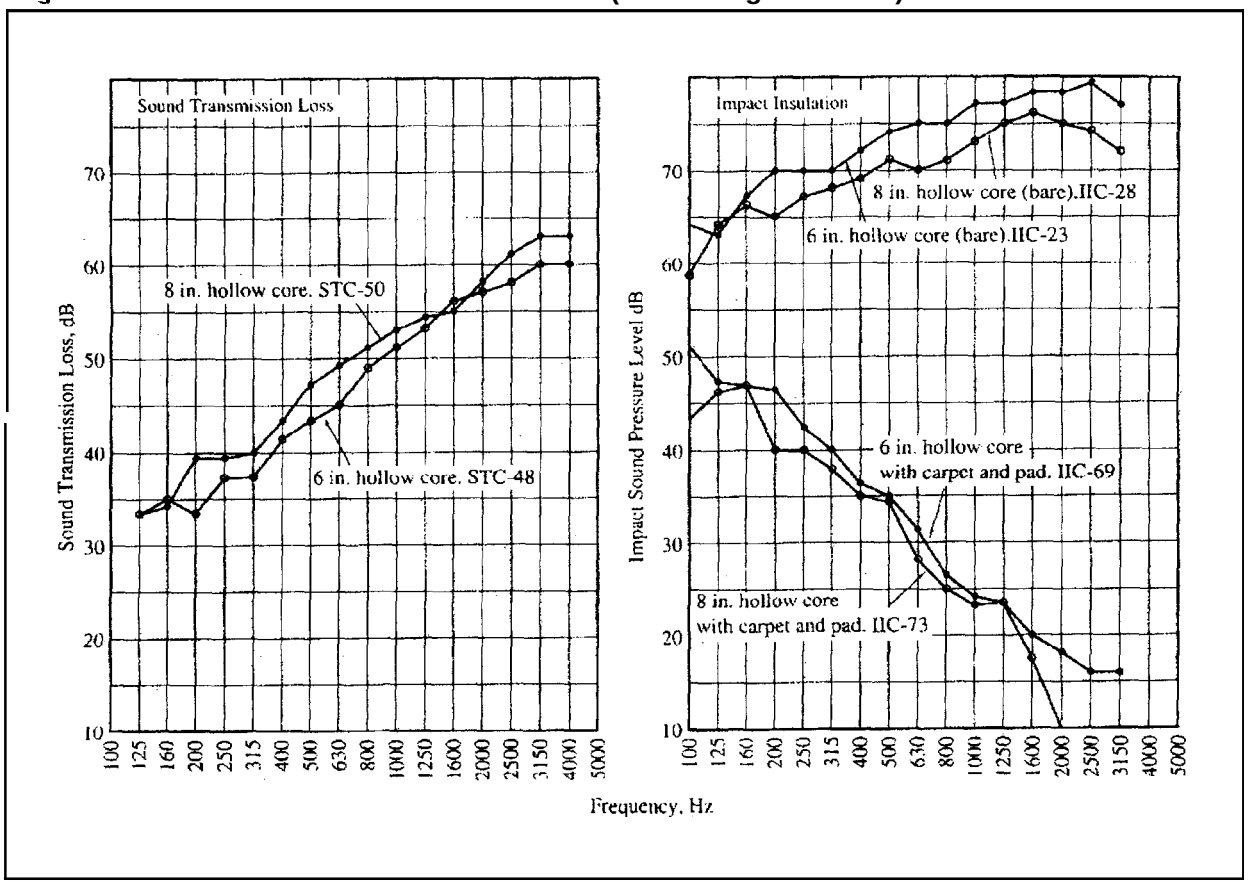


Fig. 7.4.2 Acoustical test data of hollow core slabs (normal weight concrete)



Precast concrete floors a i d roofs **usually do not** need additional treatments **in** order to **provide** adequate sound insulation. If desired, greater sound **insulation** can **be obtained** by using **a** resiliently attached layer(s) of gypsum board or other building matcnal. **The** increased transmission loss *occurs* **because** the **energy** flow **path is** now increased to include a dissipative air column and additional **mass.**

The acoustical **test results** of **both** airborne **sound** transmission loss **and** impact insulation **of 6** and 8 in (150 and 200 **mm**) hollow core **slabs** are **shown** in Figure 7.4.2. Table 7.4.1 presents the ratings for various floor-ceiling assemblies.

7.5 Impact Noise Reduction

Footsteps, dragged chairs, dropped objects. slammed **doors,** and plumbing **generate** impact noise. **Even when** airborne sounds are adequately controlled there can be severe impact noise problems.

The test method used *to* evaluate systems **for** impact sound insulation is described in **ASTM** Specification E492, Laboratory Measurement of Impact **Sound** Transmission Using the **Tapping** Machine. **As** with the **airborne standard, measurements are** made at 16 one-third octave **intervals but** in the range from 100 to 3150 Hz. For performance specification **purposes, the** single **number Impact** Insulation Class (IIC) **is used.**

Hollow cure **floors in combination** with **resilient** inaterials effectively control **impact** sound. One simple solution *consists* **of good** carpeting on resilient padding. Table 7.4.1 shows that **a** carpet and pad over a **bare slab will significantly increase** the **impact** noise reduction. The overall efficiency varies according to the characteristics **of the** carpeting and padding such as resilience. thickness and **weight. So** called resilient flooring materials, such **as** linoleum, rubber. asphalt vinyl, etc. are **not** entirely satisfactory directly on concrete, **nor** are parquet or **strip wood** floors **when** applied directly. Impact sound **also** may be controlled by

Table 7.4.1 Airborne **sound transmission** arid impact **insulation class ratings from laboratory tests of hollow core slab floor-ceiling assemblies**

Assembly NO.	Description	STC	IIC
1.	6 in (150 mm) hollow core slabs	48	23
2.	Assembly 1 with carpet and pad	48	69
3.	Assembly 1 with 1/2 in (13 mm) wood block floor-ing adhered directly	48	48
4.	Assembly 1 with 1/2 in (13 mm) wood block flooring adhered to 1/2 in (13 mm sound-deadening board underlayment adhered to concrete	49	49
5.	Assembly 1 with 3/4 in (19 mm) gypsum concrete	50	41
6.	Assembly 1 with 3/4 in (19 mm) gypsum concrete on 1/2 in (13 mm) sound-deadening board underlayment adhered to concrete	50	50
7.	Assembly 1 with carpet and pad on 3/4 in (19 mm) gypsum concrete on 1/2 in (13 mm) sound-deadening board underloyment adhered to concrete	50	72
8.	8 in (200 mm) hollow core slabs	50	28
9.	Assernblv 8 with carpet and pad	50	73
10.	Assembly 8 with 1/2 in (13 mm) wood block flooring adhered directly	51	47
11.	Assembly 8 with 1/2 in (13 mm) wood block flooring adhered to 1/2 in (13 mm sound-deadening board underlayment adhered to concrete	52	54
12.	Assembly 8 with 1/2 in (13 mm) wood block flooring adhered to 1/2 in (13 mm plywood adhered to 7/16 in (11 mm) sound-deadening board underlayment adhered to concrete	52	55
13.	Assemblv 8 with 5/16 in (8 mm) wood block flooring adhered to 1/4 in (6 mm) polystyrene underlayment adhered to concrete	50	51
14.	Assembly 8 with vinyl tile adhered to 1/2 in (13 mm) plywood adhered to 7/16 in (I 1 mm) sound-deadening board underlayment adhered to concrete	50	55
15.	Assemblv 8 with vinyl tile adhered to 1/4 in (6 tnm) inorganic felt supported cushion underlayment adhered to concrete	50	51
16.	Assemblv 8 with vinyl tile adhered to 1/8 in (3 mm) polyethylene foam underlayment adhered to concrete	50	58
17.	Assembly 8 with 1 1/2 in (38 mm) concrete topping with carpet and pad	50	76
18.	Assembly 8 with 1 1/2 in (38 mm) concrete topping with vinyl tile adhered to concrete	50	44
19.	Assemblv 8 with 1 1/2 in (38 mm) concrete topping with vinyl tile adhered to 3/8 in (9 mm) plywood adhered to 1/2 in (13 mm) sound-deadening board adhered to concrete	52	55
20.	Assembly 8 with 1 1/2 in (38 mm) concrete with 1/2 in (13 mm) wood block flooring adhered to 1/2 in (13 mm) sound-deadening board adhered to concrete	51	53
21.	Assembly 8 with 1 1/2 in (38 inm) concrete with 5/16 in (8 mm) wood block flooring adhered to foam backing adhered to concrete	51	54
22.	Assembly 8 with 3/4 in (19 mm) gypsum concrete with 5/16 in (8 rnm) wood block flooring adhered to foam backing adhered to concrete	50	53
23.	Assembly 11 with acoustical ceiling	59	61
24.	Assembly3 with quarry tile, 1 1/4 in (32 mm) reinforced mortar bed with 3.4 in (10 mm) nylon and carbon black spinerette matting	60	54
25.	Assembly 24 with suspended 5/8 in (I6 mm) gypsum board ceiling with 3 1/2 in (90 mm) insulation	61	62

providing a discontinuity in the structure such as would be obtained by adding a resilient-mounted plaster or drywall suspended ceiling.

7.6 Absorption of Sound

A sound wave always loses part of its energy as it is reflected by a surface. This loss of energy is termed sound absorption. It appears as a decrease in sound pressure of the reflected wave. The sound absorption coefficient is the fraction of energy incident but not reflected per unit of surface area. Sound absorption can be specified at individual frequencies or as an average of absorption coefficients (NRC).

A dense, non-porous concrete surface typically absorbs 1 to 2% of incident sound arid has an NCR of 0.015. In the case where additional sound absorption of precast concrete is desired, a coating of acoustical material can be spray applied, acoustical tile can be applied with adhesive, or an acoustical ceiling can be suspended. Most of the spray applied fire retardant materials used to increase the fire! resistance of precast concrete and other floor-ceiling systems can also be used to absorb sound. The NCR of the sprayed fiber types range from 0.25 to 0.75. Most cementitious types have an NCR from 0.25 to 0.50.

If an acoustical ceiling were added to Assembly 11 of Table 7.4.1 (as in Assembly 23), the sound entry through a floor or roof would be reduced 7dB. In addition, the acoustical ceiling would absorb a portion of the sound after entry and provide a few more decibels of quieting. Use of the following expression can be made to determine the intra-room noise or loudness reduction due to the absorption of sound.

$$NR = 10 \log \frac{A_o + A_a}{A_a} \qquad \text{(Eq. 7.6.1)}$$

where

NK = sound pressure level reduction, dB

A_o = original absorption, Sabins

A_a = added absorption. Sabins

Values for A_o and A, are the products of the absorption coefficients of the various room materials and their surface areas.

A plot of this equation is shown in Figure 7.6.1. For an absorption ratio of 5. the decibel reduction is 7dB. Note that the decibel reduction is the same, regardless of the original sound pressure level and depends only on the absorption ratio. This is due to the fact that the decibel scale is itself a scale of ratios, rather than difference in sound energy.

While a decibel difference is an engineering quantity which can bc physically measured, it is also important to know how the ear judges the change in sound energy due to sound conditioning. Apart from the subjective annoyance factors associated with excessive sound reflection, the ear can make accurate judgments of the relative loudness between sounds, An approximate relation between percentage loudness, reduction of reflected sound and absorption ratio is plotted in Figure 7.6.2

The percentage loudness reduction does not depend on the original loudness, but only on the absorption ratio. (The curve is drawn for loudness within the normal range of hearing and does not apply to extremely faint sounds.) Referring again to the absorption ratio of 5, the loudness reduction is read from Figure 7.6.2 as approximately 40 percent.

7.7 Acceptable Noise Criteria

As a rule, a certain amount of continuous sound can be tolerated before it becomes noise. An "acceptable" level neither disturbs room occupants nor interferes with the communication of wanted sound.

The most widely accepted and used noise criteria today are expressed as the Noise Criterion (NC) curves, Figure 7.7.1a. The figures in Table 7.7.1 represent general acoustical goals. They can also bc compared with anticipated noise levels in specific rooms to assist in evaluating noise reduction problems.

The main criticism of NC curves is that they are too permissive when the control of low or high frequency noise is of concern. For this reason, Room Criterion (RC) Curves were developed (Figure 7.7.1b).[39,40] RC curves are the result of extensive studies based on the human response to both sound pressure level and frequency and take into account the requirements for speech intelligibility.

A low background level obviously is necessary where listening and speech intelligibility is im-