Revised 2-12-09

Airport Sound Construction Compliance Packet

In an effort to reduce the potential of closing the Naval Air Station Joint Reserve Base (NAS JRB), a Joint Land Use Study Policy Committee was created. After months of review and public meetings, the Final Report was approved March 2008.

The committee information and report can be reviewed on the Council of Governments web page at www.nctcog.org/trans/aviation/jlus/index.asp

While there were several recommendations under consideration during the review process, the City of Fort Worth chose to pursue the adoption of a sound construction ordinance before the completion of the work. As such, ordinances 17680-08-2007 and 17681-08-2007 were adopted. Under those ordinances, the following uses require extra construction techniques in order to reduce the penetration of aircraft noise.

Protected Uses:

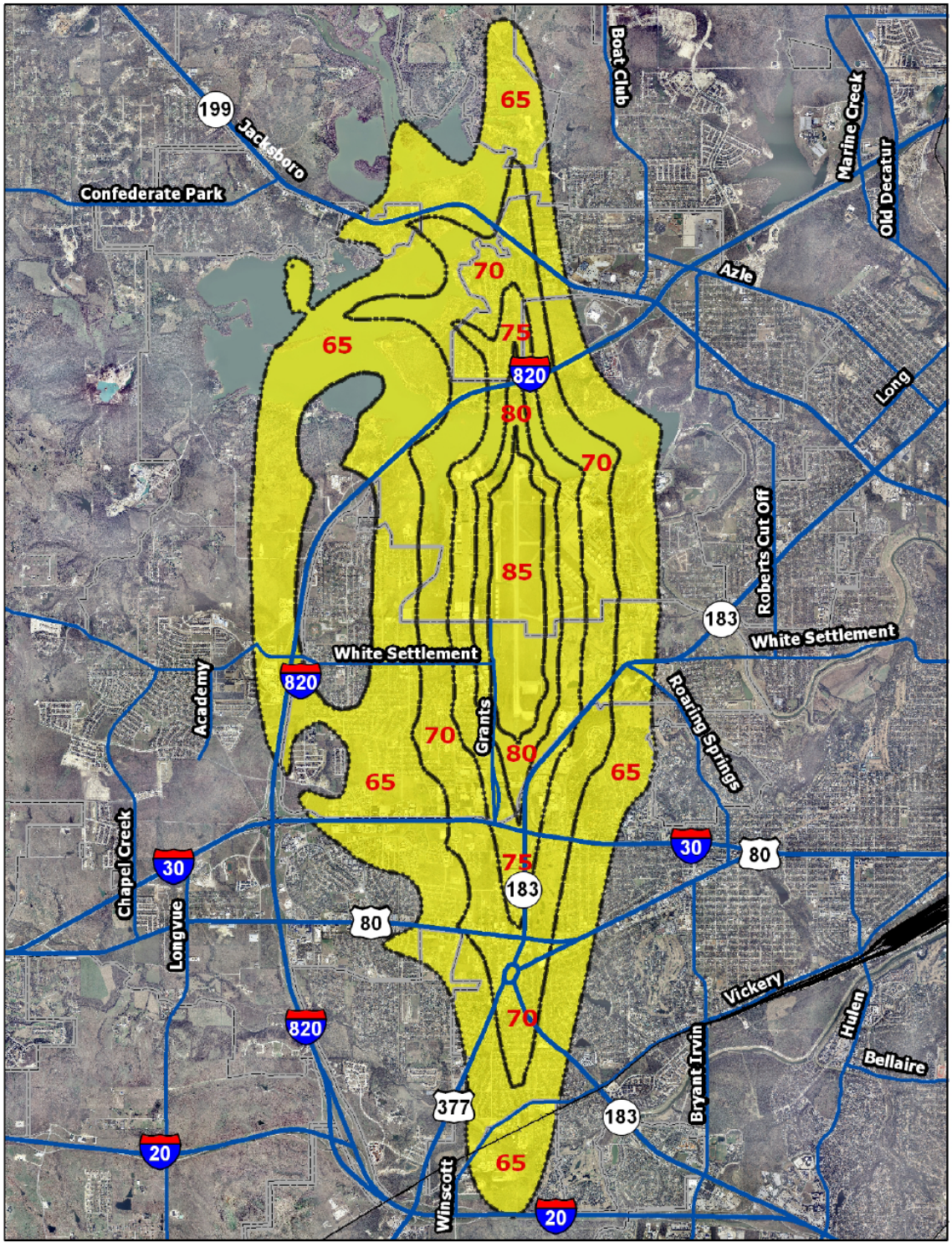
1. Single-family, two-family, townhouse, multi-family, and Assisted Living uses, generally classified as Group R, whether in a single occupancy or mixed occupancy.
2. Nursing homes and hospitals, generally classified as Group I; and
3. Child day care centers, Adult day care centers and schools, generally classified as Group E and Group I-4.

All new construction with those uses, and any Change of Use to those uses, must comply with the sound reduction construction requirements.

In the Final Report, more uses are recommended for protection. The City Council may take into considerations all of the JLUS recommendations and provide direction to staff for more ordinance adoptions. Along with the JLUS recommendations, the report included a broader base of construction designs from which to choose for compliance methods.

The provisions of the first two ordinances have been reformatted into tabular form and the new design options provided by the JLUS report have been included in the attached packet. Compliance with this packet will be accepted as compliant construction in the Sound Contours associated with the adopted ordinances. All construction within the designated 65 dB and higher contours shown on the following map must choose design options that meet or exceed the requirements specified in that zone, but only for the protected uses listed.

Any option, door, window, or product that is not listed in this document may be used provided sufficient documentation is submitted to confirm appropriate testing to achieve the required STC rating.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75
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Jacksboro
Confederate Park
Boat Club
Marine Creek
Old Decatur
Azle
820
Long
Roberts Cut Off
183
White Settlement
White Settlement
820
Academy
Grants
Roaring Springs
Chapel Creek
30
30
80
183
80
Longvue
Vickery
Hulen
820
Bryant Irvin
Bellaire
377
183
20
Winscott
20

FORT WORTH

Revised 2-12-09

Airport Sound Construction Checksheet

65 dB Contour

Protected Uses:

1. Single-family, two-family, townhouse, multi-family, and Assisted Living uses, generally classified as Group R, whether in a single occupancy or mixed occupancy.
2. Nursing homes and hospitals, generally classified as Group I; and
3. Child day care centers, Adult day care centers and schools, generally classified as Group E and Group I-4.

The checksheet must be submitted for any **protected use** for NEW construction or Change of Use in the 65 dB sound contour zone. Chosen options must be filled in. Fill in all that apply.

_____ (Check if applicable) In lieu of the prescriptive provisions listed below, an acoustical design may be submitted showing that the interior sound level, attributable to exterior sources, shall not exceed 45 dB. Such design must be prepared by a person experienced in the field of acoustical engineering or a registered architect. The design documentation with the appropriate seal shall be attached.

Exterior Windows (must have STC rating 25 or greater, or approved for 65 dB or higher)

From Table A2: Win _____ _____ _____ _____ _____ _____ _____

From Table B2: Win _____ _____ _____ _____ _____ _____ _____

From Table C2: Win _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other windows not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable requirements:

_____ (initial for acknowledgement) The total area of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area.

Exterior walls (must have STC rating of 25 or greater, or approved for 65 dB or higher)
Walls that are exterior of the protected use, but **interior** to the building, separating the protected use from the remainder area, such as, an enclosed garages, unused space, warehouse, etc., may be reduced to an STC of 20.

From Table A1: Wall _____ _____ _____ _____ _____ _____ _____

From Table B1: Wall _____ _____ _____ _____ _____ _____ _____

From Table C1: Wall _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other walls not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Exterior Doors (must be STC rating 25 or greater, or approved for 65 dB or higher)
Doors that are exterior of the protected use, but **interior** to the building, separating the protected use from the remainder area, such as, an enclosed garages, unused space, warehouse, etc., may be reduced to an STC of 20, or may use option Door 21, 22 or 23.

From Table A3: Door _____ _____ _____ _____ _____ _____ _____

From Table B3: Door _____ _____ _____ _____ _____ _____ _____

From Table C3: Door _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other doors not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable provisions.

_____ (initial for acknowledgement). View windows in doors and sidelights shall comply with the Exterior Window provisions listed above, unless using door options Door 1a, 1b, 1c or 1d.

Roof/Ceiling (must be STC rating of 25 or greater, or approved for 65 dB or higher)

From Table A4: R/C _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other Roor/Ceiling not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable requirements:

_____ (initial for acknowledgement)

a. An accessible attic space shall be provided above rooms on the uppermost level of Group R buildings.
b. Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-value as required by the Energy Code, but not less than R-30 rating applied between the ceiling joists.
c. Attic ventilation, when installed, shall be:
    1. Gable vents or other attic vents that penetrate the attic enclosure shall be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced. Or,
    2. Eave vents that are located under the roof overhang.
d. Skylights shall penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line and shall be glazed with at least 3/16-inch plastic, tempered or laminated glass. The weather-side skylight shall be any type that is permitted by this code. The total size of skylights shall be no more than 20 percent of the roof area of the room.

Floors (must be STC rating of 25 or greater, or approved for 65 dB or higher)
This includes floors exposed to outside air; e.g. floors over garage, raised floors over pier and beam structures, cantilevered floors projecting from the exterior walls, etc. which would include all floors subject to the Energy Code.

From Table A5: Floor _____ _____ _____ _____ _____ _____ _____

From Table C5: Floor _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using ther floors not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable provisions.

_____ (initial for acknowledgement) All crawlspace vents must be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.

Ventilation

_____ (initial for acknowledgement)

a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of the applicable code, in each room without opening any windows, door or other opening to the exterior. Openable windows or doors will not be counted for compliance with the fresh air provisions. Fresh air must be brought in through the HVAC system.
b. Window and/or through-the-wall ventilation or air-conditioning units shall not be used.
c. All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree (right angle) bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree (right angle) bends.
d. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.

Fireplaces

_____ (initial for acknowledgement)

Each fireplace constructed of masonry units shall be fitted with a spark arrestor, a damper as required by code and shall have glass doors across the front of the firebox.

Wall and Ceiling Openings

_____ (initial for acknowledgement)

Brick veneer, masonry blocks, or stucco exterior walls shall be grouted or caulked airtight, except for weep holes.

Openings in the exterior that degrades its ability to achieve an interior rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB or less standard in the room to which they provide access.

At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked at the pipe duct or conduit or filled with mortar to the wall.

Airport Sound Construction Checksheet

Revised 2-12-09

70 dB Contour

Protected Uses:

1. Single-family, two-family, townhouse, multi-family, and Assisted Living uses, generally classified as Group R, whether in a single occupancy or mixed occupancy.
2. Nursing homes and hospitals, generally classified as Group I; and
3. Child day care centers, Adult day care centers and schools, generally classified as Group E and Group I-4.

The checksheet must be submitted for any **protected use** for NEW construction or Change of Use in the 70 dB sound contour zone. Chosen options must be filled in. Fill in all that apply.

_____ (Check if applicable) In lieu of the prescriptive provisions listed below, an acoustical design may be submitted showing that the interior sound level, attributable to exterior sources, shall not exceed 45 dB. Such design must be prepared by a person experienced in the field of acoustical engineering or a registered architect. The design documentation with the appropriate seal shall be attached.

Exterior Windows (must have STC rating 30 or greater, or approved for 70 dB or higher)
It is permitted to use windows and doors of less than 30 STC but not less than 25 STC rating, provided the wall is upgrade to an STC 38 or higher, and non-compliance windows/door area shall not exceed 20% of the floor area per room.

From Table A2: Win _____ _____ _____ _____ _____ _____ _____

From Table B2: Win _____ _____ _____ _____ _____ _____ _____

From Table C2: Win _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other windows not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable requirements:

_____ (initial for acknowledgement) The total area of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area.

Exterior walls (must have STC rating of 30 or greater, or approved for 70 dB or higher)
Walls that are exterior of the protected use, but **interior** to the building, separating the protected use from the remainder area, such as, an enclosed garages, unused space, warehouse, etc., may be reduced to an STC of 25. When the wall separates the protected use

from an unfinished tenant space, the outside finish of the wall need not be installed until the space is finished out.

Lower rated windows or doors

(choose correct response) _____ are _____ are not being used.
If they are being used, walls with an STC of 38 or higher have been chosen.

From Table A1: Wall _____ _____ _____ _____ _____ _____ _____

From Table B1: Wall _____ _____ _____ _____ _____ _____ _____

From Table C1: Wall _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other walls not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Exterior Doors (must be STC rating 30 or greater, or approved for 70 dB or higher)

It is permitted to use windows and doors of less than 30 STC but not less than 25 STC rating, provided the wall is upgrade to an STC 38 or higher, and non-compliance windows/door area shall not exceed 20% of the floor area per room.

Doors that are exterior of the protected use, but **interior** to the building, separating the protected use from the remainder area, such as, an enclosed garages, unused space, warehouse, etc., may be reduced to an STC of 25, or may use option Door 21, 22 or 23.

From Table A3: Door _____ _____ _____ _____ _____ _____ _____

From Table B3: Door _____ _____ _____ _____ _____ _____ _____

From Table C3: Door _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other doors not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable provisions.

_____ (initial for acknowledgement). View windows in doors and sidelights shall comply with the Exterior Window provisions listed above, unless using door options Door 3a, 3b or 3c.

Roof/Ceiling (must be STC rating of 30 or greater, or approved for 70 dB or higher)

From Table A4: R/C _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other Roor/Ceiling not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable requirements:

_____ (initial for acknowledgement)

a. An accessible attic space shall be provided above rooms on the uppermost level of Group R buildings.
b. Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-value as required by the Energy Code, but not less than R-30 rating applied between the ceiling joists.
c. Attic ventilation, when installed, shall be:
    1. Gable vents or other attic vents that penetrate the attic enclosure shall be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced. Or,
    2. Eave vents that are located under the roof overhang.
d. Skylights shall penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line and shall be glazed with at least 3/16-inch plastic, tempered or laminated glass. The weather-side skylight shall be any type that is permitted by this code. The total size of skylights shall be no more than 20 percent of the roof area of the room.

Floors (must be STC rating of 30 or greater, or approved for 70 dB or higher)
This includes floors exposed to outside air; e.g. floors over garage, raised floors over pier and beam structures, cantilevered floors projecting from the exterior walls, etc. which would include all floors subject to the Energy Code.

From Table A5: Floor _____ _____ _____ _____ _____ _____ _____

From Table C5: Floor _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other floors not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable provisions.

_____ (initial for acknowledgement) All crawlspace vents must be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent,

so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.

Ventilation

_____ (initial for acknowledgement)

a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of the applicable code, in each room without opening any windows, door or other opening to the exterior. Openable windows or doors will not be counted for compliance with the fresh air provisions. Fresh air must be brought in through the HVAC system.
b. Window and/or through-the-wall ventilation or air-conditioning units shall not be used.
c. All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree (right angle) bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree (right angle) bends.
d. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.

Fireplaces

_____ (initial for acknowledgement)

Each fireplace constructed of masonry units shall be fitted with a spark arrestor, a damper as required by code and shall have glass doors across the front of the firebox.

Wall and Ceiling Openings

_____ (initial for acknowledgement)

Brick veneer, masonry blocks, or stucco exterior walls shall be grouted or caulked airtight, except for weep holes.

Openings in the exterior that degrades its ability to achieve an interior rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB or less standard in the room to which they provide access.

At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked at the pipe duct or conduit or filled with mortar to the wall.

FORT WORTH

Revised 2-12-09

Airport Sound Construction Checksheet

75 dB or greater Contour

Protected Uses:

1. Single-family, two-family, townhouse, multi-family, and Assisted Living uses, generally classified as Group R, whether in a single occupancy or mixed occupancy.
2. Nursing homes and hospitals, generally classified as Group I; and
3. Child day care centers, Adult day care centers and schools, generally classified as Group E and Group I-4.

The checksheet must be submitted for any protected use for NEW construction or Change of Use in the 75 dB or greater sound contour zone. Chosen options must be filled in. Fill in all that apply.

_____ (Check if applicable) In lieu of the prescriptive provisions listed below, an acoustical design may be submitted showing that the interior sound level, attributable to exterior sources, shall not exceed 45 dB. Such design must be prepared by a person experienced in the field of acoustical engineering or a registered architect. The design documentation with the appropriate seal shall be attached.

Exterior Windows (must have STC rating 35 or greater, or approved for 75 dB or higher)
It is permitted to use windows and doors of less than 35 STC but not less than 30 STC rating, provided the wall is upgrade to an STC 44 or higher, and non-compliance windows/door area shall not exceed 20% of the floor area per room.

From Table A2: Win _____ _____ _____ _____ _____ _____ _____

From Table B2: Win _____ _____ _____ _____ _____ _____ _____

From Table C2: Win _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other windows not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable requirements:

_____ (initial for acknowledgement) The total area of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area.

Exterior walls (must have STC rating of 35 or greater, or approved for 75 dB or higher)
Walls that are exterior of the protected use, but **interior** to the building, separating the protected use from the remainder area, such as, an enclosed garages, unused space, warehouse, etc., may be reduced to an STC of 30. When the wall separates the protected use

from an unfinished tenant space, the outside finish of the wall need not be installed until the space is finished out.

Lower rated windows or doors

(choose correct response) _____ are _____ are not being used.
If they are being used, walls with an STC of 44 or higher have been chosen.

From Table A1: Wall _____ _____ _____ _____ _____ _____ _____

From Table B1: Wall _____ _____ _____ _____ _____ _____ _____

From Table C1: Wall _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other walls not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Exterior Doors (must be STC rating 35 or greater, or approved for 75 dB or higher)

It is permitted to use windows and doors of less than 35 STC but not less than 30 STC rating, provided the wall is upgrade to an STC 44 or higher, and non-compliance windows/door area shall not exceed 20% of the floor area per room.

Doors that are exterior of the protected use, but **interior** to the building, separating the protected use from the remainder area, such as, an enclosed garages, unused space, warehouse, etc., may be reduced to an STC of 30, or may use option Door 21, 22 or 23.

From Table A3: Door _____ _____ _____ _____ _____ _____ _____

From Table B3: Door _____ _____ _____ _____ _____ _____ _____

From Table C3: Door _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other doors not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable provisions.

_____ (initial for acknowledgement).

a. View windows in doors and sidelights shall comply with the Exterior Window provisions listed above, unless using door options Door 5a, 5b or 5c.
b. The joint between the wall opening and the door frame shall be continuously filled with glass fiber insulation and the exterior cover trim shall be continuously caulked to seal the joint.

Roof/Ceiling (must be STC rating of 35 or greater, or approved for 75 dB or higher)

From Table A4: R/C _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other Roor/Ceiling not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable requirements:

_____ (initial for acknowledgement)

a. An accessible attic space shall be provided above rooms on the uppermost level of Group R buildings.
b. Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-value as required by the Energy Code, but not less than R-30 rating applied between the ceiling joists.
c. Attic ventilation, when installed, shall be:
    1. Gable vents or other attic vents that penetrate the attic enclosure shall be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced. Or,
    2. Eave vents that are located under the roof overhang.
d. Skylights shall penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line and shall be glazed with at least 3/16-inch plastic, tempered or laminated glass. The weather-side skylight shall be any type that is permitted by this code. The total size of skylights shall be no more than 20 percent of the roof area of the room.

Floors (must be STC rating of 35 or greater, or approved for 75 dB or higher)

This includes floors exposed to outside air; e.g. floors over garage, raised floors over pier and beam structures, cantilevered floors projecting from the exterior walls, etc. which would include all floors subject to the Energy Code.

From Table A5: Floor _____ _____ _____ _____ _____ _____ _____

From Table C5: Floor _____ _____ _____ _____ _____ _____ _____

_____ (check if applicable). Using other floors not listed in the tables. Must provide acceptable manufacturer's documentation on STC rating.

Other applicable provisions.

_____ (initial for acknowledgement) All crawlspace vents must be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.

Ventilation

_____ (initial for acknowledgement)

a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of the applicable code, in each room without opening any windows, door or other opening to the exterior. Openable windows or doors will not be counted for compliance with the fresh air provisions. Fresh air must be brought in through the HVAC system.
b. Window and/or through-the-wall ventilation or air-conditioning units shall not be used.
c. All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree (right angle) bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree (right angle) bends.
d. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.

Fireplaces

_____ (initial for acknowledgement)

Each fireplace constructed of masonry units shall be fitted with a spark arrestor, a damper as required by code and shall have glass doors across the front of the firebox.

Wall and Ceiling Openings

_____ (initial for acknowledgement)

Brick veneer, masonry blocks, or stucco exterior walls shall be grouted or caulked airtight, except for weep holes.

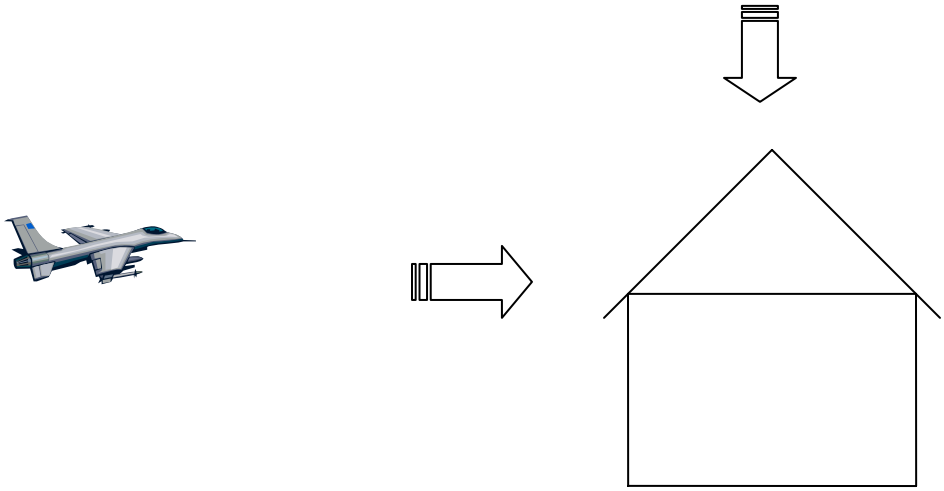
Openings in the exterior that degrades its ability to achieve an interior rating of 45 dB or less when all doors and windows are closed are prohibited. Any access

panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB or less standard in the room to which they provide access.

At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked at the pipe duct or conduit or filled with mortar to the wall.

Sound Waves

Airplanes, jets and helicopters (aircraft) approach structures from different angles. It is not always from overhead. Low flying aircraft, as well as, take offs and landings will create sound waves that approach structures from all sides.



Sound waves are just that, waves. They travel out in a circular method from the producing object. They enter through openings and in a case like an attic, reverberate within the cavity. When the entry of such waves cannot be prevented such as with the installation of attic ventilation, dampening devices are needed to prevent the reverberation.

Figure 2-2 displays the three different major paths for noise transmission into a dwelling: air infiltration through gaps and cracks, secondary elements such as windows and doors, and primary building elements such as walls and the roof.

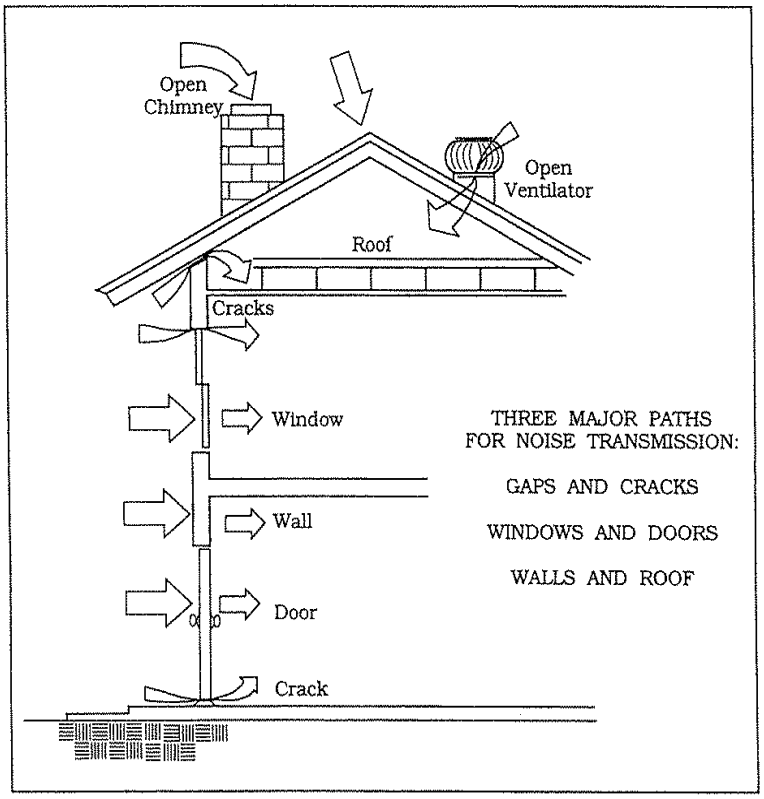


Figure 2-2. Sound Transmission Paths Into Dwelling Interiors

Low-frequency sound is most efficiently transmitted through solid structural elements such as walls, roofs, doors, and windows. High frequencies travel best through the air gaps.

Within these broad categories, different building materials have different responses based on the frequency of the incident sound and varying abilities to insulate against sound.

- Ducts to the outside, whether intake or exhaust, and all ducts in the attic or crawl space can be lined with 1-inch acoustical internal lining material, and have at least one 90-degree (right angle) elbows (turns) thereby breaking the line-of-sight to the outside as shown in Figure 3-6. It must be noted that there is concern than this fibrous acoustical lining material will affect air quality. Installing a duct sound attenuator (silencer) is an alternative to this technique; there are silencers available that do not contain fibrous lining. These measures ensure that the ventilation system is not bringing additional aircraft noise into the house.

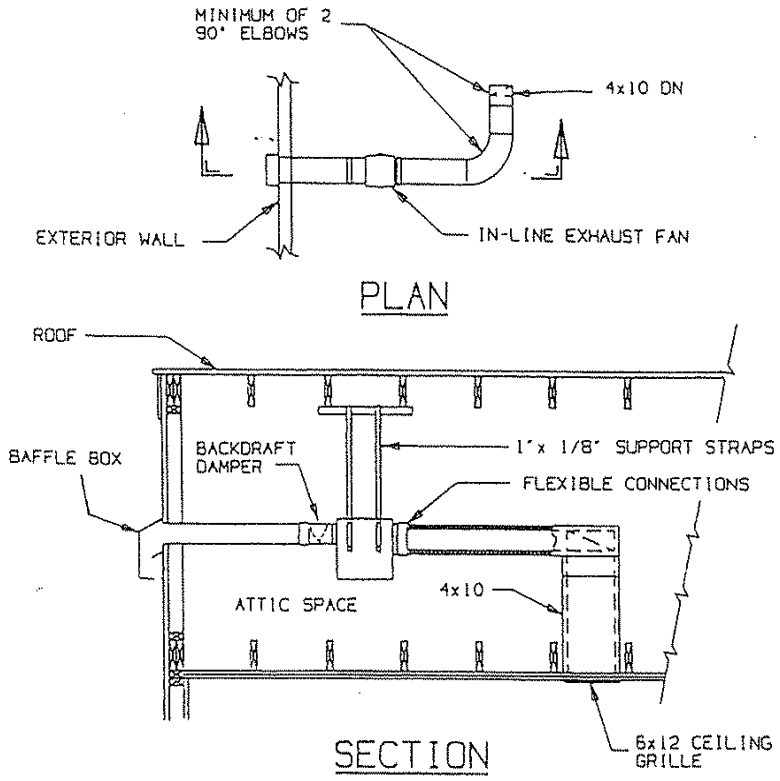


Figure 3-6. Controlling Noise Entering Through Ducts in Attic Space

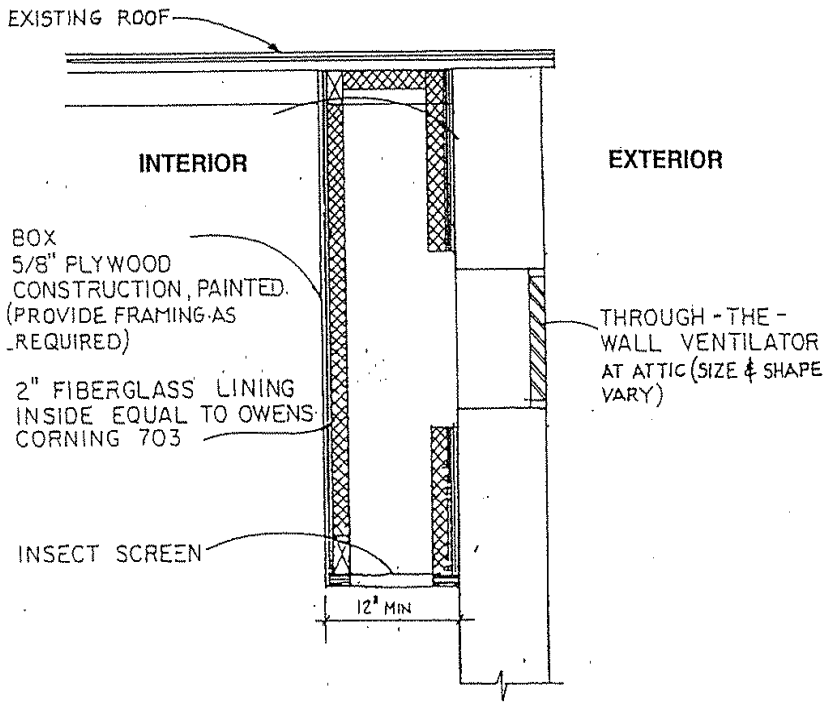
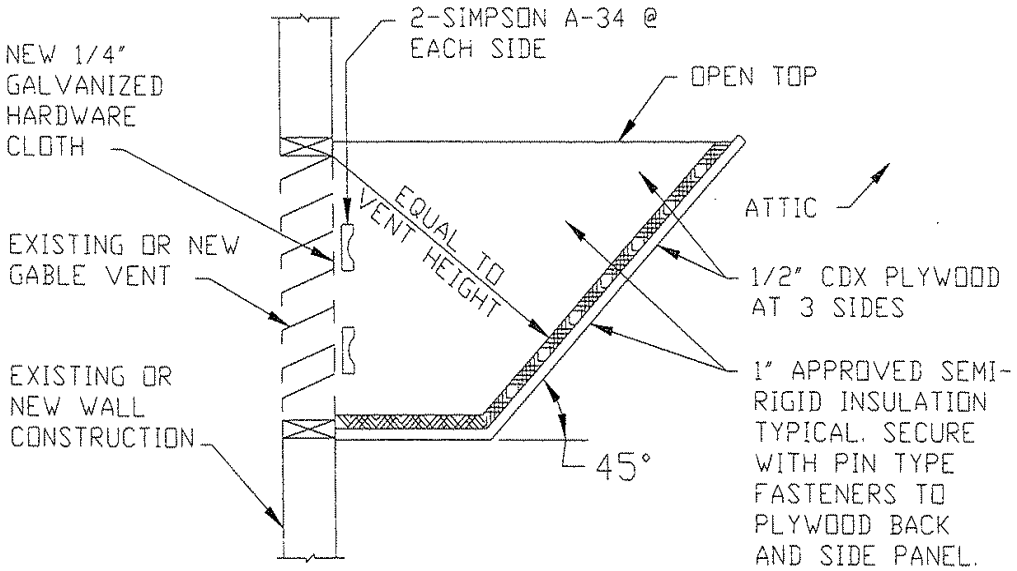


Figure 3-5. Built-in-place Gable Baffle

Attic Insulation

When considering the upgrade of thermal insulation to reduce noise levels it is important to understand what the insulation will do. Thermal insulation materials will act to absorb sound that is reverberating in the attic or in the space between flat panels. It does not prevent noise from entering the space. That is, it has no appreciable acoustic "insulating" properties but acts as an absorbent instead.

GENERIC DETAILS FOR SOUND INSULATION
PRESCRIPTIVE BUILDING STANDARDS

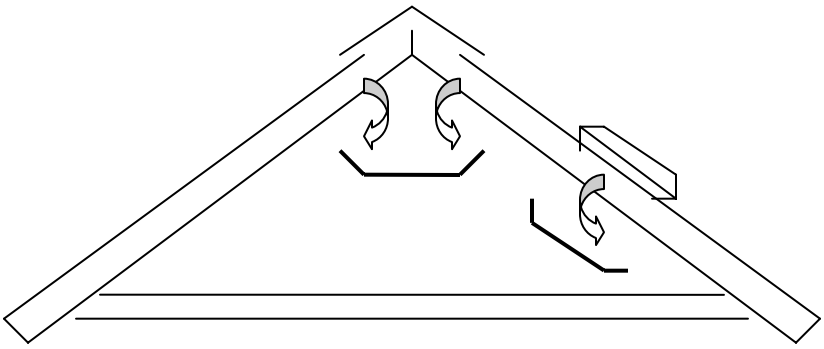


ATTIC BAFFLE FOR GABLE VENT

NOT TO SCALE

NOTE:
1. AFTER FABRICATION BAFFLE SHALL BE SECURELY ATTACHED IN POSITION.
2. NEW BAFFLE SHALL BE AT LEAST AS WIDE AS THE EXISTING VENT OPENING.

Roof vents



When using roof vents, whether a ridge vent or a single vent, a trough should be constructed and hung from the joists. The trough should be as wide as possible to cover the area of the vent. For ridge vents, it is preferable that it extend from joists to joists, leaving enough room around the edges for the required amount of venting. For single vents, the trough should be installed at the appropriate angle to match the roof slope.

The trough should be as long as the roof vent, perhaps a few inches longer, and capped on the ends.

The inside of the trough should be lined with 1” approved semi-rigid sound insulation.

Table A1
Exterior Walls

Option	Wall description	Contour allowed
Wall 1	Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, minimum 7/8-inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal or cementitious fiber siding shall be installed over ½-inch solid sheathing. Wall insulation shall be as required by the Energy Code but not less than R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation, as permitted by this code, shall be accepted provided it solidifies to a spongy state and not solid or rigid. Interior wall finish shall be at least ½" gypsum wallboard	65 dB
Wall 2	Masonry or concrete load bearing walls. Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall that is finished as required by option Wall 1.	65 dB
Wall 3	Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, minimum 7/8-inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal or cementitious fiber siding shall be installed over ½-inch solid sheathing. Wall insulation shall be as required by the Energy Code but not less than R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation, as permitted by this code, shall be accepted provided it solidifies to a spongy state and not solid or rigid. Interior wall finish shall be at least 5/8-inch gypsum wallboard or plaster; or, ½" gypsum wallboard installed on resilient channels (RC), 16" o.c. perpendicular to the studs. Gypsum screws into the RC shall not be long enough to penetrate the wood stud by more	70 dB

	than ¼" if occurring over the stud location.	
Wall 4	Masonry or concrete load bearing walls. Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall that is finished as required by option Wall 3.	70 dB
Wall 5	Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, minimum 7/8-inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal or cementitious fiber siding shall be installed over 3/4-inch solid sheathing. Wall insulation shall be as required by the Energy Code but not less than R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation, as permitted by this code, shall be accepted provided it solidifies to a spongy state and not solid or rigid. Interior wall finish shall be at least 5/8-inch gypsum wallboard installed on resilient channels (RC), 16" o.c. perpendicular to the studs. Gypsum screws into the RC shall not be long enough to penetrate the wood stud by more than ¼" if occurring over the stud location.	75 dB or greater
Wall 6	Masonry or concrete load bearing walls. Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall that is finished as required by option Wall 5.	75 dB or greater

Table A2
Exterior Windows

Option	Window	Contour allowed
Win 1a Win 1b	All openable windows in the exterior walls shall have a laboratory sound transmission class rating of at least STC 30 dB and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283; or, shall be openable double glass thermopane windows meeting the requirements of the Energy Code.	65 dB
Win 2a Win 2b	All fixed windows in the exterior walls shall be at least ¼-inch thick and shall be set in non-hardening glazing materials; or, shall be fixed double glass thermopane windows meeting the requirements of the Energy Code.	65 dB
Win 3	All openable windows in the exterior walls shall have a laboratory sound transmission class rating of at least STC 35 dB and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283.	70 dB
Win 4a Win 4b Win 4c	All fixed windows in the exterior walls of rooms shall: a. Have a laboratory sound transmission class rating of at least STC 35 dB, or b. Be 5/8-inch laminated glass with a laboratory sound transmission class rating of at least STC 35 dB and shall be set in non-hardening glazing materials, or c. Be glass block at least 3-1/2 inches thick.	70 dB
Win 5	All openable windows in the exterior walls shall have a laboratory sound transmission class rating of at least STC 40 dB and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283.	75 dB or greater
Win 6a Win 6b Win 6c	All fixed windows in the exterior walls of rooms shall: a. Have a laboratory sound transmission class rating of at least STC 40 db, or b. Be 5/8-inch laminated glass with a laboratory sound transmission class rating of at least STC 40 db and shall be set in non-hardening glazing materials, or c. Be glass block at least 3-1/2 inches thick; or	75 db or greater

Win 6d	d. Double glazed windows, with glass at least 1/8” thick separated by a minimum 3” air space.	

Table A3
Exterior Doors

Option	Door	Contour allowed
Door 1a Door 1b Door 1c Door 1d	Exterior hinged doors shall be as follows: a. a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 30 dB; or, b. a door, other than a hollow core wood door, that complies with the Energy Code; or, c. any door installed with a storm door; or, d. doors installed as part of a vestibule.	65 dB
Door 2a Door 2b	Sliding glass doors shall have glass that has a laboratory sound transmission class rating of at least STC 30 dB; or, shall be a sliding glass door that complies with the Energy Code.	65 dB
Door 3a Door 3b Door 3c	Exterior hinged doors shall be as follows: a. a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 35 dB; or, b. a door, other than a hollow core wood door, that complies with the Energy Code and installed with a storm door; or, c. doors installed as part of a vestibule.	70 dB
Door 4	Sliding glass doors shall have glass that has a laboratory sound transmission class rating of at least STC 35 dB.	70 dB

Door 5a Door 5b Door 5c	Exterior hinged doors shall be as follows: a. a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 40 dB; or b. a solid-core wood or insulated metal door at least one (1) inch thick separated by an airspace of at least four (4) inches from another door, which can be a storm door. Both doors shall be tightly fitted and weather-stripped; or, c. doors installed as part of a vestibule.	75 dB or greater
Door 6a Door 6b	Sliding glass doors shall have glass that has a laboratory sound transmission class rating of at least STC 40 dB; or, a double sliding glass door, separated by a minimum four-inch airspace. Each door shall comply with the air leakage rate of the Energy Code. Glass shall be at least three-sixteenths (3/16) inch thick but not equal in thickness between the two doors, and tempered or laminated.	75 dB or greater

Interior Doors

Door 11a Door 11b	Access doors from a garage to a room within a dwelling shall have a laboratory sound transmission rating of at least STC 30 dB; or, Shall comply with the Energy Code as a door in the exterior envelope.	All

Table A4
Roof/Ceiling Construction

Option	Roof/Ceiling	Contour allowed
R/C 1	Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½-inch solid sheathing and any roof covering allowed by this code. (*See special provisions)	65 dB
R/C 2	Commercial type flat roofs (less than 4:12 slope) are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two. (*See special provisions)	65 dB
R/C 3	Cathedral ceilings are discouraged but, if installed, must have enough space to install the minimum required insulation, with a minimum of 6" air space between the insulation and the roof deck. (*See special provisions)	65 dB
*Special provisions: Ceilings shall be finished with gypsum board or plaster that is at least 5/8-inch thick; or, ½" gypsum board on resilient channels (RC) installed 16" o.c. perpendicular to the joists. Gypsum screws into the RC shall not be long enough to penetrate the wood stud by more than ¼" if occurring over the stud location; or, a lay-in ceiling with an airspace.		
R/C 4	Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½-inch solid sheathing and any roof covering allowed by this code. (** See special provisions)	70 dB
R/C 5	Commercial type flat roofs (less than 4:12 slope) are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two. (**See special provisions.)	70 dB
R/C 6	Cathedral ceilings are discouraged but, if installed, must have ¾" solid decking above, enough space to install the minimum required insulation, with a minimum of 6" air space between the insulation and the roof deck. (**See special provisions)	70 dB
**Special provisions: Ceilings shall be finished with gypsum board or plaster that is at least 5/8-inch thick on resilient channels (RC) installed perpendicular to the joists. Gypsum screws into the RC shall not be long enough to penetrate the wood stud by more than ¼" if occurring over the stud location; or, a lay-in ceiling with an airspace.		
R/C 7	Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½-inch solid sheathing and any	75 or

	roof covering allowed by this code. (***See special conditions)	greater
R/C 8	Commercial type flat roofs (less than 4:12 slope) are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two. (***See special conditions)	75 or greater
R/C 9	Cathedral ceilings are discouraged but, if installed, must have 1" solid decking above, have enough space to install the minimum required insulation, with a minimum of 6" air space between the insulation and the roof deck. Structural information shall be provided confirming adequate support of the decking. (***See special conditions)	75 or greater

***Special provisions:

Ceilings shall be finished with gypsum board or plaster that is at least 5/8-inch thick on resilient channels (RC) installed perpendicular to the joists. Gypsum screws into the RC shall not be long enough to penetrate the wood stud by more than ¼" if occurring over the stud location; or,

a lay-in ceiling with an airspace.

Table A5
Lowest Floor of Sound Protected Uses
Construction to protect for sound penetration from the
Air through the floor below

Option	Floor	Contour allowed
FL 1	Slab on grade	All
FL 2	Floor is below grade; i.e. a basement level	All
FL 3	Floor is over a fully enclosed basement. All door and window openings in the fully enclosed basement shall be tightly fitted.	All

Table B1
Exterior Walls

Option	Wall	STC rating
Wall 21	Exterior siding, ½" solid sheathing, 2 x 4" nominal stud 16" o.c., fiberglass insulation, ½" interior gypsum attached directly to studs	39
Wall 22	7/8" stucco, No. 15 felt building paper and 1" wire mesh, 2 x 4" nominal stud 16" o.c., fiberglass insulation, ½" gypsum board attached directly to stud.	46
Wall 23	Face Brick, ½" air space with metal ties, ¾" insulation board sheathing, 2 x 4" nominal studs 16" o.c., fiberglass building insulation, ½" gypsum board attached directly to studs	56
Wall 24	1" stucco, 8" thick hollow concrete block, ½" gypsum attached to furring strips	49
Wall 25	Exterior siding, 7/16" solid sheathing, 2 x 4" nominal stud 16" o.c., batt insulation, resilient channels, ½" gypsum board	43
Wall 26	Exterior siding, 7/16" solid sheathing, 2 x 6" nominal stud 16" o.c., batt insulation, resilient channels, ½" gypsum board	47
Wall 27	Exterior siding, 7/16" solid sheathing, 2 x 4" staggered studs 16" o.c. on 2 x 6" base plate, batt insulation, ½" gypsum attached directly to studs	50

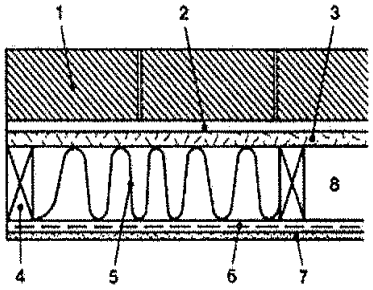
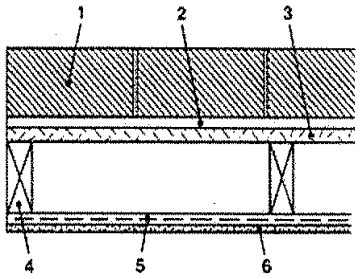
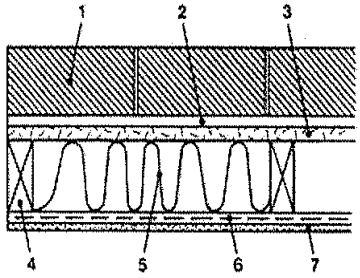
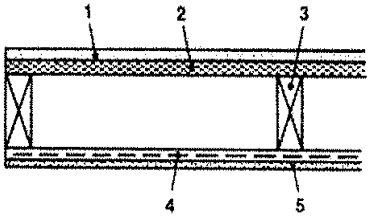
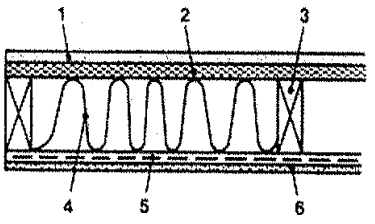
Table B2
Windows

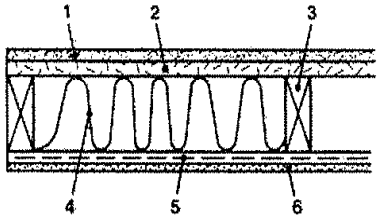
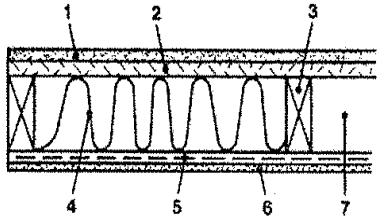
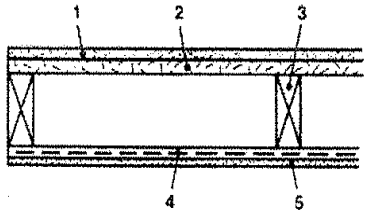
Option	Windows	STC
Win 21	Wood double hung, closed but unlocked, single glazing	23
Win 22	Aluminum sliding, latched, single glazing	24
Win 23	Wood double hung, closed but unlocked, glazed with 7/16" insulating glass	22
Win 24	1/8" double glazed window with ¼" air space	26
Win 25	¼" single glazed window	30
Win 26	¼" laminated glass single glazed window	34
Win 27	¼" + 1/8" double glazed window with 2" airspace	39
Win 28	¼" + 1/8" double glazed window with 4 ¾" airspace	43

Table B3
Doors

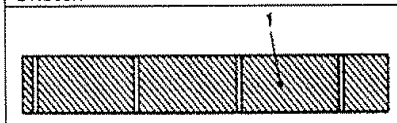
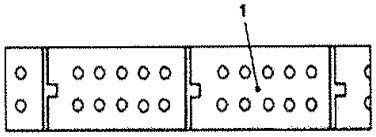
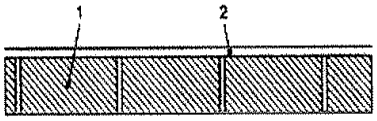
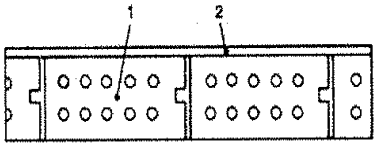
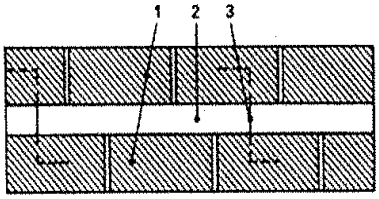
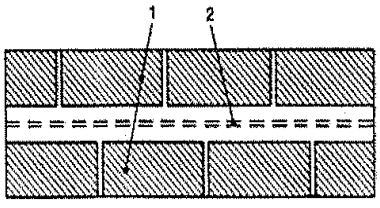
Option	Doors	STC
Door 21	Wood, flush solid core, with brass weather stripping	27
Door 22	Wood, flush solid core, plastic weather stripping, aluminum storm door	34
Door 23	Wood, French door, brass weather stripping	26
Door 24	Steel, flush, with urethane foam core, with magnetic weather stripping	28
Door 25	Wood, solid core	26
Door 26	Steel or fiberglass	25
Door 27	Sliding glass	27

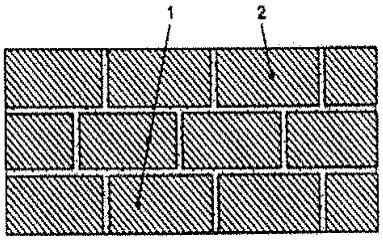
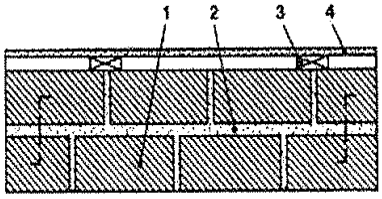
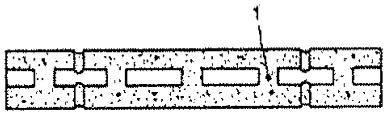
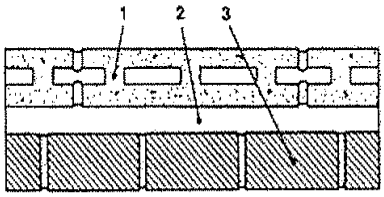
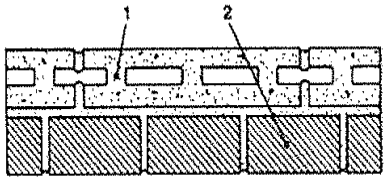
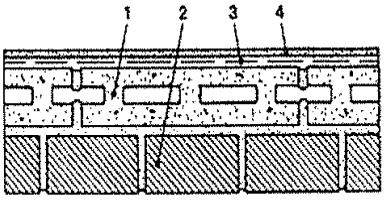
Table C1
Exterior Walls

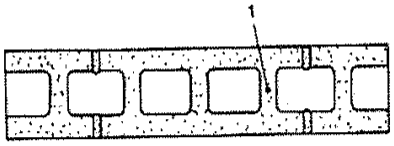
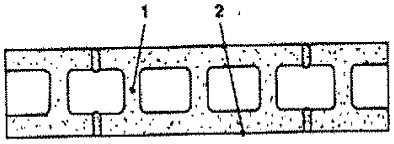
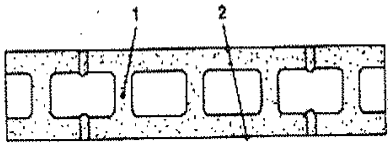
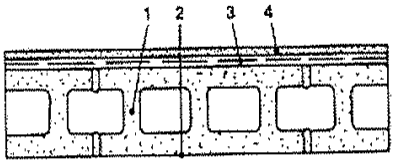
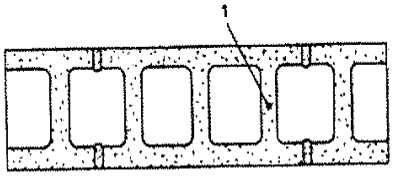
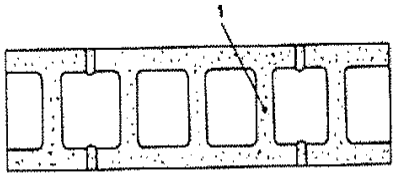
	Sketch	Brief Description	STC
Wall 41		1. Face brick (9x14′ wall). 2. ½″ air space, with metal ties. 3. ¾″ insulation board sheathing. 4. 2x4″ studs 16″o.c. 5. Fiberglas building insulation (3 ½″). 6. Resilient channel. 7. ½″ gypsum board. 8. Wall penetrated by 6x5' picture window 1″ glazed insulating glass.	39
Wall 42		1. Face brick. 2. ½″ air space, with metal ties. 3. ¾″ insulation board sheathing. 4. 2x4″ studs 16″o.c. 5. Resilient channel. 6. ½″ gypsum board.	54
Wall 43		1. Face brick. 2. ½″ air space, with metal ties. 3. ¾″ insulation board sheathing. 4. 2x4″ studs 16″o.c. 5. Fiberglas building insulation (3 ½″). 6. Resilient channel. 7. ½″ gypsum board.	56
Wall 44		1. 7/8″ stucco. 2. No.15 felt building paper and 1″ wire mesh. 3. 2x4″ studs 16″o.c. 4. Resilient channel. 5. ½″ gypsum board screwed to channel.	49
Wall 45		1. 7/8″ stucco. 2. No.15 felt building paper and 1″ wire mesh. 3. 2x4″ studs 16″o.c. 4. Fiberglas building insulation (3 ½″). 5. Resilient channel. 6. ½″ gypsum board screwed to channel.	57

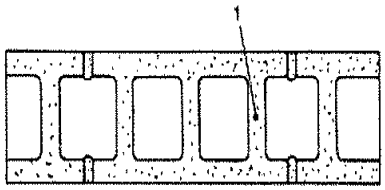
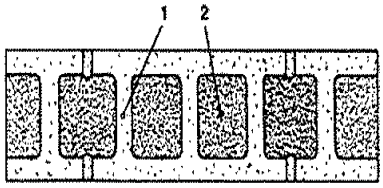
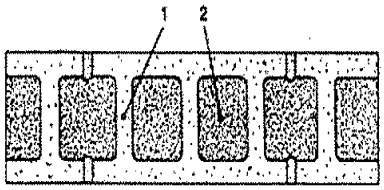
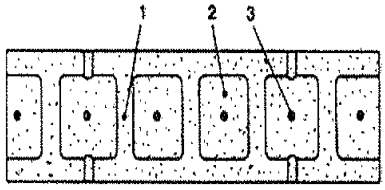
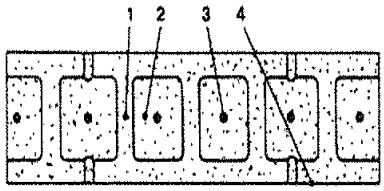
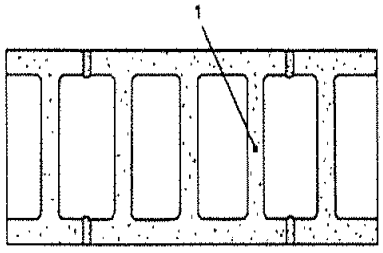
	Sketch	Brief Description	STC
Wall 46		1. 5/8x10" redwood siding. 2. ½" insulation board sheathing. 3. 2x4" wood studs 16"o.c. 4. Fiberglas building insulation (3 ½"). 5. Resilient channel. 6. ½" gypsum board screwed to channel.	47
Wall 47		1. 5/8x10" redwood siding (9x14' wall). 2. ½" insulation board sheathing. 3. 2x4" wood studs 16.o.c. 4. Fiberglas building insulation (3 ½"). 5. Resilient channel. 6. ½" gypsum board screwed to channel. 7. a. Wall penetrated by a 6x5' picture window, 1" glazed insulating glass. b. Wall penetrated by a 6x5' 16 panel window, glazed single strength.	(a.38) (b.35)
Wall 48		1. 5/8 x 10" redwood siding. 2. ½" insulation board sheathing. 3. 2x4" wood studs 16"o.c. 4. Resilient channel. 5. ½" gypsum board screwed to channel.	43

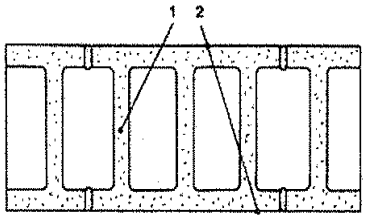
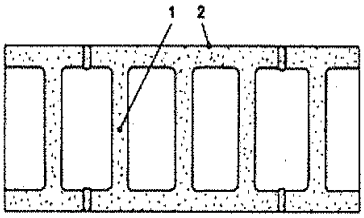
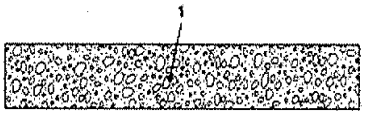
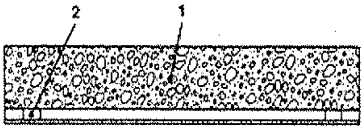
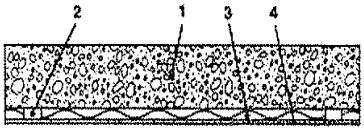
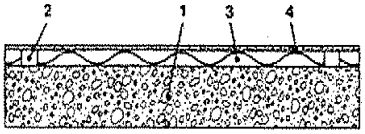
Exterior Masonry Walls

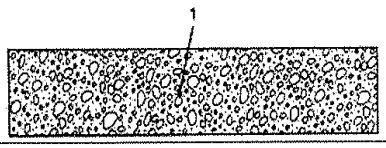
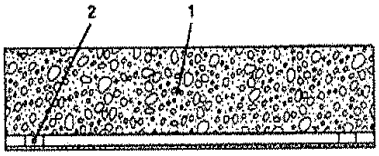
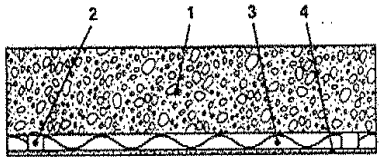
	Sketch	Brief Description	STC
Wall 51		1. 4" face brick, mortared together.	45
Wall 52		1. Hollow core brick, mortared together.	51
Wall 53		1. Common brick, mortared together. 2. ½" gypsum/sand plaster.	50
Wall 54		1. Hollow core brick, mortared together. 2. ½" gypsum/sand plaster.	53
Wall 55		1. Face brick, mortared together. 2. 2" air space. 3. Metal ties.	50
Wall 56		1. Brick, mortared together. 2. 2 ¼" cavity filled with concrete grout and #6 bars vertically 48"o.c. and #5 bars horizontally 30"o.c.	59

	Sketch	Brief Description	STC
Wall 57		1. Common brick, mortared together. 2. Face brick, mortared together.	59
Wall 58		1. Common brick, mortared together. 2. ¾" mortar-filled cavity with metal Z ties 24"o.c. in both directions. 3. 1x3" furring strips 16"o.c. and nailed vertically into mortar joints 12"o.c. 4. ½" gypsum board nailed 8"o.c. along edges and 12"o.c. in field.	53
Wall 59		1. 4x8x16" 3-cell lightweight concrete masonry units (17 lbs./block).	40
Wall 60		1. 4x8x18" 3-cell lightweight concrete masonry units (19 lbs./block). 2. 2" air cavity. 3. Common brick, mortared together.	54
Wall 61		1. 4x8x18" 3-cell lightweight concrete masonry units (19 lbs./block). 2. Common brick, mortared together. (brick headers after every second course of block to tie the withes together).	51
Wall 62		1. 4x8x18" 3-cell lightweight concrete masonry units (19 lbs./block). 2. Common brick, mortared together. 3. Resilient channels. 4. ½" gypsum board screwed to channels.	56

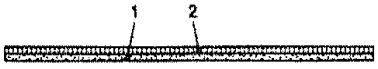
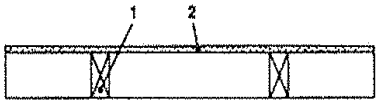
	Sketch	Brief Description	STC
Wall 63		1. 6x8x16″ 3-cell lightweight concrete masonry units (21 lbs./block).	44
Wall 64		1. 6x8x16″ 3-cell lightweight concrete masonry units (21 lbs./block). 2. Paint both sides with primer-sealer coat and finish coat of latex.	46
Wall 65		1. 6x8x18″ 3-cell dense concrete masonry units (36 lbs./block). 2. Paint both sides with primer-sealer coat and finish coat of latex.	48
Wall 66		1. 6x8x16″ 3-cell lightweight concrete masonry units (21 lbs./block). 2. Paint, primer-sealer coat and finish coat of latex. 3. Resilient channels, 24″o.c. 4. ½″ gypsum board screwed to channels.	53
Wall 67		1. 8x8x16″ 3-cell lightweight concrete masonry units (28 lbs./block).	45
Wall 68		1. 8x8x18″ 3-cell lightweight concrete masonry units (34 lbs./block).	49

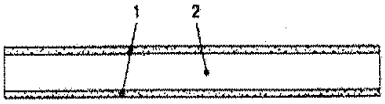
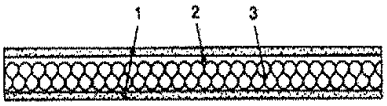
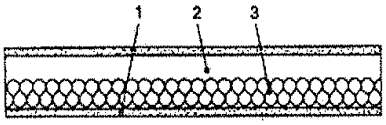
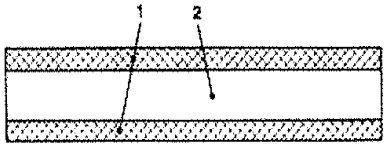
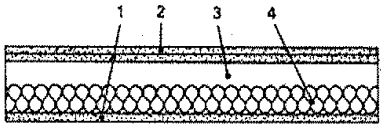
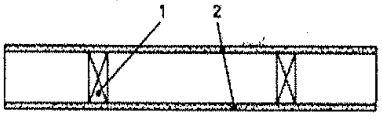
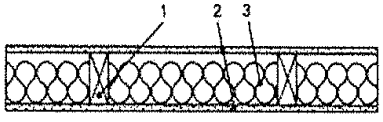
	Sketch	Brief Description	STC
Wall 69		1. 8x8x18″ 3-cell lightweight concrete masonry units (38 lbs./block).	49
Wall 70		1. 8x8x18″ 3-cell lightweight concrete masonry units (34 lbs./block). 2. Expanded mineral loose-fill insulation.	51
Wall 71		1. 8x8x18″ 3-cell lightweight concrete masonry units (38 lbs./block). 2. Expanded mineral loose-fill insulation.	51
Wall 72		1. 8x8x18″ 3-cell lightweight concrete masonry units (33 lbs./block). 2. Grout in cells. 3. #5 bar in each cell.	48
Wall 73		1. 8x8x18″ 3-cell lightweight concrete masonry units (33 lbs./block). 2. Grout in cells. 3. #5 bar each cell. 4. Paint two coats flat latex each side.	55
Wall 74		1. 12x8x16″ 3-cell lightweight concrete masonry units (43 lbs./block).	39

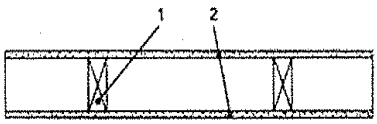
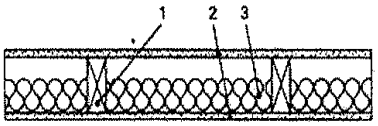
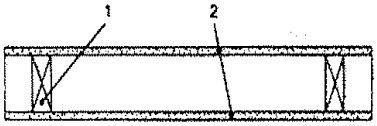
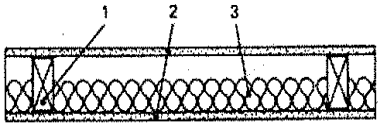
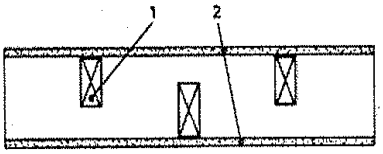
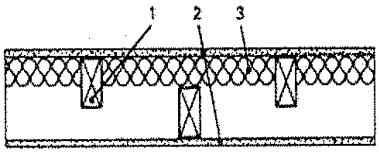
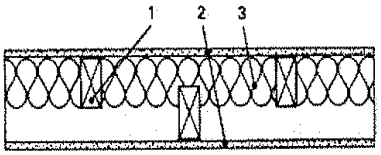
	Sketch	Brief Description	STC
Wall 75		1. 12x8x16. 3-cell lightweight concrete masonry units (43 lbs./block). 2. Paint both sides with 3 coats of latex block filler.	50
Wall 76		1. 12x8x16" 3-cell lightweight concrete masonry units (43 lbs./block). 2. Paint one side only with 3 coats latex block filler.	51
Wall 77		1. 6" cast concrete wall (71 psf).	57
Wall 78		1. 6" cast concrete wall. 2. "Z" furring channels. 3. ½" gypsum board.	59
Wall 79		1. 6" cast concrete wall. 2. "Z" furring channels. 3. 1", 8-pcf rockwool. 4. ½" gypsum board.	62
Wall 80		1. 6" cast concrete wall. 2. 2x2" wood furring. 3. 1 ½" 4-pcf rockwool. 4. ½" gypsum board.	63

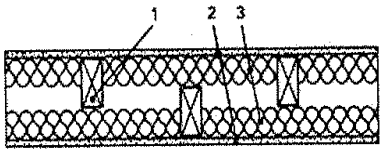
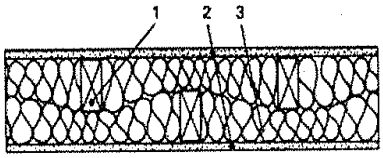
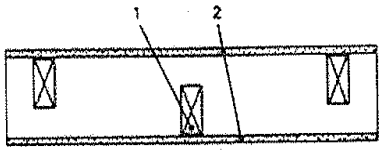
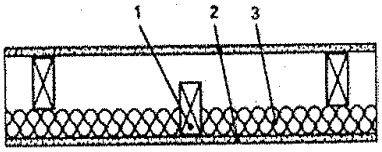
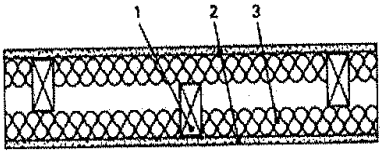
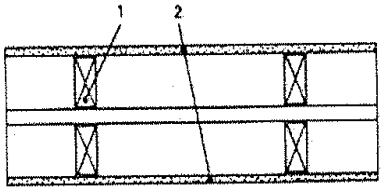
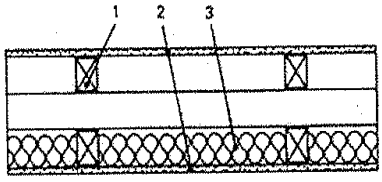
	Sketch	Brief Description	STC
Wall 81		1. 8" cast concrete wall (96.6 psf).	58
Wall 82		1. 8" cast concrete wall. 2. 2x2" wood furring. 3. ½" gypsum board.	59
Wall 83		1. 8" cast concrete wall. 2. 2x2" wood furring. 3. 1 ½", 4 psf rockwall. 4. ½" gypsum board.	63

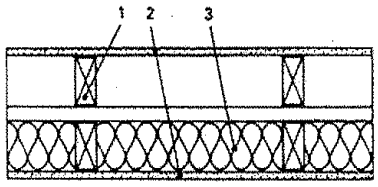
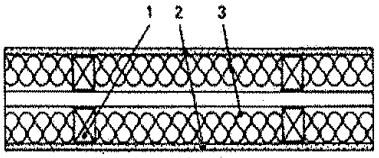
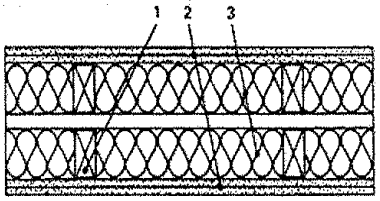
WALLS: Interior: Wooden Studs

	Sketch	Brief Description	STC
Wall 91		1. ½" gypsum board. 2. 3/16" plywood laminated with contact cement.	28
Wall 92		1. ½" gypsum board. 2. ½" wood-fiber board laminated with gypsum joint compound.	30
Wall 93		1. 2x4" studs, 16"o.c. 2. 5/8" gypsum board screwed to studs.	28

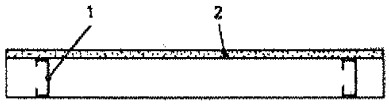
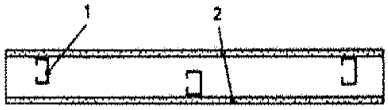
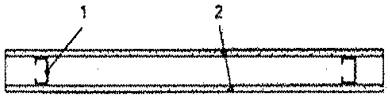
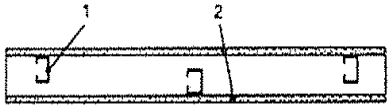
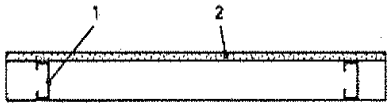
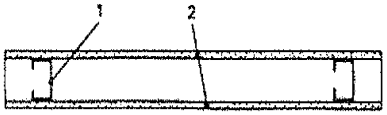
Wall 94		1. ½" gypsum board, no studs. 2. 2 ½" air space.	30
Wall 95		1. ½" gypsum board, no studs. 2. 2 ½" air space. 3. 2" thick sound attenuation blanket.	44
Wall 96		1. ½" gypsum board, no studs. 2. 3 5/8" air space. 3. 2" thick sound attenuation blanket.	45
Wall 97		1. 1 3/8" thick wood-fiber board nailed to 2x4" plates top and bottom and painted both sides. 2. 3 ½" air cavity.	44
Wall 98		1. ½" gypsum board, no studs. 2. ½" gypsum board laminated to base layer with gypsum joint compound. 3. 3 5/8" air cavity. 4. 2" thick sound attenuation blanket.	48
Wall 99		1. 2x4" studs, 16"o.c. 2. 3/8" gypsum board nailed to studs.	35
Wall 100		1. 2x4" studs, 16"o.c. 2. 3/8" gypsum board nailed to studs. 3. 3" thick sound attenuation blanket.	41

Wall 101		1. 2x4″ studs, 16″o.c. 2. ½″ gypsum board screwed to studs.	34
Wall 102		1. 2x4″ studs, 16″o.c. 2. ½″ gypsum board screwed to studs. 3. 2″ thick sound attenuation blanket.	37
Wall 103		1. 2x4″ studs, 24″o.c. 2. ½″ gypsum board screwed to studs.	36
Wall 104		1. 2x4″studs, 24″o.c. 2. ½″ gypsum board screwed to studs. 3. 2″ thick sound attenuation blanket.	40
Wall 105		1. 2x4″ studs spaced 16″o.c. and staggered 8″o.c. on 2x6″ plates. 2. ½″ gypsum board screwed 12″o.c.	39
Wall 106		1. 2x4″ studs spaced 16″o.c. and staggered 8″o.c. on 2x6″ plates. 2. ½″ gypsum board screwed 12″o.c. 3. 2 ¼″ thick sound attenuation blanket.	48
Wall 107		1. 2x4″ studs spaced 16″o.c. and staggered 8″o.c. on 2x6″ plates. 2. ½″ gypsum board screwed 12″o.c. 3. 3 ½″ thick sound attenuation blanket.	49

Wall 108		1. 2x4" studs spaced 16"o.c. and staggered 8"o.c. on 2x6" plates. 2. ½" gypsum board screwed 12"o.c. 3. 2 ¼" thick sound attenuation blankets in both stud cavities.	49
Wall 109		1. 2x4" studs spaced 16"o.c. and staggered 8"o.c. on 2x6" plates. 2. ½" gypsum board screwed 12"o.c. 3. 3 ½" thick sound attenuation blankets in both stud cavities.	51
Wall 110		1. 2x4" studs spaced 24"o.c. and staggered 12"o.c. on 2x6" plates. 2. ½" type X gypsum board screwed 12"o.c.	42
Wall 111		1. 2x4" studs spaced 24"o.c. and staggered 12"o.c. on 2x6" plates. 2. ½" gypsum board screwed to studs. 3. 2" thick sound attenuation blanket.	46
Wall 112		1. 2x4" studs spaced 24"o.c. and staggered 12"o.c. on 2x6" plates. 2. ½" type X gypsum board screwed 12"o.c. 3. 2" thick sound attenuation blankets in both stud cavities.	48
Wall 113		1. Double row of 2x4" studs 16"o.c. on separate plates spaced 1" apart. 2. ½" type X gypsum board screwed 12"o.c.	47
Wall 114		1. Double row of 2x3" studs 16"o.c. on 2x3" plates spaced 2 ½" apart. 2. ½" gypsum board screwed 16"o.c. 3. 2 ¼" thick sound attenuation blanket.	55

Wall 115		1. Double row of 2x4" studs 16"o.c. on separate plates spaced 1" apart. 2. ½" type X gypsum board screwed 12"o.c. 3. 3 ½" thick sound attenuation blanket.	56
Wall 116		1. Double row of 2x4" studs 16"o.c. on separate plates spaced 1" apart. 2. ½" gypsum board screwed 12"o.c. 3. 2 ¼" thick sound attenuation blankets in both stud cavities.	56
Wall 117		1. Double row of 2x4" studs 16.o.c. on separate plates spaced 1" apart. 2. Double row of 5/8" type X gypsum board screwed 16.o.c. 3. 3 ½" thick sound attenuation blankets in both stud cavities.	63

WALLS: Interior: Metal Studs

	Sketch	Brief Description	STC
Wall 121		1. 1 5/8" metal studs, 24"o.c. 2. 1/2. vinyl-faced gypsum board screwed to studs.	27
Wall 122		1. 1 5/8" metal studs spaced 24"o.c. and staggered 12"o.c. on 2 ½" metal tracks. 2. 1/2" gypsum board screwed to studs.	34
Wall 123		1. 1 5/8" metal studs, 24"o.c. 2. 5/8" gypsum board screwed 12"o.c. at edges and 24"o.c. in field.	37
Wall 124		1. 1 5/8" metal studs spaced 24"o.c. and staggered 12"o.c. on 21/2" metal channels. 2. 5/8" gypsum board screwed to studs.	38
Wall 125		1. 2 ½" metal studs, 24"o.c. 2. 1/2" vinyl-faced gypsum board screwed to studs.	27
Wall 126		1. 2 1/2" metal studs, 24"o.c. 2. 5/8" gypsum board screwed to studs.	37

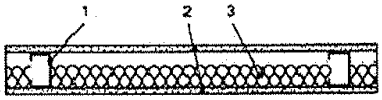
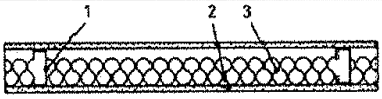
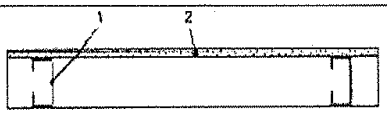
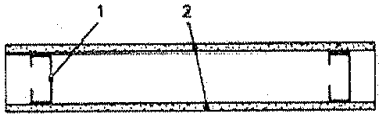
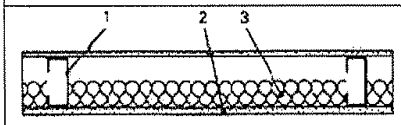
	Sketch	Brief Description	STC
Wall 127		1. 2 ½" metal studs, 24"o.c. 2. 5/8" gypsum board screwed 12"o.c. at edges and 24"o.c. in field. 3. 1 ½" thick sound attenuation blanket.	42
Wall 128		1. 2 ½" metal studs, 24"o.c. 2. ½" gypsum board screwed to studs. 3. 2" thick sound attenuation blanket.	44
Wall 129		1. 3 5/8" metal studs, 24"o.c. 2. 1/2. gypsum board screwed to studs.	27
Wall 130		1. 3 5/8" metal studs, 24"o.c. 2. ½" gypsum board screwed to studs.	36
Wall 131		1. 3 5/8" metal studs, 24"o.c. 2. ½" gypsum board screwed to studs. 3. 2" thick sound attenuation blanket.	44

Table C2
Exterior Windows

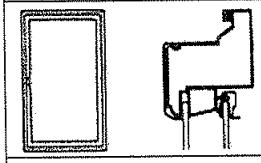
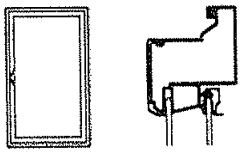
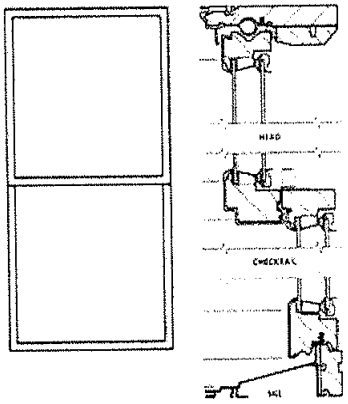
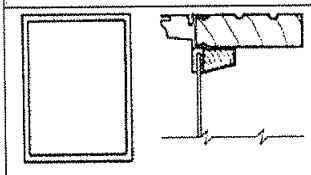
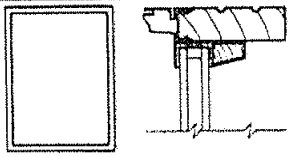
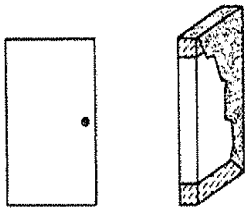
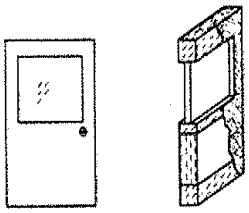
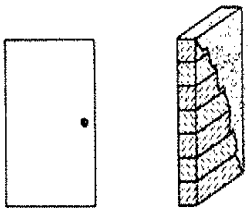
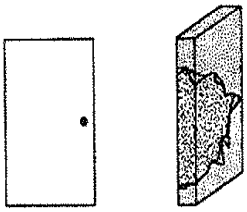
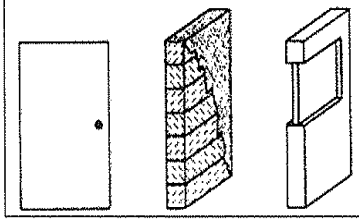
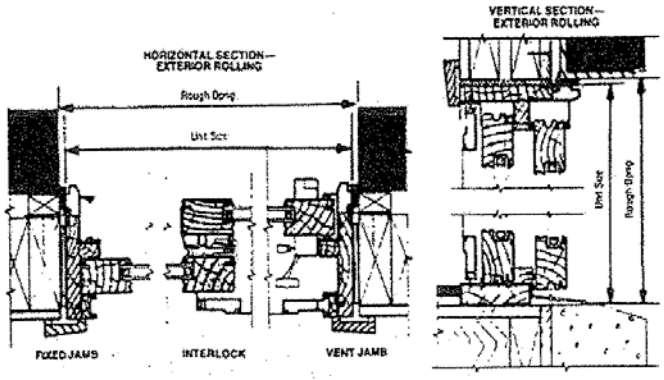
	Sketch Front / Cross Section	Brief Description	STC
Win 11		30x48″ aluminum clad casement, two 1/8″ panels of glass, 13/16″ apart in a wood frame.	29
Win 12		30x48″ aluminum clad casement, one 3/32″ panel and one 1/8″ panel, 13/16″ apart in a wood frame.	31
Win 13		32x24x24″ aluminum double-hung windows (32″ wide with 24″ high upper sash and a 24″ high lower sash), each sash has one 3/32″ panel and one 1/8″ panel, 13/16″ apart in a wood frame.	29
Win 14		6x5' picture window glazed double strength, single panel.	29
Win 15		6x5' picture window plus storm sash, glazed double strength single panel, 3 ¾″ separation between panels.	38

Table C3
Exterior Doors

	Sketch Front / Cross Section	Brief Description	STC
Door 11		3x7' hollow-core wood door, 1 ¾" thick.	20
Door 12		3x7' hollow-core door, 1 3/4" thick, 30% of area glazed with 1/8" glass.	19
Door 13		3x7' solid-core wood door, 1 ¾" thick.	27
Door 14		3x7' steel-faced door, 1 ¾" thick, rigid polyurethane core.	26
Door 15		3x7' solid-core wood door, 1 ¾" thick plus an aluminum storm door, glazed single strength.	34



*All exterior doors are sealed with a weathering strip around the frame. Interior doors do not have a weather strip and are not flush to the floor to permit the installation of a carpet.

DOORS: Interior

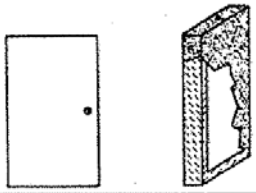
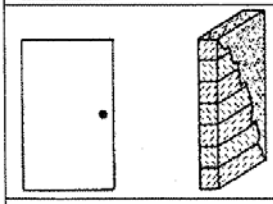
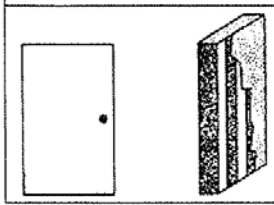
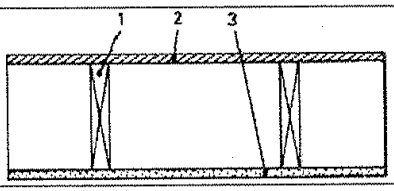
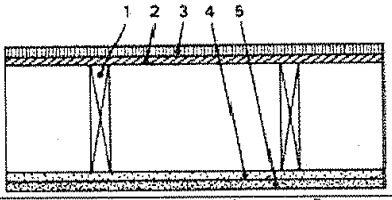
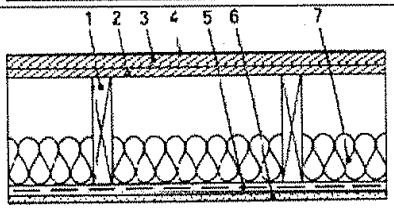
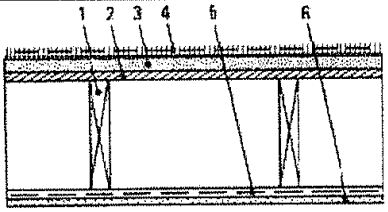
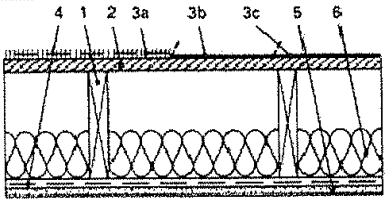
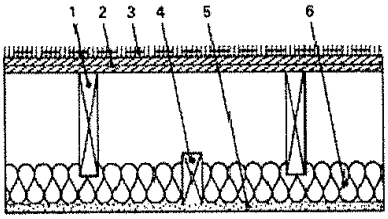
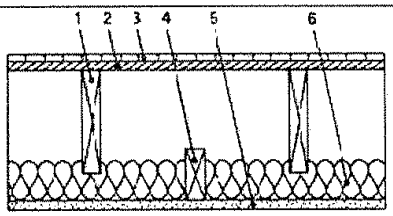
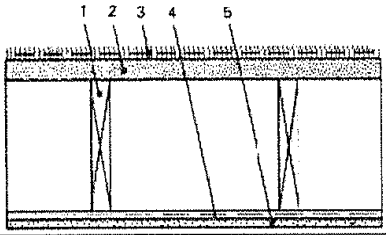
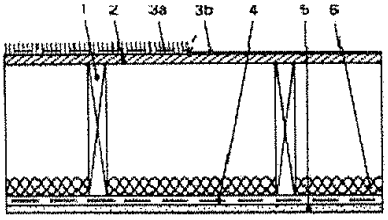
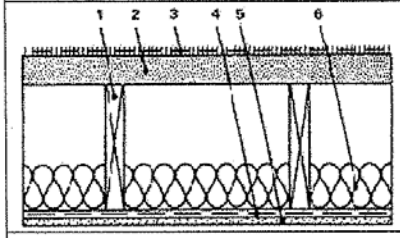
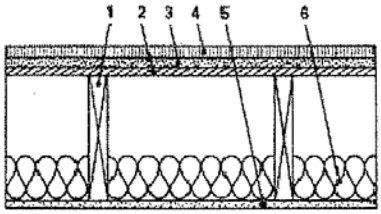
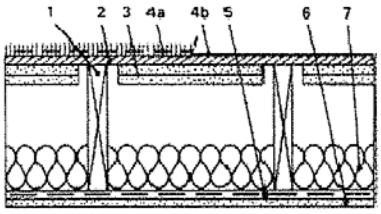
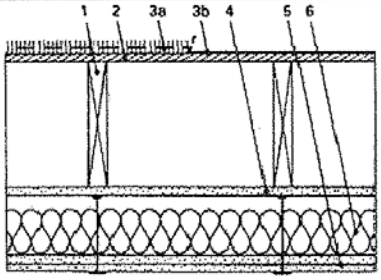
	Sketch Front / Cross Section	Brief Description	STC
Door 21		3x7' solid-core wood door, 1 ¾" thick, weight 1.5 lb/ft².	17
Door 22		3x7' solid-core wood door, 1 ¾" thick, weight 4.0 lb/ft².	20
Door 23		3x7' hollow-core steel door, 1 ¾" thick, weight 5.0 lb/ft².	17

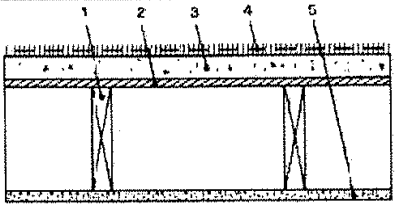
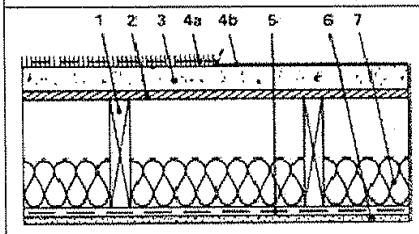
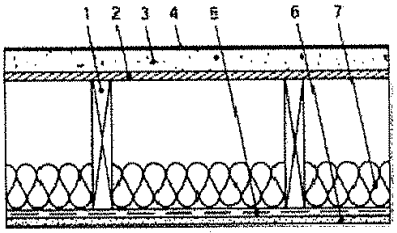
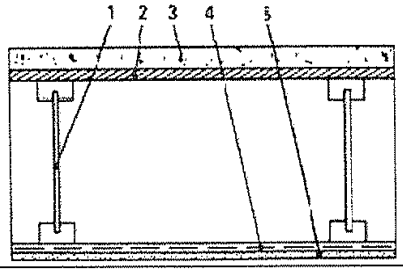
Table C5
Floors

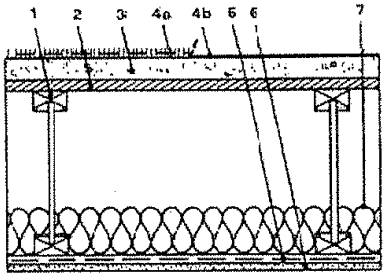
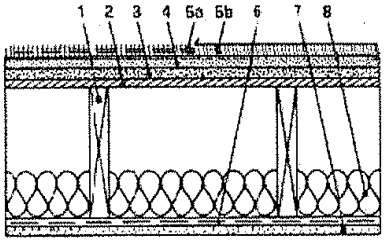
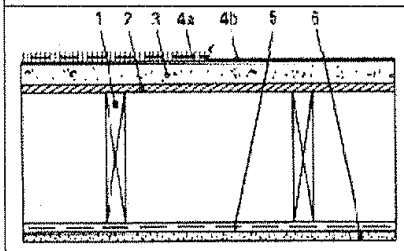
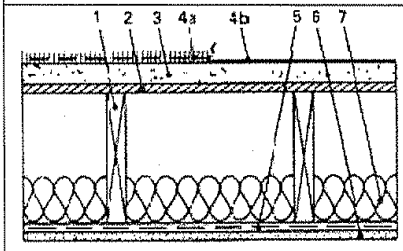
Floors: Wood

	Sketch	Brief Description	STC (IIC)
FL 11		1. 2x8″ wooden joists, 16″o.c. 2. 7/8″ tongue and groove nailed to joints. 3. 3/8″ gypsum nailed to joints.	NA (32)
FL 12		1. 2x8″ wooden joists, 16″o.c. 2. ½″ plywood nailed. 3. 25/32″ hardwood flooring. 4. 1/2″ gypsum nailed to joists. 5. Ceiling tire.	NA (37)
FL 13		1. 2x8″ wooden joists, 16″o.c. 2. 5/8″ tongue and groove plywood nailed with 8d nails 6″o.c. 3. 3/8″ plywood stapled 3″o.c. at edges and 6″o.c. in field. 4. .075″ sheet vinyl. 5. Resilient channels, 24″o.c. 6. 5/8″ gypsum board screwed 12″o.c. 7. 3″ thick sound attenuation blanket.	46 (44)
FL 14		1. 2x8″ wooden joists, 16″o.c. 2. 5/8″ plywood nailed with 8d nails. 3. ½″ nominal wood-fiber board glued to plywood. 4. 44 oz. carpet on 50 oz. pad. 5. Resilient channels, 24″o.c. 6. 5/8″ gypsum board screwed 12″o.c.	48 (65)
FL 15		1. 2x8″ wooden joists, 16″o.c. 2. 19/32″ tongue and groove plywood nailed with 8d nails 6″o.c. at edges and 10″o.c. in field. 3. a. 44 oz. carpet on 40 oz. hair pad. b. .075″ sheet vinyl. c. 1/16″ sheet vinyl. 4. Resilient channels, 24″o.c. 5. 5/8″ gypsum board screwed 12″o.c. 6. 3″ thick sound attenuation blanket.	48 (a. 69) (b. 45) (c.43)

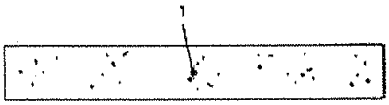
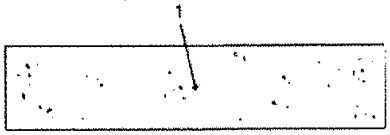
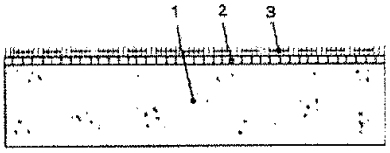
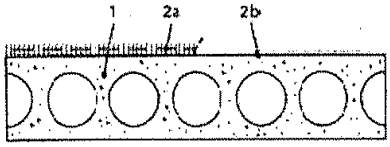
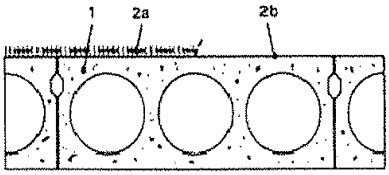
	Sketch	Brief Description	STC (IIC)
FL 16		1. 2x8" wooden joists, 16"o.c. 2. 1 1/8" tongue and groove plywood nailed 6"o.c. at edges and 16"o.c. in field. 3. 44 oz. wool carpet on 40 oz. hair pad. 4. 2x4" ceiling joists, 16"o.c. and staggered between floor joists. 5. 5/8" gypsum board nailed to 2x4" joists. 6. 3" thick sound attenuation blanket.	53 (80)
FL 17		1. 2x8" wooden joists, 16"o.c. 2. 1/2" plywood nailed with 8d nails 6"o.c. at edges and 16"o.c. in field. 3. 25/32" wood strip flooring nailed to sub floor. 4. 2x4" wooden ceiling joists, 16"o.c. and staggered between floor joists. 5. 5/8" gypsum board nailed to 2x4" joists. 6. 3" thick sound attenuation blanket.	54 (45)
FL 18		1. 2x10" wooden joists, 16"o.c. 2. 1 11/32" tongue and groove wood-fiber board. 3. 44 oz. wool carpet on 40 oz. hair pad. 4. Resilient channels, 24"o.c. 5. 5/8" gypsum screwed 12"o.c.	49 (68)
FL 19		1. 2x10" wooden joists, 16"o.c. 2. 19/32" tongue and groove plywood. 3. a. Carpet and pad. b. Vinyl tile. 4. Resilient channels, 24"o.c. 5. 5/8" gypsum screwed 12"o.c. 6. 1" thick sound attenuation blanket.	51 (a. 74) (b.51)

	Sketch	Brief Description	STC (IIC)
FL 20		1. 2x10″ wooden joists, 16″o.c. 2. 1 11/32″ tongue and groove wood-fiber board. 3. 40 oz. wool carpet on 80 oz. sponge rubber pad. 4. Resilient channels, 24″o.c. 5. 1/2″ gypsum board screwed 12″o.c. 6. 3″ thick sound attenuation blanket.	50 (72)
FL 21		1. 2x10″ wooden joists, 16″o.c. 2. 5/8″ plywood sub floor glued to joists, nailed with 8d nails 12″o.c. 3. ¼″ particleboard glued to plywood. 4. ½″ parquet wood flooring glued to particleboard. 5. ½″ type-X gypsum board screwed 12″o.c. 6. 3″ thick sound attenuation blanket.	43 (NA)
FL 22		1. 2x10″ wooden joists, 16″o.c. 2. 5/8″ tongue and groove plywood nailed with 8d nails 6″o.c. along edges and 10″o.c. in field. 3. Two layers of 5/8″ gypsum board attached with screws 12″o.c. to underside of sub floor. 4. a. 44 oz. carpet on 40 oz. hair pad. b. 1/16″ vinyl asbestos tile. 5. Resilient channels, 24″o.c. 6. 5/8″ gypsum board screwed 12″o.c. 7. 3 ½″ thick sound attenuation blanket.	56 (a. 74) (b.50)
FL 23		1. 2x10″ wooden joists, 16″o.c. 2. 5/8″ tongue and groove plywood nailed with 8d nails 6″o.c. along edges and 10″o.c. in field. 3. a. 44 oz. carpet on 40 oz. hair pad. b. 1/16″ vinyl asbestos tile. 4. 5/8″ gypsum board nailed 7″o.c. 5. Two layers of 5/8″ gypsum board suspended by wire hangers 5″ long in a 2x4' heavy-duty T grid ceiling system. 6. 3 ½″ thick sound attenuation blanket.	49 (a. 68) (b.47)

	Sketch	Brief Description	STC (IIC)
FL 24		1. 2x8" wooden joists, 16"o.c. 2. 5/8" tongue and groove plywood nailed to joists with 8d nails 6"o.c. at edges and 10"o.c. in field. 3. 1 5/8" lightweight concrete over 4 mil. polyethylene film. 4. 44 oz. carpet on 40 oz. hair pad. 5. 5/8" gypsum board nailed to joists.	47 (66)
FL 25		1. 2x8" wooden joists, 16"o.c. 2. 5/8" tongue and groove plywood nailed to joists with 8d nails 6"o.c. at edges and 10"o.c. in field. 3. 1 5/8" thick lightweight concrete over 4 mil. polyethylene film. 4. a. 44 oz. carpet on 40 oz. hair pad. b. .075" sheet vinyl. 5. Resilient channels, 24"o.c. 6. 5/8" gypsum board screwed 12"o.c. 7. 3" thick sound attenuation blanket.	53 (a. 74) (b. 47)
FL 26		1. 2x10" wooden joists. 16"o.c. 2. 5/8" plywood nailed to joists. 3. 3. 1 ½" thick lightweight concrete, 13 psf. 4. Cushioned vinyl. 5. Resilient channels, 24"o.c. 6. 5/8" gypsum board screwed to channels. 7. 3 ½" thick sound attenuation blanket.	NA (51)
FL 27		1. Plywood web I-beams 12" deep and 24"o.c. 2. 3/4" plywood sub floor nailed with 6d nails 6"o.c. at edges and 10"o.c. in field. 3. 1 ½" thick lightweight concrete, 15 psf. 4. Resilient channels, 24"o.c. 5. 5/8" gypsum board screwed 12"o.c.	57 (NA)

	Sketch	Brief Description	STC (IIC)
FL 28		1. Plywood web I-beams 12″ deep and 24″o.c. 2. 3/4″ plywood sub floor nailed with 6d nails 6″o.c. at edges and 10″o.c. in field. 3. 1 1/2″ thick lightweight concrete, 15 psf. 4. a. 44 oz. carpet on 40 oz. hair pad. b. .07″ vinyl tile. 5. Resilient channels, 24.o.c. 6. 5/8″ gypsum board screwed 12″o.c. 7. 3″ thick sound attenuation blanket.	58 (a. 77) (b. 50)
FL 29		1. 2x10″ wooden joists, 16″o.c. 2. 5/8″ plywood glued to joists, nailed with 8d nails 12″o.c. 3. ¼″ particleboard glued to plywood. 4. ½″ fiberboard glued to particleboard. 5. a. 76 oz. carpet on 50 oz. hair pad. b. 1/2″ parquet wood flooring. 6. Resilient channels, 24″o.c. 7. ½″ type-X gypsum board screwed 12″o.c. 8. 3″ thick sound attenuation blanket.	51 (NA)
FL 30		1. 2x10″ wooden joists, 16″o.c. 2. 5/8″ plywood sub floor nailed with 8d nails 6″o.c. along edges, 10″o.c. in field. 3. 1 1/2″ thick lightweight concrete over 15 lb. asphalt felt. 4. a. 20 oz. carpet on 40 oz. hair pad. b. 1/16″ thick vinyl-asbestos tile. 5. Resilient channels, 24″o.c. 6. ½″ type-X gypsum board screwed 12″o.c.	56 (NA)
FL 31		1. 2x10″ wooden joists, 16″o.c. 2. 5/8″ plywood sub floor nailed with 8d nails 6″o.c. along edges, 10″o.c. in field. 3. 1 ½″ thick lightweight concrete over 15 lb. asphalt felt. 4. a. 20 oz. carpet on 40 oz. hair pad. b. 1/16″ thick vinyl-asbestos tile. 5. Resilient channels, 24″o.c. 6. 5/8″ type-X gypsum board screwed 12″o.c. 7. 3 ½″ thick sound attenuation blanket.	61 (NA)

FLOORS: Concrete

	Sketch	Brief Description	STC (IIC)
FL 41		1. 4″ thick concrete slab, 54 psf.	44 (25)
FL 42		1. 6″ thick concrete slab, 75 psf.	55 (34)
FL 43		1. 6″ thick concrete slab. 2. ½″ wood-fiber board glued to concrete. 3. 44 oz. carpet on 40 oz. hair pad.	NA (81)
FL 44		1. 6″ thick hollow-core concrete panel, 45 psf. 2. a. Carpet and pad. b. No floor covering.	48 (a. 69) (b. 23)
FL 45		1. 8″ thick hollow-core concrete panel, 57 psf. 2. a. 66 oz. carpet on 50 oz. hair pad. b. No floor covering.	50 (a. 74) (b. 28)