Ordinance 2008- Exhibit A

Amendments to the:
2006 International Building Code
Appendix F

NOISE LEVEL REDUCTION DESIGN AND CONSTRUCTION STANDARDS

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NOISE LEVEL REDUCTION DESIGN AND CONSTRUCTION STANDARDS
PIMA COUNTY, ARIZONA

SECTION 1: PURPOSE/SCOPE

Exterior noise may be isolated and reduced through construction techniques that selectively increase the sound insulating quality of the exterior of occupied structures. The following standards provide design and construction requirements for reduction of interior noise/sound levels from exterior sources for select new construction or use changes within Compatible Use Zones (CUZ) 3 and 4 pertaining to the Tucson International Airport (TIA) Airport Environs Zone and Noise Control Zones (NCZ) "A" and "B" pertaining to the Davis-Monthan Air Force Base (DMAFB) Airport Environs as identified in the Pima County Zoning Code, Chapter 18.57 Airport Environs and Facilities.

These standards apply to noise-sensitive land uses as defined in Chapter 18.57 and application includes all residential uses, all indoor areas where the public is received, all office areas, and all noise sensitive indoor areas or indoor areas where normal noise level is low, including libraries, schools, and religious facilities, in order to achieve a maximum interior noise level of 45 Ldn (day-night average sound level in decibels). A maximum interior noise level that is less than 45 Ldn is not required.

CUZ-3 contains the area within the 70 Ldn noise contour of TIA.
CUZ-4 contains the area between the 65 and the 70 Ldn noise contours of TIA.
NCZ-A contains the area between the 65 and 70 Ldn noise contours of DMAFB.
NCZ-B contains the areas between the 70 and 75 Ldn noise contours and the 75 and 80 Ldn noise contours and within the 80 Ldn noise contour of DMAFB.

For a change of use of an existing structure located within NCZ "A" or "B" of the DMAFB airport environs on (EFFECTIVE DATE OF ORDINANCE), the standards apply to the portions of the existing structure up to and including the entire structure if the use of the existing structure is changed to one or more allowed uses which require noise level reduction.

Residential uses existing within NCZ "A" or "B" of the DMAFB airport environs on (EFFECTIVE DATE OF ORDINANCE) may expand or reconstruct provided that the new construction conforms to requirements for noise level reduction.

If the gross-floor area of a non-residential structure or use existing within NCZ "A" or "B" of the DMAFB airport environs on (EFFECTIVE DATE OF ORDINANCE) is expanded by less than fifty percent, the requirements for noise level reduction, if applicable, apply only to the area of expansion. If the gross floor area the non-residential structure or use is expanded by fifty percent or more, the requirements for noise level reduction, if applicable, apply to the entire non-residential structure or use.

Reconstruction of less than fifty percent of the gross-floor area of a non-residential structure or use existing within NCZ "A" or "B" of the DMAFB airport environs on (EFFECTIVE DATE OF ORDINANCE) shall require noise level reduction, if applicable, to only to the area of

reconstruction. If reconstruction of the non-residential structure or use is fifty percent or more of the gross floor area, the requirements for noise level reduction, if applicable, apply to the entire non-residential structure or use.

SECTION 2: COMPLIANCE

The following standards, combined with other currently adopted Pima County building codes, shall be deemed to meet the noise level reduction values specified herein of 20, 25, 30, and 35 decibels (dB). Alternate construction and design standards certified by an Arizona-registered architect or engineer as achieving a maximum interior noise level of 45 Ldn at the time of final construction shall be deemed to meet the required noise level reduction. Manufactured homes that are documented as built to provide sound attenuation meeting the 45 Ldn maximum interior noise level are exempt from provisions of the Noise Level Reduction Construction and Design Standards.

SECTION 3: GENERAL REQUIREMENTS

A. The Noise Level Reduction (NLR) standards specified herein may be achieved by any suitable combination of building designs, choices of building materials, and execution of construction details in accordance with established architectural and acoustical principles.

B. Compliance with the construction standards herein is sufficient to comply with the NLR requirements specified in the various noise zones. A variety of assumptions were necessary to develop these standards. If the plans and specifications submitted do not indicate compliance with the construction standards herein, the applicant shall provide a written statement from an Arizona-registered architect or engineer certifying that the construction of the building as indicated in the plans and specifications will result in a maximum interior noise level of 45 Ldn.

C. Sound Transmission Class (STC) ratings for windows and doors are valid only if they are determined by laboratory (not field) tests performed by an independent laboratory for the product. A rating estimated for glass alone is not an acceptable substitute for STC tests of windows and doors, except for determining the rating of sidelights and transoms. Likewise, ratings estimated for door leafs alone are not an acceptable substitute for STC ratings of doors. The installed products must have the same composition and overall configuration of storm panels, glass type (laminated, tempered, or float glass), glass thickness, spacing between panes of insulated glass, door core, gaskets, weatherstripping, door bottom seals, thresholds, etc., and the same overall configuration as the tested assembly. The overall configuration includes the operational type (casement, double hung, fixed, slider, etc.) in the case of windows, and the general size of glazing (⅛-, ¼-, ½-, or full-view) in the case of doors.

D. Door sidelights and door and window transoms shall be considered “windows” and shall meet provisions for windows. For these products it is acceptable to reference the STC rating of the glass alone. However, for the adjacent windows and doors it is still necessary to reference STC tests for the entire assembly, not just the glass or door leaf.

E. In order to achieve the STC ratings specified herein, special measures are necessary to install doors and windows. These include use of non-hardening (acoustical) caulk at all hidden surfaces, flexible caulk at all exposed surfaces, and solid continuous blocking to fill all voids over ¼ inch around windows and doors.

SECTION 4: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 20 dB

A. Windows

1. Windows shall have a laboratory sound transmission class rating of at least STC 28; or

2. Glass shall be at least 3/16 inch thick and sealed per Section 3(E).

B. Floors, Foundations, and Basements

If the crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. Two-inch thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾ inch pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. In flood zones, use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

C. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.

4. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90º bends, or one 90º bend and a total length of at least 20 feet (or the maximum allowed by the dryer manufacturer).

5. Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used, provide acoustical chimney top dampers and use tight-fitting ¼ inch tempered glass fireplace doors.

6. Vented fuel-burning appliances (e.g., gas dryers, gas fire places, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g., kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

7. All ducts in attics shall be rigid metal.

8. Dryers shall be located in attics or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 5: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 25 dB

A. Exterior Walls

Where non-framed walls are used, walls shall be a minimum four inches thick normal weight earthen or cementitious material, or of materials having an overall sound transmission class rating of at least STC 47.

B. Windows

1. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area, the windows shall have a laboratory sound transmission class rating of at least STC-28.

2. If the exterior windows and doors together comprise 25-35% of the Total Exterior Wall Area, the windows shall have a laboratory sound transmission class rating of at least STC-30.

3. If the exterior windows and doors together comprise more than 35% of the Total Exterior Wall Area, the windows shall have a laboratory sound transmission class rating of at least STC-32.

C. Doors

For rooms with at least one exterior wall, if exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area, the doors shall have a laboratory sound transmission class rating of at least STC-29.

D. Roof-Ceiling Assembly

1. Roof framing members shall be at least 14 inches deep for their entire span.

2. Attic access panels shall be constructed of ¾ inch thick plywood and shall have continuous neoprene bulb seals.

3. Skylights shall not be provided.

E. Floors, Foundations, and Basements

If the crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. Two-inch thick precast concrete

panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾ inch pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. In flood zones, use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.

4. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90º bends, or one 90º bend and a total length of at least 20 feet (or the maximum allowed by the dryer manufacturer).

5. Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used, provide acoustical chimney top dampers and use tight-fitting ¼ inch tempered glass fireplace doors.

6. Vented fuel-burning appliances (e.g., gas dryers, gas fire places, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g., kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

7. All ducts in attics shall be rigid metal.

8. Dryers shall be located in attics or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 6: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 30 dB

A. Exterior Walls

1. Where framed walls are used, single-leaf resilient channels shall be used between the studs and the gypsum board.

2. Where non-framed walls are used, walls shall be a minimum four inches thick normal weight earthen or cementitious material, or of materials having an overall sound transmission class rating of at least STC 47.

B. Windows

1. If the exterior windows and doors together comprise 70% or less of the Total Exterior Wall Area, the windows shall have a laboratory sound transmission class rating of at least STC-34.

2. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area, the windows shall have a laboratory sound transmission class rating of at least STC-36.

C. Doors

1. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area, the doors shall have a laboratory sound transmission class rating of at least STC 31.

2. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area, the doors shall have a laboratory sound transmission class rating of at least STC 34.

3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 29.

D. Roof-Ceiling Assembly

1. Roof framing members shall be at least 14 inches deep for their entire span.

2. Attic access panels shall be constructed of ¾ inch thick plywood and shall have continuous neoprene bulb seals.

3. Skylights shall not be provided.

E. Floors, Foundations, and Basements

If the crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. Two-inch thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾ inch pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. Use acoustical louvers for all vents. In flood zones, use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.

4. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90º bends, or one 90º bend and a total length of at least 20 feet (or the maximum allowed by the dryer manufacturer).

5. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.

6. Vented fuel-burning appliances (e.g., gas dryers, gas fire places, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g., kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

7. All ducts in attics shall be rigid metal.

8. Dryers shall be located in attics or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 7: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 35 dB

A. Exterior Walls

1. For framed walls:

   a. If exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area, single-leaf resilient channels shall be used between the studs and gypsum board.

   b. If exterior windows and doors together comprise 15 to 30% of the Total Exterior Wall Area, the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates.)

   c. If exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area, the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates), and two layers of ½ inch gypsum board shall be provided at the interior surface of the room.

2. Where non-framed walls are used, walls shall be a minimum four inches thick normal weight earthen or cementitious material, or of materials having an overall sound transmission class rating of at least STC 47.

B. Windows

1. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area, the windows shall have a laboratory sound transmission class rating of at least STC-38.

2. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area, the windows shall have a laboratory sound transmission class rating of at least STC-42.

C. Doors

1. If the exterior windows and doors together comprise 30% or less of the Total Exterior Wall Area, the doors shall have a laboratory sound transmission class rating of at least STC 37.

2. If the exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area, the doors shall have a laboratory sound transmission class rating of at least STC 40.

3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 29.

D. Roof-Ceiling Assembly

1. Recessed lights shall not be used in top-floor ceilings.

2. Roof framing members shall be at least 14 inches deep for their entire span.

3. Attic access panels shall be constructed of ¾ inch thick plywood and shall have continuous neoprene bulb seals.

4. Skylights shall not be provided.

E. Floors, Foundations, and Basements

If the crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. Two-inch thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾ inch pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. Use acoustical louvers for all vents. In flood

zones, use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.

4. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90º bends, or one 90º bend and a total length of at least 20 feet (or the maximum allowed by the dryer manufacturer).

5. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.

6. Vented fuel-burning appliances (e.g., gas dryers, gas fire places, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g., kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

7. All ducts in attics shall be rigid metal.

8. Dryers shall be located in attics or other non-habitable spaces. Dryer ducts shall be rigid metal.