Technical Appendix

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APPENDIX 1
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TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 *(DNL or CNEL)*		Noise Zone 2 *(DNL or CNEL)*		Noise Zone 3 *(DNL or CNEL)*		
SLUCM NO	**LAND USE NAME**	**< 55**	**55- 64**	**65 - 69**	**70 -74**	**75- 79**	**80 -84**	**85+**
	Residential							
11	Household Units	Y	Y [1]	N [1]	N [1]	N	N	N
11.11	Single units: detached	Y	Y [1]	N [1]	N [1]	N	N	N
11.12	Single units: semidetached	Y	Y [1]	N [1]	N [1]	N	N	N
11.13	Single units: attached row	Y	Y [1]	N [1]	N [1]	N	N	N
11.21	Two units: side-by-side	Y	Y [1]	N [1]	N [1]	N	N	N
11.22	Two units: one above the other	Y	Y [1]	N [1]	N [1]	N	N	N
11.31	Apartments: walk-up	Y	Y [1]	N [1]	N [1]	N	N	N
11.32	Apartment: elevator	Y	Y [1]	N [1]	N [1]	N	N	N
12	Group quarters	Y	Y [1]	N [1]	N [1]	N	N	N
13	Residential Hotels	Y	Y [1]	N [1]	N [1]	N	N	N
14	Mobile home parks or courts	Y	Y [1]	N	N	N	N	N
15	Transient lodgings	Y	Y [1]	N [1]	N [1]	N [1]	N	N
16	Other residential	Y	Y [1]	N [1]	N [1]	N	N	N
20	***Manufacturing***							
21	Food & kindred products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
22	Textile mill products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
25	Furniture and fixtures; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
26	Paper and allied products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
27	Printing, publishing, and allied industries	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
28	Chemicals and allied products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
29	Petroleum refining and related industries	Y	Y	Y	Y[2]	Y[3]	Y[4]	N

TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES (Continued)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 *(DNL or CNEL)*		Noise Zone 2 *(DNL or CNEL)*		Noise Zone 3 *(DNL or CNEL)*		
SLUCM NO.	**LAND USE NAME**	**< 55**	**55- 64**	**65 - 69**	**70 -74**	**75- 79**	**80 -84**	**85+**
30	***Manufacturing (continued)***							
31	Rubber and misc. plastic products; manufacturing	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
32	Stone, clay and glass products; manufacturing	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
33	Primary metal products; manufacturing	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
34	Fabricated metal products; manufacturing	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	Y	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
40	***Transportation, communication and utilities.***							
41	Railroad, rapid rail transit, and street railway transportation	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
42	Motor vehicle transportation	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
43	Aircraft transportation	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
44	Marine craft transportation	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
45	Highway and street right-of-way	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
46	Automobile parking	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
47	Communication	Y	Y	Y	25 [5]	30 [5]	N	N
48	Utilities	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
49	Other transportation, communication and utilities	Y	Y	Y	25 [5]	30 [5]	N	N
50	***Trade***							
51	Wholesale trade	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
52	Retail trade – building materials, hardware and farm equipment	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
53	Retail trade – shopping centers	Y	Y	Y	25	30	N	N
54	Retail trade - food	Y	Y	Y	25	30	N	N

TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES (Continued)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 *(DNL or CNEL)*		Noise Zone 2 *(DNL or CNEL)*		Noise Zone 3 *(DNL or CNEL)*		
SLUCM NO	LAND USE NAME	< 55	55- 64	65 -69	70 -74	75-79	80 -84	85+
50	***Trade (Continued)***							
55	Retail trade – automotive, marine craft, aircraft and accessories	Y	Y	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	Y	Y	25	30	N	N
57	Retail trade – furniture, home, furnishings and equipment	Y	Y	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	Y	Y	25	30	N	N
59	Other retail trade	Y	Y	Y	25	30	N	N
60	***Services***							
61	Finance, insurance and real estate services	Y	Y	Y	25	30	N	N
62	Personal services	Y	Y	Y	25	30	N	N
62.4	Cemeteries	Y	Y	Y	Y [2]	Y [3]	Y [4,11]	Y [6,11]
63	Business services	Y	Y	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
64	Repair Services	Y	Y	Y	Y [2]	Y [3]	Y [4]	N
65	Professional services	Y	Y	Y	25	30	N	N
65.1	Hospitals, other medical fac.	Y	Y [1]	25	30	N	N	N
65.16	Nursing Homes	Y	Y	N [1]	N [1]	N	N	N
66	Contract construction services	Y	Y	Y	25	30	N	N
67	Government Services	Y	Y [1]	Y [1]	25	30	N	N
68	Educational services	Y	Y [1]	25	30	N	N	N
69	Miscellaneous	Y	Y	Y	25	30	N	N
70	***Cultural, entertainment and recreational***							
71	Cultural activities (& churches)	Y	Y[1]	25	30	N	N	N
71.2	Nature exhibits	Y	Y[1]	Y[1]	N	N	N	N
72	Public assembly	Y	Y[1]	Y	N	N	N	N
72.1	Auditoriums, concert halls	Y	Y	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	Y	Y [1]	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y	Y	Y [7]	Y [7]	N	N	N
73	Amusements	Y	Y	Y	Y	N	N	N
74	Recreational activities (include golf courses, riding stables, water rec.)	Y	Y[1]	Y[1]	25	30	N	N
75	Resorts and group camps	Y	Y [1]	Y [1]	Y [1]	N	N	N
76	Parks	Y	Y [1]	Y [1]	Y [1]	N	N	N
79	Other cultural, entertainment and recreation	Y	Y [1]	Y [1]	Y [1]	N	N	N

TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES
(Continued)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 *(DNL or CNEL)*		Noise Zone 2 *(DNL or CNEL)*		Noise Zone 3 *(DNL or CNEL)*		
SLUCM NO.	**LAND USE NAME**	**< 55**	**55- 64**	**65 -69**	**70 -74**	**75-79**	**80 -84**	**85+**
80	***Resource Production and Extraction***							
81	Agriculture (except live stock)	Y	Y	Y [8]	Y [9]	Y [10]	Y [10,11]	Y [10,11]
81.5,	Livestock farming	Y	Y	Y [8]	Y [9]	N	N	N
81.7	Animal breeding	Y	Y	Y [8]	Y [9]	N	N	N
82	Agriculture related activities	Y	Y	Y [8]	Y [9]	Y [10]	Y [10,11]	Y [10,11]
83	Forestry Activities	Y	Y	Y [8]	Y [9]	Y [10]	Y [10,11]	Y [10,11]
84	Fishing Activities	Y	Y	Y	Y	Y	Y	Y
85	Mining Activities	Y	Y	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y	Y	Y

KEY TO TABLE 2 - SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES

SLUCM	Standard Land Use Coding Manual, U.S. Department of Transportation
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
Y* (Yes with Restrictions)	The land use and related structures are generally compatible. However, see note(s) indicated by the superscript.
N^x – (No with exceptions)	the land use and related structures are generally incompatible. However, see notes indicated by the superscript.
NLR (Noise Level Reduction)	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35	The numbers refer to Noise Level Reduction levels. Land Use and related structures generally compatible however, measures to achieve NLR of 25, 30 or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.
DNL	Day-Night Average Sound Level.
CNEL	Community Noise Equivalent Level (Normally within a very small decibel difference of DNL)
Ldn	Mathematical symbol for DNL.

NOTES FOR TABLE 2 - SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES

1.

a)Although local conditions regarding the need for housing may require residential use in these Zones, residential use is discouraged in DNL 65-69 and strongly discouraged in DNL 70-74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these Zones.

b) Where the community determines that these uses must be allowed, measures to achieve and outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB in DNL 65-69 and NLR of 30 dB in DNL 70-74 should be incorporated into building codes and be in individual approvals; for transient housing a NLR of at least 35 dB should be incorporated in DNL 75-79.

c) Normal permanent construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation, upgraded Sound Transmission Class (STC) ratings in windows and doors and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

d) NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design and use of berms and barriers can help mitigate outdoor noise exposure NLR particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

4. Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

6. No buildings.

7. Land use compatible provided special sound reinforcement systems are installed.

8. Residential buildings require a NLR of 25

9. Residential buildings require a NLR of 30.

10. Residential buildings not permitted.

11. Land use not recommended, but if community decides use is necessary, hearing protection devices should be worn.

TABLE 3-AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES [1]

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
10	***Residential***				
11	Household Units				
11.11	Single units: detached	N	N	Y[2]	Maximum density of 1-2 Du/Ac
11.12	Single units: semidetached	N	N	N	
11.13	Single units: attached row	N	N	N	
11.21	Two units: side-by-side	N	N	N	
11.22	Two units: one above the other	N	N	N	
11.31	Apartments: walk-up	N	N	N	
11.32	Apartment: elevator	N	N	N	
12	Group quarters	N	N	N	
13	Residential Hotels	N	N	N	
14	Mobile home parks or courts	N	N	N	
15	Transient lodgings	N	N	N	
16	Other residential	N	N	N	
20	***Manufacturing*** [3]				
21	Food & kindred products; manufacturing	N	N	Y	Maximum FAR 0.56
22	Textile mill products; manufacturing	N	N	Y	Same as above
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	N	N	N	
24	Lumber and wood products (except furniture); manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
25	Furniture and fixtures; manufacturing	N	Y	Y	Same as above
26	Paper and allied products; manufacturing	N	Y	Y	Same as above
27	Printing, publishing, and allied industries	N	Y	Y	Same as above
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	

TABLE 3-AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES [1] (Continued)

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ II Recommendation	Density Recommendation
30	***Manufacturing [3] (continued)***				
31	Rubber and misc. plastic products; manufacturing	N	N	N	
32	Stone, clay and glass products; manufacturing	N	N	Y	Maximum FAR 0.56
33	Primary metal products; manufacturing	N	N	Y	Same as above
34	Fabricated metal products; manufacturing	N	N	Y	Same as above
35	Professional scientific, & controlling instrument; photographic and optical goods; watches & clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
40	***Transportation, communication and utilities [4].***				See Note 3 below.
41	Railroad, rapid rail transit, and street railway transportation	N	Y[5]	Y	Same as above.
42	Motor vehicle transportation	N	Y[5]	Y	Same as above
43	Aircraft transportation	N	Y[5]	Y	Same as above
44	Marine craft transportation	N	Y[5]	Y	Same as above
45	Highway and street right-of-way	N	Y[5]	Y	Same as above
46	Auto parking	N	Y[5]	Y	Same as above
47	Communication	N	Y[5]	Y	Same as above
48	Utilities	N	Y[5]	Y	Same as above
485	Solid waste disposal (Landfills, incineration, etc.)	N	N	N	
49	Other transport, comm. and utilities	N	Y[5]	Y	See Note 3 below
50	***Trade***				
51	Wholesale trade	N	Y	Y	Maximum FAR of 0.28 in APZ I. & .56 in APZ II.
52	Retail trade – building materials, hardware and farm equipment	N	Y	Y	Maximum FAR of 0.14 in APZ I & 0.28 in APZ II

TABLE 3-AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES [1] (Continued)

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
50	***Trade (Continued)***				
53	Retail trade – shopping centers	N	N	Y	Maximum FAR of 0.22.
54	Retail trade - food	N	N	Y	Maximum FAR of 0.24
55	Retail trade – automotive, marine craft, aircraft and accessories	N	Y	Y	Maximum FAR of 0.14 in APZ I & 0.28 in APZ II
56	Retail trade – apparel and accessories	N	N	Y	Maximum FAR 0.28
57	Retail trade – furniture, home, furnishings and equipment	N	N	Y	Same as above
58	Retail trade – eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Maximum FAR of 0.22
60	***Services*** [6]				
61	Finance, insurance and real estate services	N	N	Y	Maximum FAR of 0.22 for "General Office/Office park"
62	Personal services	N	N	Y	Office uses only. Maximum FAR of 0.22.
62.4	Cemeteries	N	Y[7]	Y[7]	
63	Business services (credit reporting; mail, stenographic, reproduction; advertising)	N	N	Y	Max. FAR of 0.22 in APZ II
63.7	Warehousing and storage services	N	Y	Y	Max. FAR 1.0 APZ I; 2.0 in APZ II
64	Repair Services	N	Y	Y	Max. FAR of 0.11 APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Max. FAR of 0.22
65.1	Hospitals, nursing homes	N	N	N	
65.1	Other medical facilities	N	N	N	
66	Contract construction services	N	Y	Y	Max. FAR of 0.11 APZ I; 0.22 in APZ II
67	Government Services	N	N	Y	Max FAR of 0.24
68	Educational services	N	N	N	
69	Miscellaneous	N	N	Y	Max. FAR of 0.22

TABLE 3-AIR INSTALLATIONS COMPATIBLE USE ZONES SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES [1] (continued)

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
70	***Cultural, entertainment and recreational***				
71	Cultural activities	N	N	N	
71.2	Nature exhibits	N	Y[8]	Y[8]	
72	Public assembly	N	N	N	
72.1	Auditoriums, concert halls	N	N	N	
72.11	Outdoor music shells, amphitheaters	N	N	N	
72.2	Outdoor sports arenas, spectator sports	N	N	N	
73	Amusements - fairgrounds, miniature golf, driving ranges; amusement parks, etc	N	N	Y	
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[8]	Y[8]	Max. FAR of 0.11 APZ I; 0.22 in APZ II
75	Resorts and group camps	N	N	N	
76	Parks	N	Y[8]	Y[8]	Same as 74
79	Other cultural, entertainment and recreation	N	Y[8]	Y[8]	Same as 74
80	***Resource production and extraction***				
81	Agriculture (except live stock)	Y[4]	Y[9]	Y[9]	
81.5, 81.7	Livestock farming and breeding	N	Y[9,10]	Y[9,10]	
82	Agriculture related activities	N	Y[9]	Y[9]	Max FAR of 0.28 APZ I; 0.56 APZ II no activity which produces smoke, glare, or involves explosives
83	Forestry Activities [11]	N	Y	Y	Same as Above
84	Fishing Activities [12]	N[12]	Y	Y	Same as Above
85	Mining Activities	N	Y	Y	Same as Above
89	Other resource production or extraction	N	Y	Y	Same as Above
90	***Other***				
91	Undeveloped Land	Y	Y	Y	
93	Water Areas	N[13]	N[13]	N[13]	

KEY TO TABLE 3 - SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES

SLUCM - Standard Land Use Coding Manual, U.S. Department of Transportation

Y (Yes) - Land use and related structures are normally compatible without restriction.

N (No) – Land use and related structures are not normally compatible and should be prohibited.

Y^X – (Yes with restrictions) the land use and related structures are generally compatible. However, see notes indicated by the superscript.

N^X – (No with exceptions) the land use and related structures are generally incompatible. However, see notes indicated by the superscript.

FAR – Floor Area Ratio. A floor area ratio is the ratio between the square feet of floor area of the building and the site area. It is customarily used to measure non-residential intensities.

Du/Ac – Dwelling Units per Acre. This metric is customarily used to measure residential densities.

NOTES FOR TABLE 3 - SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES

The following notes refer to Table 3.

1. A “Yes” or a “No” designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist installations and local governments, general suggestions as to floor/area ratios are provided as a guide to density in some categories. In general, land use restrictions which limit commercial, services, or industrial buildings or structure occupants to 25 per acre in APZ I, and 50 per acre in APZ II are the range of occupancy levels considered to be low density. Outside events should normally be limited to assemblies of not more that 25 people per acre in APZ I, and maximum assemblies of 50 people per acre in APZ II.

2. The suggested maximum density for detached single-family housing is one to two Du/Ac. In a Planned Unit Development (PUD) of single family detached units where clustered housing development results in large open areas, this density could possibly be increased provided the amount of surface area covered by structures does not exceed 20 percent of the PUD total area. PUD encourages clustered development that leave large open areas.

3. Other factors to be considered: Labor intensity, structural coverage, explosive characteristics, air-pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.

4. No structures (except airfield lighting), buildings or aboveground utility/ communications lines should normally be located in Clear Zone areas on or off the installation. The Clear Zone is subject to severe restrictions. See NAVFAC P-80.3 or Tri-Service Manual AFM 32-1123(I); TM 5-803-7, NAVFAC P-971 “Airfield and Heliport Planning & Design” dated 1 May 99 for specific design details.

5. No passenger terminals and no major above ground transmission lines in APZ I.

6. Low intensity office uses only. Accessory uses such as meeting places, auditoriums, etc. are not recommended.

7. No Chapels are allowed within APZ I or APZ II.

8. Facilities must be low intensity, and provide no tot lots, etc. Facilities such as clubhouses, meeting places, auditoriums, large classes, etc. are not recommended.

9. Includes livestock grazing but excludes feedlots and intensive animal husbandry. Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.

10. Includes feedlots and intensive animal husbandry.

11. Lumber and timber products removed due to establishment, expansion, or maintenance of Clear Zones will be disposed of in accordance with appropriate DOD Natural Resources Instructions.

12. Controlled hunting and fishing may be permitted for the purpose of wildlife management.

13. Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are compatible.

APPENDIX 2

SAMPLE NOISE REDUCTION STANDARDS FOR RESIDENTIAL CONSTRUCTION

Source: "Eastern Carolina Joint Land Use Study, Prepared for Craven County, Carter County, City of Havelock, Town of Emerald Isle, Town of Bogue, Town of Atlantic, and MCAS Cherry Point by the Eastern Carolina Council, Region P Council of Governments; November 2002.

Note: Standards may differ by geographic region.

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SOUND INSULATION IN RESIDENTIAL STRUCTURES

DEFINITION

Sound insulation refers to the use of acoustical related building materials for the reduction of noise for architectural abatement purposes. These materials apply to any areas of a structure that may be part of a sound transmission path including windows, doors, roof systems, ventilation, wall systems (exterior), and utility access points through a building envelope.

CHARACTERISTICS

The application of sound insulation techniques can involve existing and/or planned structures or buildings. Often the benefits for noise control, such as double pane windows have additional benefits in terms of energy conservation and reduced heat loss. The primary objective of an airport sound insulation program is to reduce the sound transmission through the building envelope (e.g., exterior wall, window, and roof system), thereby having lower interior noise levels. The implementation of such a program may be the adoption of a building code or performance requirements established by a public agency.

POSITIVE FEATURES

The primary benefit of a sound insulation program is to protect the noise receiver, while they are indoors. Frequently, there are associated benefits of energy conservation when there is building insulation. Such efforts have the flexibility of applying to both existing structures, as well as buildings that will be constructed. Therefore, it can be more comprehensive than a building code. Since building codes generally are applicable only to planned or new structures.

NEGATIVE FEATURES

Sound insulation controls apply directly to a structure. Therefore it does not improve the outdoor environments, when the individual is outside the home. Often times, sound insulation is considered for selected areas or buildings, rather than being a comprehensive approach.

LEGAL STANDING

Sound insulation programs are frequently mandates for certain geographical areas as a policy of a jurisdiction with matching federal and local funds involved. Since a program is adopted by a jurisdiction it does represent legal standing.

Note: Standards may differ by geographic region.

Sound Attenuation ***Definitions***

DNL Day - Night Sound Level:
An average of the cumulative measure of the noise exposure during a 24-hour day.

Exterior Wall Rating:
EWR is a single-number rating for exterior building elements (such as walls, windows, doors, etc.) and represents the effective sound transmission loss capability, in decibels, of each element, It differs from the STC rating in that it is based on aircraft noise rather than office noise spectra. For this reason, EWR is superior to STC for describing the sound-insulating properties of exterior wall elements exposed to aircraft noise. The EWR concept was developed by Wylie Laboratories and has been used extensively in studies of residential sound insulation. It is conceptually similar to the STC rating method. Like TL and SIC, the higher the EWR value, the better the noise reduction.

Noise Reduction:
The quantitative measure of sound isolation between spaces is called Noise Reduction (NR). The NR between two spaces, such as from the exterior to the interior of a dwelling, depends on the TL of the various components in the separating wall, the area of the separating wall, and the acoustical absorption n the receiving room. This value takes more into account than just the sound transmission characteristics of the wall material. Generally, values of NR are determined in one-third octave bands. A higher NR gives a lower noise level in the receiving room, indicating greater noise insulation.

Noise Level Reduction:
NLR is used to describe the reduction of environmental noise sources, such as aircraft. Lt is a single-number metric based on values of A-weighted noise reduction (NR). The greater the sound insulation in a wall, the lower the noise level in the receiving room, giving a higher NLR. The NLR is useful because it is a simpler metric to use than NR; one number is easier to apply than a set of numbers in one-third octave bands. However some building materials and components are more effective at reducing low-frequency noise than other materials or components. Since aircraft noise contains a lot of low frequency sound, it is important to ensure that insulating materials and components perform well at low frequencies. NLR is a good indicator of overall wall performance but may not be appropriate when designing modifications for aircraft noise reduction, especially if a good NLR value disguises poor low frequency insulation.

Sound Transmission Class:
Since working with a series of one-third octave TL measurements can be cumbersome, a single number descriptor based on the one-third octave values has been developed. This rating method is called the Sound Transmission Class (STC). Like TL, the higher the STC rating for a construction method or component, the higher the sound insulation. Originally, STC ratings were developed as a single-number descriptor for the TL of

interior office walls for typical office noise and speech spectra. Now, they are used, often incorrectly, for exterior walls as well. Most acoustical materials and components are commonly specified in terms of their SIC ratings.

Sound Transmission Loss:
This is the physical measure, which describes the sound insulation value of a built construction system or component. It is a measure, on a logarithmic scale, of the ratio of the acoustic sound power incident on the tested piece to the acoustic sound power transmitted through it. The TL is expressed in decibels (dB). Generally, TL is measured as a function of frequency in one-third octave frequency bands. The higher the sound insulation, the less sound will be transmitted, resulting in a higher TL value. Values of TL are determined in acoustical laboratories under controlled testing methods prescribed by the American Society of Testing and Materials (ASTM).

Sound Insulation Objectives

The goal for residential sound insulation is to reduce the dwelling interior noise levels due to aircraft operations. Total “soundproofing” of the dwelling, such that aircraft operations are inaudible, is economically infeasible. Modest improvements over the existing characteristics (i.e. less than 5 dB) may not provide a noticeable improvement for the homeowner and hence are not cost effective. The ideal solution is to provide sound insulation, which lies between these two extremes.

Interior Noise Objectives

The DNL is the best predictor of overall long-term community reaction to noise from aircraft as well as other activities. Exterior noise exposure less than DNL 65 dB is normally considered compatible with residential land use. Noise exposure is normally incompatible above 65 dB unless stated noise reductions are achieved within the dwellings. A 25 dB NLR is required in the noise zone from 65 to 70 dB. From 70 to 75 dB, a 30 NLR is required. Above 75 dB, residential land use is generally deemed incompatible and should be discouraged.

Sometimes, the DNL noise reduction goal in habitable rooms is supplemented by a single-event noise level criterion. This Sound Exposure Level (SEL) reflects the annoyance associated with individual flyovers because of activity interference. The SEL goal is 65 dB in general living spaces and 60 dB in bedrooms and television viewing rooms. These criteria are only applied to homes within the DNL defined noise impact area, not to homes outside the 65 dB DNL contour boundaries.

To use the SEL interior noise criteria, the outside noise exposure level is compared to the interior goal For example, if the dwelling were between the SEL contour boundaries of 85 to 90 dB, then the required NLR to achieve 60 dB in a bedroom would be 30 dB. (The conservative upper bound of the noise zone is normally used to set NLR goals.)

Note: Standards may differ by geographic region.

Room Variations

The noise level of different rooms in a house depends on the absorption within the room, as well as on the noise entering from outside. Upholstered furniture, drapes, and carpeting absorb sound while hard surfaces do not. In addition, different categories of rooms vary on how predictable their sound environments are. Living rooms, for example, tend to be consistent from one house to another because they almost always have the same types of furnishings in them. Bedrooms vary because some are guest rooms with less furniture, and some have been converted to other uses. Kitchens tend to vary widely due to the use of different wall coverings, such as cabinets and appliances, or floor coverings, such as tile or carpet. These room variations act in addition to variation in exterior sound level and sound transmission through the outside wall.

Sound Insulation Concept

Sound Transmission

In order to effectively examine noise control measures for dwellings it is helpful to understand how sound travels from the exterior to the interior of the house. This happens in one of two basic ways: through the solid structural elements and directly through the air. Consider the sound transmission through a wall constructed with a brick exterior, stud framing, interior finish wall and absorbent material (insulation) in the cavity. The sound transmission starts with noise impinging on the wall exterior. Some of this sound energy will be reflected away and some will make the wall vibrate. The vibrating wall radiates sound into the airspace, which in turn sets the interior finish surface vibrating, with some energy lost in the airspace. This surface then radiates sound into the dwelling interior. Vibration energy also bypasses the air cavity by traveling through the studs and edge connections. Openings in the dwelling, which provide air infiltration paths through windows, vents, and leaks, allow sound to travel directly to the interior. This is a very common and often overlooked source of noise intrusion.

Flanking is a similar concept and usually refers to sound passing around a wall. Examples of common flanking paths include: air ducts, open ceiling or attic plenums, continuous sidewalls and floors, and joist and crawlspaces. The three different major paths for noise transmission into a dwelling are air infiltration through gaps and cracks, secondary elements such as windows and doors, and primary building elements such as walls and the roof.

Low-frequency sound is most efficiently transmitted through solid structural elements such as walls, roof, doors, and windows. High frequencies travel best through the air gaps. Within these broad categories, different building materials have different frequency responses to sound and varying abilities to insulate against sound.

Reducing Transmitted Sound

The amount of sound energy transmitted through a wall, roof or floor can be limited in several ways. First, all air infiltration gaps, openings, and possible flanking paths must be eliminated wherever possible. This is the single most important, but occasionally overlooked, step in noise reduction. This includes keeping windows and doors closed and putting baffles on open-air vents.

Some materials reflect more of the incident sound, converting less of it into vibration energy. The mass of the exterior and interior panels influences how much sound will pass through them. The more mass a structural element has the more energy it takes to set it into vibration, so adding weight to a wall or ceiling by attaching a gypsum board layer will make the assembly pass less sound. Then, absorption in the air cavity and resilient mounting of interior finish panels can further reduce the sound transmitted to the room. The primary approaches for improving sound isolation are:

1. Elimination of openings and flanking paths (when accessible).
2. Improvement of windows and doors.
3. Massive construction (build a wall 3 feet thick and 40 feet high around the whole house).
4. Isolation of panel elements through separation or resilient mounting.
5. Absorption.

Problem Areas

Sound intrusion problems are commonly caused by:

1. Building construction components and configurations not providing sufficient sound insulation.
2. Structural elements, such as windows, doors, walls, roofs and floors chosen and combined in an unbalanced way so that some parts are much weaker sound insulators than others.
3. Unintended openings or sound-flanking paths caused by deterioration or improper installation of construction elements.

Balanced Acoustical Design

The most important, or controlling, sound paths must be identified in order to know how to construct or modify a dwelling to meet a specified noise criteria. The ideal sound insulation design would achieve a condition where all the important sound paths transmit the same amount of acoustical energy. This eliminates any weak links in the building's insulation envelope and is commonly referred to as a balanced acoustical design.

In most cases, after leaks and gaps are sealed, the windows are the controlling sound paths. Replacing them with acoustical windows typically does more to improve the sound insulation performance than any other architectural modifications. Once this is done the other elements may become important in meeting specific noise reduction goals. Exterior doors often require improved sound insulation. Ceilings and walls, which face the exterior, may require modification as well, particularly in the higher DNL noise zone.

New Versus Old

Dwellings can vary in their sound isolation performance. Generally, air infiltration, and therefore sound infiltration, around windows and doors tends to be worse for older dwellings. Inadequate or deteriorated weather-stripping and misaligned framing usually cause this. On the other hand, most older construction techniques and materials tend to be more massive than newer lighter-weight construction. As a result, many older buildings tend to perform better with regard to sound transmission through walls, roofs, and floors than do new houses. Homeowner modifications can also degrade the dwelling's sound insulation performance. Examples include home improvements such as skylights, whole-house attic fans, through-the-wall air conditioners, and solariums. In general, it is much more efficient, and cost effective, to take acoustic performance into account when designing and building a home at the start. Remodeling an already built home is more costly and time consuming than anticipating and building for good sound insulation.

While homes, which are well insulated thermally, often perform well acoustically, thermal insulation is not always a good indicator of sound insulation. Many thermal windows, installed in new construction or added as a homeowner upgrade provide little sound insulation when compared to walls or acoustical windows and are frequently the weak link in the building envelope. However thermal treatments usually eliminate air infiltration and may serve to improve the acoustical performance of a dwelling. Thermal insulation batts are often useful in the wall cavities and attic spaces to absorb some sound.

The North Carolina State Building Code requires homes to meet certain R-Values for thermal performance. These requirements have changed through the years requiring higher R-Values in the more recent homes. The thickness or the density of the product normally determines the R-Value of the insulation. Older homes have less insulation and are subject to more noise infiltration. Currently, the Building Code requires R-13 in the walls, R-19 in the floors and R-30 in the ceilings.

Most homes today are constructed using double pane windows. Although the windows perform well thermally, they usually do not perform well acoustically. The panes are separated by approximately % inch of air space and thin panes of glazing are used. The thin panes of glazing allow for vibration and the vibrations are transmitted through the

air space to the interior glazing and into the home.

Recommended Building Requirements

Recommended Building Requirements for a Minimum NLR of 25 dB Compliance with the following standards shall be deemed to meet the requirements of the compatible use districts in which an NLR 25 is specified.

General:

a. Brick veneer, masonry blocks, or stucco exterior walls shall be constructed airtight. All joints shall be grouted or caulked airtight, except weep holes for drainage.
b. At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar.
c. Window and/or through-the-wall ventilation units shall not be used.
d. Through-the-wall/door mailboxes shall not be used.

Exterior Walls:

a. Exterior walls other than as described in this section shall have a laboratory sound transmission class rating of at least STC-39.
b. Masonry walls having a surface weight of at least 25 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy “bridging” paint.
c. Stud walls shall be at least 4” in nominal depth and shall be finished on the outside with siding-on-sheathing, stucco, or brick veneer.

   (1) Interior surface of the exterior walls shall be of gypsum board or plaster at least 1/2” thick, installed on the studs.

   (2) Continuous composition board, plywood, or gypsum board sheathing at least 1/2” thick shall cover the exterior side of the wall studs behind wood or metal siding. Asphalt or wood shake shingles are acceptable in lieu of siding.

   (3) Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.

   (4) Insulation material at least 2” thick shall be installed continuously throughout the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.

Windows:

a. Windows other than as described in this section shall have a laboratory sound transmission class rating of at least STC-28.
b. Glass shall be at least 3/16” thick.
c. All operable windows shall be weather stripped and airtight when closed so as to conform to an air infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.
d. Glass of fixed-sash windows shall be sealed in an airtight manner with a non-hardening sealant, or a soft elastomer gasket, or glazing tape.
e. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal Specifications: TT-S-00227, TT-S-00230, or TT-S-00153.
f. The total area of glass in both windows and doors in sleeping spaces shall not exceed 20% of the floor area.

Doors:

a. Doors, other than as described in this section shall have a laboratory sound transmission class rating of at least STC-28.
b. All exterior side-hinged doors shall be solid-core wood or insulated hollow metal at least 1-3/4” thick and shall be fully weather-stripped.

c. Exterior sliding doors shall be weather stripped with an efficient airtight gasket system. The glass in the sliding doors shall be at least 3/16” thick.
d. Glass in doors shall be sealed in an airtight non-hardening sealant, or in a soft elastomer gasket or glazing tape. The perimeter of doorframes shall be sealed airtight to the exterior wall construction.

Roofs:

a. Combined roof and ceiling construction other than described in this section shall have a laboratory sound transmission class rating of at least STC-39.
b. With an attic or rafter space at least 6” deep, and with a ceiling below, the roof shall consist of closely butted 1/2” composition board, plywood, oriented strand board or gypsum board sheathing, topped by roofing as required.
c. If the underside of the roof is exposed, or if the attic or rafter spacing is less than 6”, the roof construction shall have a surface weight of at least 25 pounds per square foot. Rafters, joists, or other framing may not be included in the surface weight calculation.
d. Window or dome skylights shall have a Laboratory sound transmission class rating of at least STC-28.

Ceilings:

a. Gypsum board or plaster ceilings at least1/2” thick. Ceilings shall be substantially airtight, with a minimum number of penetrations.
b. Glass fiber or mineral wool insulation at least 2” thick shall be provided above the ceiling between joists.

Floors:

Openings to any crawl spaces below the floor of the lowest occupied rooms shall not exceed 2% of the floor area of the occupied rooms.

Ventilation:

a. 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.
b. Gravity vent openings in attic shall not exceed code minimum in number and size.
c. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with coated glass fiber 1” thick, and shall be at least 5 ft long with one 90 degree bend.
d. All vent ducts connecting the interior space to the outdoors, except domestic range exhaust ducts, shall contain at least a 5 ft. length of internal sound absorbing duct lining. Each duct shall be provided with a 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.
e. Duct lining shall be coated glass fiber duct liner at least 1” thick.
f. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a baffle plate across the exterior termination, which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line of sight into the vent duct. The baffle plate shall be of the same material and thickness as the vent duct material.
g. Fireplaces shall be provided with well-fitted dampers.

Recommended Building Requirements for a Minimum NLR of 3OdB Compliance with the following standards shall be deemed to meet the requirements of the compatible use districts in which an NLR 30 is specified.

General:

a. Brick veneer, masonry blocks, or stucco exterior walls shall be constructed airtight. All joints shall be grouted or caulked airtight.

Note: Standards may differ by geographic region.

b. At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar.
c. Window and/or through-the-wall ventilation units shall not be used.
d. Operational fireplaces shall not be used.
e. All sleeping spaces shall be provided with either a sound absorbing ceiling or a carpeted floor.
f. Through-the-wall/door mailboxes shall not be used.

Exterior Walls:

a. Exterior walls, other than as described below, shall have a laboratory sound transmission class rating of at least STC-44.
b. Masonry walls having a surface weight of at least 40 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy “bridging” paint.
c. Stud walls shall be at least 4” in nominal depth and shall be finished on the outside with siding-on-sheathing, stucco, or brick veneer.

    (1) Interior surface of the exterior walls shall be of gypsum board or plaster at least 1/2” thick, installed on the studs. The gypsum board or plaster may be fastened rigidly to the studs if the exterior is brick veneer or stucco. If the exterior is siding-on-sheathing, the interior gypsum board or plaster must be fastened resiliently to the studs.
    (2) Continuous composition board, plywood or gypsum board sheathing shall cover the exterior side of the wall studs behind wood or metal siding. The sheathing and facing shall weigh at least 4 pounds per square foot.
    (3) Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.
    (4) Insulation material at least 2” thick shall be installed continuously throughout the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.

Windows:

a. Windows, other than as described in this section, shall have a laboratory sound transmission class rating of at least STC-33.
b. Glass of double-glazed windows shall be at least 1/8” thick. Panes of glass shall be separated by a minimum 3/4” air space.
c. Double-glazed windows shall employ fixed sash or efficiently weather-stripped operable sash. The sash shall be rigid and weather-stripped with material that is compressed air tight when the window is closed so as to conform to an infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.
d. Glass of fixed-sash windows shall be sealed in an airtight manner with a non-

hardening sealant, or a soft elastomer gasket, or glazing tape.

e. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal Specifications: TT-S-00227, TT-S-00230, or TT-S-00153.
f. The total area of glass of both windows and exterior doors in sleeping spaces shall not exceed 20% of the floor area.

Doors:

a. Doors, other than as described in this section, shall have a laboratory sound transmission class rating of at least STC-33.
b. Double door construction is required for all door openings to the exterior. Openings fitted with side-hinged doors shall have one solid-core wood or insulated hollow metal core door at least 1-3/4” thick, separated by an airspace of at least 4” from another door, which can be a storm door. Both doors shall be tightly fitted and weather-stripped.
c. The glass of double-glazed sliding doors shall be separated by minimum 3/4” airspace. Each sliding frame shall be provided with an efficiently airtight weather stripping material.
d. Glass of all doors shall be at least 3/16” thick. Glass of double sliding doors shall not be equal in thickness.
e. The perimeter of doorframes shall be sealed airtight to the exterior wall construction.
f. Glass of doors shall be set and sealed in an airtight, non-hardening sealant, or a soft elastomer gasket, or glazing tape.

Roofs:

a. Combined roof and ceiling construction other than described in this section shall have laboratory sound transmission class rating of at least STC-44.
b. With an attic or rafter space at least 6” deep, and with a ceiling below, the roof shall consist of closely butted 1/2” composition board, plywood, oriented strand board or gypsum board sheathing topped by roofing as required.
c. If the underside of the roof is exposed, or if the attic or rafter spacing is less than 6”, the roof construction shall have a surface weight of at least 40 pounds per square foot. Rafters, joists or other framing may not be included in the surface weight calculations.
d. Window or dome skylights shall have a laboratory sound transmission class rating of at least STC-33.

Ceilings:

a. Gypsum board or plaster ceilings at least 1/2” thick shall be provided
b. Glass fiber or mineral wool insulation at least 2” thick shall be provided above the ceiling between joists.

Floors:

a. The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement. All door and window openings in the fully enclosed basement shall be tightly fitted.

Ventilation:

a. 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.
b. Gravity vent openings in attic snail not exceed code minimum in number and size. The openings shall be fitted with transfer ducts at least 3 ft in length containing internal sound absorbing duct lining. Each duct shall have a lined 90-degree bend in the duct such that the line of sight is interrupted from the exterior through the duct into the attic.
c. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with coated glass fiber 1” thick, and shall be at least 5 ft long with one 90 degree bend.
d. All vent ducts connecting the interior space to the outdoors, except domestic range exhaust ducts shall contain at least a 10 ft. length of internal sound absorbing duct lining. Each duct shall be provided with a lined 90-degree 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.
e. Duct lining shall be coated glass fiber duct.
f. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a baffle plate across the exterior termination, which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line of sight into the vent duct. The baffle plate shall be made of the same material and thickness as the vent duct material.
g. Building heating units with flues or combustion air vents shall be located in a closet or room closed off from the occupied space by doors.
h. Doors between occupied space and mechanical equipment areas shall be solid core wood or 20 gauge steel hollow metal at least 1-3/4” thick and shall be fully weather-stripped.

Recommended Building Requirements for a Minimum NLR of35dB Compliance with the following standards shall be deemed to meet the requirements of the compatible use districts in which an NLR 35 is specified

General:

a. Brick veneer, masonry blocks or stucco exterior walls shall be constructed

airtight. All joints shall be grouted or caulked airtight.

b. At the penetration of exterior walls by pipes, ducts or conduits, the space between the wall and pipes, ducts or conduits shall be caulked or filled with mortar.
c. Window and/or through-the-wall ventilation units shall not be used.
d. Operational vented fireplaces shall not be used.
e. All sleeping spaces shall be provided with either a sound absorbing ceiling or a carpeted floor.
f. Through-the-wall/door mailboxes shall not be used.
g. No glass or plastic skylight shall be used.

Exterior Walls:

a. Exterior walls other than as described below shall have a laboratory sound transmission class rating of at least STC-49.
b. Masonry walls having a surface weight of at least 75 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy “bridging” paint.
c. Stud walls shall be at least 4” in nominal depth and shall be finished on the outside with siding-on-sheathing, stucco, or brick veneer.

(1) Interior surface of the exterior walls shall be of gypsum board or plaster at least 1/2” thick, installed on studs, The gypsum board or plaster may be fastened rigidly to the studs if the exterior is brick veneer. If the exterior is stucco or siding-on-sheathing, the interior gypsum board or plaster must be fastened resiliently to the studs.
(2) Continuous composition board, plywood or gypsum board sheathing shall cover the exterior side of the wall studs behind wood or metal siding. The sheathing and facing shall weigh at least 4 pounds per square foot.
(3) Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.
(4) Insulation material at least 3-1/2” thick shall be installed continuously through the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.

Windows:

a. Windows other than as described in this section shall have a laboratory sound transmission class rating of at least STC-38.
b. Glass of double-glazed windows shall be at least 1/8” thick; Panes of glass shall be separated by a minimum 3/4” air space and shall not be equal in thickness.
c. Glass of windows shall be sealed in an airtight manner with a non-hardening sealant, or a soft elastomer gasket or glazing tape.

d. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal Specifications: TT-S-00227, TT-S-00230, or TT-S-00153.
e. The total area of glass of both windows and exterior doors in sleeping spaces shall not exceed 20% of the floor area.

Doors:

a. Doors, other than as described in this section, shall have a laboratory sound transmission class rating of at least STC-38.
b. Double door construction is required for all door openings to the exterior. The door shall be side-hinged and shall be solid-core wood or insulated hollow metal, at least 1-3/4" thick, separated by a vestibule at least 3 ft in length. Both doors shall be tightly fitted and weather-stripped.
c. The perimeter of doorframes shall be sealed airtight to the exterior wall construction.

Roofs:

a. Combined roof and ceiling construction other than described in this section and Section 3-7 shall have a laboratory sound transmission class rating of at least STC-49.
b. With an attic or rafter space at least 6" deep, and with a ceiling below, the roof shall consist of closely butted 1/2" composition board, plywood, oriented strand board or gypsum board sheathing topped by roofing as required.
c. If the underside of the roof is exposed, or if the attic or rafter spacing is less than 6" the roof construction shall have a surface weight of at least 75 pounds per square foot. Rafters, joists or other framing may not be included in the surface weight calculation.

Ceilings:

a. Gypsum board or plaster ceilings at least 1/2" thick shall be provided where required by Paragraph 3-6. Ceilings shall be substantially airtight, with a minimum number of penetrations. The ceiling panels shall be mounted on resilient clips or channels. A non-hardening sealant shall be used to seal gaps between the ceiling and walls around the ceiling perimeter.
b. Glass fiber or mineral wool insulation at least 3 1/2" thick shall be provided above the ceiling between joists.

Floors:

The floors of the lowest occupied rooms shall be slab on fill or below grade.

Ventilation:

a. 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 need to open any windows, doors, or other openings to the exterior.
b. Gravity vent openings in attic shall not exceed code minimum in number and size. The opening shall be fitted with transfer ducts at least 6 ft. in length containing internal sound absorbing duct lining. Each duct shall have a lined 90-degree bend in the duct such that there is no direct line of sight from the exterior through the duct into the attic.
c. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with 1" thick coated glass fiber, and shall be at least 10 ft long with one 90 degree bend.
d. All vent ducts connecting the interior space to the outdoors, excepting domestic range exhaust ducts, shall contain at least a 10 ft length of internal sound absorbing duct lining. Each duct shall be provided with a lined 90-degree 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.
e. Duct lining shall be coated glass fiber duct liner at least 1" thick.
f. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a baffle plate across the exterior termination, which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line of sight into the vent duct. The baffle plate shall be of the same material and thickness as the vent duct material.
g. Building heating units with flues or combustion air vents shall be located in a closet or room
closed off from the occupied space by doors.
h. Doors between occupied space and mechanical equipment areas shall be solid core wood or 20 gauge steel hollow metal at least 1-3/4" thick and shall be fully weather-stripped.

Methods for Exterior Wall Sound Insulation in New Homes

Typically, most wall construction consists of a 3.5-inch stud cavity with studs spaced 16 inches on center, %-inch gypsum drywall on the interior, 7/16 structural sheathing on the exterior and either siding or brick veneer as the finish on the exterior, Consider using the construction techniques below:

1. Increase the wall stud cavity to 5.5-inches, spaced 24 inches on center. The increased depth of the stud cavity will allow for the installation of R-1 9 insulation.

2. When considering the type of insulation material, consider using cellulose insulation material. This material is of a higher density. The method of installation

is a spray method that tends to completely fill the cavity without voids.

3. Prior to the installation of insulation material in the walls, seal all penetrations through the top and bottom plates. Remember if air can enter, so can sound. Seal all penetrations through the bottom plate with caulk. Seal all penetrations through the top plate with caulking materials meeting the requirements of ASTM E-136. Sealing the penetrations is a requirement of the North Carolina State Building Code.

4. Increase the thickness of the interior wall finish from 1/2-inch to 5/8-inch gypsum wallboard.

5. Caulk around all openings through the drywall such as receptacles, switches, plumbing drains, etc.

6. Increase the thickness of the exterior sheathing material to 5/8-inch or thicker material.

7. Consider using brick veneer instead of siding material for the exterior finish. Insure at least a one-inch air space between the brick veneer and the siding.

8. If siding is to be used, avoid using vinyl siding. Choose siding with a higher density such as Hardiplank, or wood siding. Install 30-pound felt between the siding and sheathing lapped 2 inches on horizontal joints and 6 inches on vertical joints.

9. If vinyl siding is a must, install 1/4-thick fanfold insulation board between the siding and sheathing.

10. Avoid large openings or breaks in continuity in the walls, such as large windows.

11. Install bathroom vent and kitchen hood vents on the side of the home away from the flight track. Make sure that vent terminations have an automatic closure on the end. Always use metal pipe for the vent pipe.

Methods for Improving Attic and Ceiling Sound Insulation In New Homes

1. Consider using energy trusses. Energy trusses allow for the installation of ceiling insulation to a full depth along the plate lines at exterior walls.

2. Install baffles on attic vents where practical.

3. Install acoustically absorptive material to a thickness equal to R-38 to the attic space to reduce reverberant sound level buildup. Apply material evenly throughout the attic space, taking care to keep it away from eave vents and

openings. Consider the use of cellulose insulation. This material fills the cavity without leaving voids in the material and is of a higher density than fiberglass.

4. Install 5/8-inch gypsum board as the interior ceiling finish.

5. Caulk around all penetrations through the ceiling membrane such as light fixtures.

6. Avoid the use of “can-type — recessed light” light fixtures.

7. Avoid the use of true exposed wood beams on the ceiling. This creates a continuous path for sound through the ceiling structure.
8. Avoid the use of whole house exhaust fans in the ceiling.

Methods for Improving Floor Sound Insulation In New Homes

1. Install R-30 insulation batts between the joists. The North Carolina State Building Code requires R-19.

2. Seal all penetrations through the floor assembly such as Heating and Air Conditioning supplies; exhaust ducts such as down draft exhaust from dryers and ranges, etc.

3. Install foundation vents of the swing cover awning type instead of the horizontal slider type.

4. Consider a sealed crawlspace and insulate the foundation walls, If this method is chosen, caulk between the mudsill and the foundation.

Methods for Improving Window Sound Insulation in New Homes

1. The most effective method of reducing sound transmission by a window is by increasing thickness of the glass panes. Basically, thicker is better. Thicker glass tends to bend less, and therefore vibrates less when exposed to sound waves. Using 6mm glass combinations or laminated glass is the simplest, most cost effective method of reducing sound transmission.

2. When choosing windows for your new home remember windows are generally the weakest link in sound attenuation

3. Choose windows that are double-glazed with panes at least 3/16 inch thick. Windows shall be double glazed with panes at least three/sixteenths inch ***(3/16”)*** thick. Panes of glass should be separated by a minimum one-half inch ***(1/2”)***

airspace, and should not be equal in thickness.

4. Double glazed windows should employ fixed sash or efficiently weather-stripped, operable sash. The sash shall be rigid and weather-stripped with material that is compressed airtight when the window is closed.

5. Glass should be sealed in an airtight manner with a non-hardening sealant or a soft
elastomer gasket or gasket tape.

6. The perimeter of the window frames should be sealed airtight to the exterior wall construction with a sealant. The usual installation of windows employs stuffing the void between the window and framing with fiberglass insulation. The use of a sealant on top of the insulation material acts as an air infiltration barrier. Insulation by itself is not a good air infiltration barrier. Remember, if air can pass through, so can sound.

7. Avoid large picture windows and sliding glass doors on sides of the dwelling, which face the flight track.

Methods for Improving Door Sound Insulation in New Homes

1. Double door construction should be considered for all hinged door openings to the exterior. Such doors should be side hinged and shall be solid core wood or insulated hollow metal at least one and three-fourths inch (1-3/4”) thick separated by an airspace of at least three inches (3”) from another door, storm door. Both doors shall be tightly fitted and weather-stripped.

2. All doors, shall be at least three-sixteenths (3/16”) thick. Glass of double sliding doors shall not be of equal thickness.

3. The perimeter of doorframes shall be sealed airtight to the exterior wall construction (framing). Stuff the gap between the doorframe and the framing with insulation and seal with a non-hardening caulk. Remember, if air can pass through, so can sound.

4. Glass in doors should be sealed in an airtight non-hardening sealant or in a soft elastomer gasket or gasket tape.

Methods for Improving Sound Insulation in Existing Homes

The best time to consider sound attenuation is during the construction of new homes. Retrofitting an existing home for sound attenuation can be costly. If one is considering retrofitting for sound attenuation, it is best done during a planned renovation project. As mentioned earlier in this guide, windows are generally the weakest link in sound

attenuation. Some of the simpler and easiest ways to attain sound attenuation is by a combination of the following:

1. Add insulation in the attic to an overall R-Value thickness of R-38.

2. Caulk around all penetrations through the interior finishes. (Receptacles, light fixtures, plumbing drains, etc.)

3. Install single pane storm windows over existing single pane windows.

4. Install weather-stripping on all doors.

5. Employ any of the methods described in Methods for Improving Sound Attenuation in New Homes as the project allows.

Methods of Noise and Vibration Control In Residential HVAC Systems

1. Mount the motor/fan at grade level on factory-supplied vibration isolators to minimize vibration transmitted to the house.

2. If fans or other pieces of equipment are located in the attic, use mounting bases and vibration isolators to reduce structure borne noise and vibration transmission.

3. Install flexible duct connectors to limit vibration transmitted to the ductwork or the dwelling structure.

4. Use standard sheet metal ductwork in attics and crawlspaces. Ductwork is exposed to higher levels of aircraft noise in these spaces. Do not use flexible ductwork in attic spaces since it does not have as good sound-insulating properties as standard sheet metal.

5. Supply grilles in rooms should be of the opposed-blade type and be designed for low noise.

6. A duct sound trap (muffler) should be installed just inside the fresh-air inlet opening. The sound trap will reduce any aircraft noise that passes through this opening and will eliminate the possibility of aircraft noise being transmitted via the duct path.

COMPARISON OF COMPONENTS FOR SOUND ATTENUATION

Component	*Regular*	*Sound Attenuation*
Door		
3/0 X 6/8 insulated embossed 6 panel exterior steel door	$ 175.00	175.00
Windows Length X Width United Inch = UI Windows compared are 1 over 1 with grids		
Up to 64 Ul	$214.00	$222.90
64 to 69 Ul	$231.20	$241.10
69 to 74 Ul	$248.40	$259.30
74 to 79 UI	$ 265.60	$ 277.40
79 to 84 U1	$282.80	$295.60
84 to 89 UI	$ 300.20	$ 314.00
89 to 94 Ul	$317.30	$332.00
94 to 99 U1	$334.50	$350.30
99 to 104 UI	$352.00	$368.00
Over lO4 Ul	$3.52 per UI	$3.68perUi
Insulation/Sound Batting Walls		
3.5 inch stud cavity: R-13 Fiberglass Batt	$ 0.36 psf	$0.36 psf
3.5 inch stud cavity: R-13 Cellulose Sprayed	$ 0.70	$0.70 psf
5.5 inch stud cavity: R-19 Fiberglass Batt	$ 0.39	$0.39 psf
5.5 inch stud cavity: R-19 Cellulose Sprayed	$ 0.90	$ 0.90 psf
Insulation/Sound Batting Ceilings		
R-30 Fiberglass Batt	$ 0.61 psf	$ 0.61 psf
R-38 Fiberglass Batt	$ 0.80 psf	$ 0.80 psf
R-30 Fiberglass Blown	$ 0.40 psf	$ 0.40 psf
R-38 Fiberglass Blown	$ 0.50 psf	$ 0.50 psf
R-30 Cellulose Sprayed	$ 0.32 psf	$ 0.32 psf
R-38 Cellulose Sprayed	$ 0.42 psf	$ 0.42 psf
Drywall		
1/2 inch X 4 ft. X 12 ft.	$ 8.98 per sheet	$ 8.98 per sheet
5/8 inch X 4 ft X 12 ft.	$10.56 per sheet	$ 10.56 per sheet
Miscellaneous		
Seal/Caulk around 3/0 X 5/0 window with non-hardening caulk assuming 3/8-inch crack		$ 5.00 per window
Seal/Caulk around 3/0 X 6/8 doors with non-hardening caulk assuming 3/8-inch crack		$ 6.00 per door
Insulate metal exhaust duct on exterior of duct		$ 2.50 per foot

Values in this table are for comparison only and are not intended to be a guaranteed price quote for any product.

Note: Standards may differ by geographic region.

APPENDIX 3

2005 JLUS-Related Virginia State Legislature Amendments

S 1160: An Act to amend and reenact 152-2295 of the Code of Virginia, relating to airport noise zones.

S 1161: An Act to amend and reenact 55-518 through 55-521 and 55-524 of the Code of Virginia and to amend the Code of Virginia by adding a section numbered 55-519.1 relating to the Virginia Residential Property Disclosure Act; required disclosures for properties adjacent to a military air installation.

S 1162: An Act to amend the Code of Virginia by adding a section numbered 55-248.121:1, relating to the Virginia Residential Landlord and Tenant Act; required disclosures for properties located adjacent to a military air installation.

VIRGINIA ACTS OF ASSEMBLY — CHAPTER

An Act to amend and reenact § 15.2-2295 of the Code of Virginia, relating to airport noise zones.

[S 1160]

Approved

Be it enacted by the General Assembly of Virginia:

1. That § 15.2-2295 of the Code of Virginia is amended and reenacted as follows:

§ 15.2-2295. Aircraft noise attenuation features in buildings and structures within airport noise zones.

Any locality in whose jurisdiction, or adjacent jurisdiction, is located a licensed airport or United States government or military air facility, may enforce building regulations relating to the provision or installation of acoustical treatment measures in residential buildings and structures, or portions thereof, other than farm structures, for which building permits are issued after January 1, 2003, in areas affected by above average noise levels from aircraft due to their proximity to flight operations at nearby airports. *Any locality in whose jurisdiction a United States Master Jet Base is located or any adjacent locality may, in addition, adopt and enforce building regulations relating to the provision or installation of acoustical treatment measures applicable to buildings and structures, or portions thereof, in Assembly, Business, Educational, Institutional, and Mercantile groups, as defined in the International Building Code.*

In establishing the regulations, the locality may adopt one or more noise overlay zones as an amendment to its zoning map and may establish different measures to be provided or installed within each zone, taking into account the severity of the impact of aircraft noise upon buildings and structures within each zone. Any such regulations or amendments to a zoning map shall provide a process for reasonable notice to affected property owners. Any regulations or amendments to a zoning map shall be adopted in accordance with this chapter. A statement shall be placed on all recorded surveys, subdivision plats and all final site plans approved after January 1, 2003, giving notice that a parcel of real property either partially or wholly lies within an airport noise overlay zone. No existing use of property which is affected by the adoption of such regulations or amendments to a zoning map shall be considered a nonconforming use solely because of the regulations or amendments. The provisions of this section shall not affect any local aircraft noise attenuation regulations or ordinances adopted prior to the effective date of this act, and such regulations and ordinances may be amended provided the amendments shall not alter building materials, construction methods, plan submission requirements or inspection practices specified in the Virginia Uniform Statewide Building Code.

VIRGINIA ACTS OF ASSEMBLY — CHAPTER

An Act to amend and reenact §§ 55-518 through 55-521 and 55-524 of the Code of Virginia and to amend the Code of Virginia by adding a section numbered 55-519.1 relating to the Virginia Residential Property Disclosure Act; required disclosures for properties adjacent to a military air installation.

[S 1161]

Approved

Be it enacted by the General Assembly of Virginia:

1. That §§ 55-518 through 55-521 and 55-524 of the Code of Virginia are amended and reenacted and the Code of Virginia is amended by adding a section numbered 55-519.1 as follows:

§ 55-518. Exemptions.

A. The following are specifically excluded from the provisions of this chapter:

1. Transfers pursuant to court order including, but not limited to, transfers ordered by a court in administration of an estate, transfers pursuant to a writ of execution, transfers by foreclosure sale, transfers by a trustee in bankruptcy, transfers by eminent domain, and transfers resulting from a decree for specific performance.

2. Transfers to a beneficiary of a deed of trust by a trustor or successor in interest who is in default; transfers by a trustee under a deed of trust pursuant to a foreclosure sale, or transfers by a beneficiary under a deed of trust who has acquired the real property at a sale conducted pursuant to a foreclosure sale under a deed of trust or has acquired the real property by a deed in lieu of foreclosure.

3. Transfers by a fiduciary in the course of the administration of a decedent's estate, guardianship, conservatorship, or trust.

4. Transfers from one or more co-owners solely to one or more other co-owners.

5. Transfers made solely to any combination of a spouse or a person or persons in the lineal line of consanguinity of one or more of the transferors.

6. Transfers between spouses resulting from a decree of divorce or a property settlement stipulation pursuant to the provisions of Title 20.

7. Transfers made by virtue of the record owner's failure to pay any federal, state, or local taxes.

8. Transfers to or from any governmental entity or public or quasi-public housing authority or agency.

9. Transfers involving the first sale of a dwelling*; provided, that this exemption shall not apply to the disclosures required by § 55-519.1*.

B. Notwithstanding the provisions of subdivision 9 of this section, the builder of a new dwelling shall disclose in writing to the purchaser thereof all known material defects which would constitute a violation of any applicable building code. The disclosure required by this subsection shall be made by a builder (i) when selling a completed dwelling, before acceptance of the purchase contract or (ii) when selling a dwelling before or during its construction, after issuance of a certificate of occupancy. Such disclosure shall not abrogate any warranty or any other contractual obligations the builder may have to the purchaser. The disclosure required by this subsection may be made on the disclosure form described in § 55-519. The builder may not satisfy the requirements of this subsection by the use of the disclaimer statement described in § 55-519. If no defects are known by the builder to exist, no written disclosure is required by this subsection.

§ 55-519. Required disclosures.

A. With regard to transfers described in § 55-517 of this chapter, the owner of the residential real property shall furnish to a purchaser one of the following:

1. *Except with respect to the disclosures required by § 55-519.1,* a residential property disclaimer statement in a form provided by the Real Estate Board stating that the owner makes no representations or warranties as to the condition of the real property or any improvements thereon, and that the purchaser will be receiving the real property "as is," that is, with all defects which may exist, if any, except as otherwise provided in the real estate purchase contract; or

2. A residential property disclosure statement disclosing those items contained in a form provided by the Real Estate Board to implement the provisions of this chapter and to list items which are required to be disclosed relative to the physical condition of the property. Such disclosure form may include defects of which the owner has actual knowledge regarding: (i) the water and sewer systems, including the source of household water, water treatment system, and sprinkler system; (ii) insulation; (iii) structural systems, including roof, walls, floors, foundation and any basement; (iv) plumbing, electrical, heating

and air conditioning systems; (v) wood-destroying insect infestation; (vi) land use matters; (vii) hazardous or regulated materials, including asbestos, lead-based paint, radon and underground storage tanks; and (viii) other material defects known to the owner. The disclosure form shall contain a notice to prospective purchasers and owners (a) that the prospective purchaser and the owner may wish to obtain professional advice or inspections of the property and (b) that information is available at the Department of Environmental Quality which identifies confirmed releases or discharges of oil which may affect the property. The disclosure form shall also contain a notice to purchasers that the information contained in the disclosure is the representations of the owner and is not the representations of the broker or salesperson, if any. The owner shall not be required to undertake or provide any independent investigation or inspection of the property in order to make the disclosures required by this chapter.

B. The disclosure and disclaimer forms shall contain a notice to purchasers that regardless of whether the owner proceeds under subdivision 1 or 2 of subsection A, the owner makes no representations with respect to any matters which may pertain to parcels adjacent to the subject parcel. Further, such notice shall advise purchasers to exercise whatever due diligence a particular purchaser deems necessary with respect to adjacent parcels in accordance with terms and conditions as may be contained in the real estate purchase contract, but in any event, prior to settlement on a parcel of residential real property.

C. The disclosure and disclaimer forms shall contain a notice to purchasers that whether the owner proceeds under subdivision 1 or 2 of subsection A, purchasers should exercise whatever due diligence they deem necessary with respect to information on any sexual offenders registered under Chapter 23 (§ 19.2-387 et seq.) of Title 19.2, including how to obtain such information.

§ 55-519.1. Required disclosures for properties located adjacent to a military air installation.

The owner of residential real property located in any locality in which a military air installation is located, or in any adjacent locality, shall furnish to the purchaser on a form provided by the Real Estate Board, a written disclosure stating that such property is located in a noise zone or accident potential zone, or both, as designated by the locality in its official zoning map. Such disclosure shall state the specific noise zone or accident potential zone, or both, in which the property is located according to the official zoning map.

§ 55-520. Time for disclosure; cancellation of contract.

A. The owner of residential real property subject to this chapter shall deliver to the purchaser the written disclosures or disclaimer required by this chapter prior to the acceptance of a real estate purchase contract. For the purposes of this chapter, a "real estate purchase contract" means a contract for the sale, exchange, or lease with option to buy of real estate subject to this chapter, and "acceptance" means the full execution of a real estate purchase contract by all parties. The residential property disclaimer statement or residential property disclosure statement may be included in the real estate purchase contract, in an addendum thereto, or in a separate document.

B. If the disclosure or disclaimer required by this chapter is delivered to the purchaser after the acceptance of the real estate purchase contract, the purchaser's sole remedy shall be to terminate the real estate purchase contract at or prior to the earliest of (i) three days after delivery of the disclosure or disclaimer in person~~,~~*;* or (ii) five days after the postmark if the disclosure or disclaimer is deposited in the United States mail, postage prepaid, and properly addressed to the purchaser~~,~~*;* or (iii) settlement upon purchase of the property~~,~~*;* or (iv) occupancy of the property by the purchaser~~,~~*;* or (v) the execution by the purchaser of a written waiver of the purchaser's right of termination under this chapter contained in a writing separate from the real estate purchase contract~~,~~*;* or (vi) the purchaser making written application to a lender for a mortgage loan where such application contains a disclosure that the right of termination shall end upon the application for the mortgage loan. In order to terminate a real estate purchase contract when permitted by this chapter, the purchaser must, within the times required by this chapter, give written notice to the owner either by hand delivery or by United States mail, postage prepaid, and properly addressed to the owner. If the purchaser terminates a real estate purchase contract in compliance with this chapter, the termination shall be without penalty to the purchaser, and any deposit shall be promptly returned to the purchaser. Any rights of the purchaser to terminate the contract provided by this chapter shall end if not exercised prior to the earlier of (i) the making of a written application to a lender for a mortgage loan where the application contains a disclosure that the right of termination shall end upon the application for the mortgage loan or (ii) settlement or occupancy by the purchaser, in the event of a sale, or occupancy, in the event of a lease with option to purchase.

C. Notwithstanding the provisions of subsection B or of subdivision B 2 of § 55-524, no purchaser of residential real property located in a noise zone designated on the official zoning map of the locality as having a day-night average sound level of less than 65 decibels shall have the right to terminate a real estate purchase contract pursuant to this section for failure of the property owner to timely provide any disclosure required by § 55-519.1.

§ 55-521. Owner liability.

A. *Except with respect to the disclosures required by § 55-519.1,* the owner shall not be liable for

any error, inaccuracy or omission of any information delivered pursuant to this chapter if: (i) the error, inaccuracy or omission was not within the actual knowledge of the owner or was based on information provided by public agencies or by other persons providing information as specified in subsection B that is required to be disclosed pursuant to this chapter, or the owner reasonably believed the information to be correct, and (ii) the owner was not grossly negligent in obtaining the information from a third party and transmitting it. *The owner shall not be liable for any error, inaccuracy, or omission of any information required to be disclosed by § 55-519.1 if the error, inaccuracy, or omission was the result of information provided by an officer or employee of the locality in which the property is located.*

B. The delivery by a public agency or other person, as described in subsection C below, of any information required to be disclosed by this chapter to a prospective purchaser shall be deemed to comply with the requirements of this chapter and shall relieve the owner of any further duty under this chapter with respect to that item of information.

C. The delivery by the owner of a report or opinion prepared by a licensed engineer, land surveyor, geologist, wood-destroying insect control expert, contractor or other home inspection expert, dealing with matters within the scope of the professional's license or expertise, shall satisfy the requirements of subsection A if the information is provided to the owner pursuant to a request therefor, whether written or oral. In responding to such a request, an expert may indicate, in writing, an understanding that the information provided will be used in fulfilling the requirements of this chapter and, if so, shall indicate the required disclosures, or portions thereof, to which the information being furnished is applicable. Where such a statement is furnished, the expert shall not be responsible for any items of information, or, portions thereof, other than those expressly set forth in the statement.

§ 55-524. Actions under this chapter.

A. Notwithstanding any other provision of this chapter or any other statute or regulation, no cause of action shall arise against an owner or a real estate licensee for failure to disclose that an occupant of the subject real property, whether or not such real property is subject to this chapter, was afflicted with human immunodeficiency virus (HIV) or that the real property was the site of:

1. An act or occurrence which had no effect on the physical structure of the real property, its physical environment, or the improvements located thereon; or

2. A homicide, felony, or suicide.

B. The purchaser's remedies hereunder for failure of an owner to comply with the provisions of this chapter are as follows:

1. In the event of a misrepresentation in any residential property disclosure statement or failure to deliver a disclosure or disclaimer statement, an action for actual damages suffered as a result of defects existing in the property as of the date of execution of the real estate purchase contract which would have been disclosed by a disclosure in compliance with this chapter and of which the purchaser was not aware at the time of settlement if by sale of the property, or occupancy by the purchaser if by lease with the option to purchase; or

2. In the event of a misrepresentation in any residential property disclosure statement or the failure to provide the disclosure or disclaimer required by this chapter, the contract may be terminated subject to the provisions of subsection B of § 55-520.

3. In the event the owner fails to provide the disclosure required by § 55-519.1, or the owner misrepresents, willfully or otherwise, the information required in such disclosure, except as result of information provided by an officer or employee of the locality in which the property is located, the purchaser may maintain an action to recover his actual damages suffered as the result of such violation. Notwithstanding the provisions of this subdivision, no purchaser of residential real property located in a noise zone designated on the official zoning map of the locality as having a day-night average sound level of less than 65 decibels shall have a right to maintain an action for damages pursuant to this section.

C. Any action brought under this subsection shall be commenced within one year of the date the purchaser received the disclosure or disclaimer statement. If no disclosure or disclaimer statement was delivered to the purchaser, an action shall be commenced within one year of the date of settlement if by sale, or occupancy if by lease with an option to purchase.

Nothing contained herein shall prevent a purchaser from pursuing any remedies at law or equity otherwise available against an owner in the event of an owner's intentional or willful misrepresentation of the condition of the subject property.

2. That the Real Estate Board shall promulgate regulations containing the forms for the disclosures required by the provisions of this act to be effective within 280 days of its enactment.

VIRGINIA ACTS OF ASSEMBLY — CHAPTER

An Act to amend the Code of Virginia by adding a section numbered 55-248.12:1, relating to the Virginia Residential Landlord and Tenant Act; required disclosures for properties located adjacent to a military air installation.

[S 1162]

Approved

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding a section numbered 55-248.12:1 as follows:

§ 55-248.12:1. Required disclosures for properties located adjacent to a military air installation; remedy for nondisclosure.

A. Notwithstanding the provisions of subdivision A 10 of § 55-248.5, the landlord of property in any locality in which a military air installation is located, or any person authorized to enter into a rental agreement on his behalf, shall provide to a prospective tenant a written disclosure that the property is located in a noise zone or accident potential zone, or both, as designated by the locality on its official zoning map. Such disclosure shall be provided prior to the execution by the tenant of a written lease agreement or, in the case of an oral lease agreement, prior to occupancy by the tenant. The disclosure shall specify the noise zone or accident potential zone in which the property is located according to the official zoning map of the locality. A disclosure made pursuant to this section containing inaccurate information regarding the location of the noise zone or accident potential zone shall be deemed as nondisclosure unless the inaccurate information is provided by an officer or employee of the locality in which the property is located.

B. Any tenant who is not provided the disclosure required by subsection A may terminate the lease agreement at any time during the first 30 days of the lease period by sending to the landlord by certified or registered mail, return receipt requested, a written notice of termination. Such termination shall be effective as of (i) 15 days after the date of the mailing of the notice or (ii) the date through which rent has been paid, whichever is later. In no event, however, shall the effective date of the termination exceed one month from the date of mailing. Termination of the lease agreement shall be the exclusive remedy for the failure to comply with the disclosure provisions of this section, and shall not affect any rights or duties of the landlord or tenant arising under this chapter, other applicable law, or the rental agreement.

APPENDIX 4

Prepared by:
Escambia County Attorney's Office
14 West Government Street, Room 411
Pensacola, Florida 32502
850/595-4970

AVIGATION EASEMENT

THIS GRANT OF AN AVIGATION EASEMENT made this _____ day of _____, 2004, by and between _____, whose mailing address is _____ ("Grantor," which term shall include the singular and plural, masculine and feminine), and Escambia County, a political subdivision of the State of Florida, acting by and through its duly authorized Board of County Commissioners, whose mailing address is 223 Palafox Place, Pensacola, Florida 32502 ("Grantee").

WITNESSETH

WHEREAS Grantor is the owner of certain real property located in Escambia County, Florida; and

WHEREAS, Grantee requires, as a condition precedent to the development or use of the property, conveyance from Grantor of an Avigation Easement; and

WHEREAS Grantor has agreed to grant an Avigation Easement to Grantee in and over Grantor=s property under the terms and conditions set forth in this instrument;

NOW, THEREFORE, Grantor, for good and valuable consideration the receipt and sufficiency of which is acknowledged, does grant to Grantee and Grantee=s heirs, assigns, successors, and legal representatives, a perpetual Avigation Easement in and over the following described property (Property):

See legal description attached as Exhibit A

This Avigation Easement is granted with the following express terms and conditions:

1. Grantor grants, bargains, sells, and conveys to Grantee, its successors and assigns, for the use and benefit of Grantee and any civilian or military airfields that may be located in Escambia County and any operators, owners, or users of civilian or military Aircraft that may operate in the airspace in and above Escambia County, a perpetual Avigation Easement for the free and unobstructed flight of Aircraft ("Aircraft" being defined for the purpose of this instrument as any contrivance now known or hereafter invented, used, or designed for flight in and through the air) in and through the airspace above, over, and across the surface of the Property, together with the right to create or cause in the airspace such noise, vibrations, odors, vapors, exhaust, smoke, dust or other effects that may be inherent in the operation of Aircraft, and for the use of the airspace by Aircraft for launching from, maneuvering about, and landing at local civilian or military airfields.

2. Nothing in this instrument shall operate to preclude claims by Grantor, his heirs, assigns, successors, and legal representatives, for any physical injuries or damages caused by Aircraft crashing into or otherwise coming into direct physical contact with the Property or persons located thereon.

3. Grantor, for himself, his heirs, assigns, successors, and legal representatives, expressly releases and forever discharges Grantee, its elected or appointed officials, representatives, agents, employees, and any operators, owners, or users of civilian or military Aircraft or airfields, from any and all liability whatsoever, including any and all suits, claims, debts, obligations, costs, expenses, actions, or demands, vested or contingent, known or unknown, whether for injuries to persons or damages to property, which Grantor may own, hold, or assert by reason of noise, vibrations, odors, vapors, exhaust, smoke, dust or other effects that may be inherent in the operation of Aircraft, caused or created by the flight or passage of Aircraft in or through the airspace subject to the easement described in this instrument. Additionally, Grantor, for himself, his heirs, assigns, successors, and legal representatives, waives any and all right to sue Grantee, its elected or appointed officials, representatives, agents, or employees, and any operators, owners, or users of civilian or military Aircraft or airfields, and agrees to dismiss any and all such suits that may be now or subsequently asserted against Grantee, its elected or appointed officials, representatives, agents, or employees, and any operators, owners, or users of civilian or military Aircraft or airfields, for injuries to persons or damage to property arising from noise, vibrations, odors, vapors, exhaust, smoke, dust or other effects that may be inherent in the operation of Aircraft, caused or created by the flight or passage of Aircraft in or through the airspace subject to the easement described in this instrument. Grantor acknowledges that the above-stated consideration is all that Grantor will receive for this easement and no promise for any other or further consideration has been made by anyone. Grantor further acknowledges that Grantor is executing this instrument solely in reliance upon his own knowledge, belief, and judgment and not upon any representations made by any party released or others in their behalf.

4. Grantor shall not build, construct, cause or permit to be built or constructed, or permit to remain on the Property any building or structure that would interfere with the rights conveyed by this instrument or that would violate any local, state, or federal law or regulation regarding the operation of Aircraft or airfields.

5. Grantor shall not use or permit the use of the Property in such a manner as to create electrical, electronic, or other interference with radio, radar, microwave, or other similar means of Aircraft communications, or to make it difficult for pilots to distinguish between airfield navigation lights and visual aids and other lights, or to result in glare or other condition that would impair the vision of pilots, or to otherwise endanger the operation of Aircraft.

6. In the event of any violation of the rights and restrictions contained in this instrument, Grantee shall have the right, at its sole option after giving five (5) days prior notice to Grantor, to use any and all means to remedy the violation. Additionally, Grantee shall have a perpetual easement for ingress to and egress from the Property for the purpose of inspecting or removing any instrumentality that may be causing or contributing to a violation of the rights and restrictions conveyed by this instrument.

7. Grantor acknowledges that the Property is located in an area impacted by Aircraft noise and that present and future Aircraft noise may interfere with the unrestricted use and enjoyment of the Property. Grantor further acknowledge that Aircraft noise may change over time by virtue of greater numbers of Aircraft, louder Aircraft, variations in airfield operations, and changes in airfield and air traffic control procedures.

8. This Avigation Easement and all of the terms and conditions described in this instrument shall run with the land in perpetuity and shall be binding upon Grantor and his heirs, assigns, successors and legal representatives.

9. In the event that one or more of the provisions contained in this instrument or any part thereof or any application thereof shall be held invalid, illegal, or unenforceable in any respect by a court of competent jurisdiction, the validity, legality and enforceability of the remaining provisions shall not be affected or impaired and shall remain in full force and effect.

10. In the event that any civilian or military airfield adjacent to the Property ceases to operate, or if such other circumstances subsequently arise that would obviate the purpose underlying this instrument, then Grantor, his heirs, assigns, successors, and legal representatives, may petition the Board of County Commissioners of Escambia County to terminate this Avigation Easement. If the Board of County Commissioners approves the termination of this Avigation Easement, then it shall promptly execute and record in the public records an appropriate document reflecting the termination.

11. Grantor, for himself and his heirs, assigns, successors, and legal representatives, covenants with Grantee, its successors and assigns, that Grantor is lawfully seized and possessed of the Property in fee simple, has a good right and full power to grant, bargain, sell and convey this Avigation Easement over the Property.

IN WITNESS WHEREOF Grantor has executed this instrument on the date first above written.

APPENDIX 4

GRANTOR:

Witness _____
Print Name _____

Witness _____ By:_____
Print Name _____

STATE OF FLORIDA
COUNTY OF ESCAMBIA

The foregoing instrument was acknowledged before me this _____ day of _____, 2004, by _____. He/She (_) is personally known to me, (_) produced current _____ as identification.

_____
Signature of Notary Public

_____
Printed Name of Notary Public

(Notary Seal)

GRANTOR:

Witness _____
Print Name _____

Witness _____ By:_____
Print Name _____

STATE OF FLORIDA
COUNTY OF ESCAMBIA

The foregoing instrument was acknowledged before me this _____ day of _____, 2004, by _____. He/She is (_) personally known to me, (_) produced current _____ as identification.

_____
Signature of Notary Public

_____
Printed Name of Notary Public

(Notary Seal)

APPENDIX 4

ACCEPTANCE

This Avigation Easement accepted by Escambia County, Florida on the _____ day of _____, 2004, as authorized by the Board of County Commissioners of Escambia County, Florida at its meeting held on the _____ day of _____, 2004.

BOARD OF COUNTY COMMISSIONERS
ESCAMBIA COUNTY, FLORIDA

_____
Marie Young, Chairman

ATTEST: Ernie Lee Magaha
Clerk of the Circuit Court

_____
Deputy Clerk

(Seal)

APPENDIX 4

GRANTOR:

_____
(name of corporation or other business entity)

Witness _____
Print Name _____

Witness _____ By: _____
Print Name _____ (signature)

_____
(name/title)

STATE OF FLORIDA
COUNTY OF ESCAMBIA

The foregoing instrument was acknowledged before me this _____ day of _____, 2004, by _____ as _____ (title) of _____(name of corporation or other business entity). He/She (_) is personally known to me, (_) produced current _____ as identification.

_____
Signature of Notary Public

_____
Printed Name of Notary Public

(Notary Seal)

APPENDIX 5

Statement of Understanding
City of Virginia Beach and United States Navy

March 15, 2005

PREAMBLE

Representatives of the U.S. Navy, Naval Air Station Oceana, and the City of Virginia Beach, together comprising the Joint Land Use Study sub-committee formed on February 10, 2005 have reached an UNDERSTANDING THAT:

- The meetings and discussions engaged in by the Joint Land Use Study sub-committee represent the most frank and in-depth dialogue concerning encroachment and incompatible development to have ever taken place between the Navy and the City. The Navy and the City will engage in a continuing dialogue with respect to encroachment upon military installations, and with respect to any new or evolving regulations and instructions concerning encroachment.

- As part of the process described below, from this point forward any person, persons or those persons representing any group or organization proposing development that is incompatible with Chief of Naval Operations Instruction 11010.36B of 19 December 2002, *Air Installations Compatible Use Zones (AICUZ) Program*, or otherwise encroaches upon NAS Oceana and its environs, will be asked by the City of Virginia Beach to meet with Navy officials so that:

    - NAS Oceana's mission, and its importance to U.S. Navy mission readiness, national defense and homeland security requirements, can be explained.

    - A description or demonstration of the sounds created by military operations with respect to the type of structures proposed can be given.

    - If no other recourse is available, a request can be made for a voluntary reconsideration of the type of development proposed to one that offends the criteria of the AICUZ program to the least possible degree.

- The Navy and the City understand the value of developing a process whereby the Navy will be informed of, and afforded an opportunity to comment upon, *all* development that may be incompatible with military operations.

1. With regard to the responsibilities of, and the actions by, the Navy and the City regarding the effort to restrain encroachment and incompatible development:

- The Navy and the City both understand that any opinion expressed by the Navy concerning proposed development must be wholly in accordance with Chief of Naval Operations Instruction 11010.36B of 19 December 2002, *Air Installations Compatible Use Zones (AICUZ) Program*.

- The City understands the Navy position is now, and has been, that residential development in areas of 65 dB DNL and greater is discouraged and that this position is in accord with the AICUZ program.

- The Navy acknowledges that the responsibility for enacting, amending, repealing and otherwise developing and promulgating zoning ordinances, codes and laws lies solely with the City of Virginia Beach, subject to statutory and constitutional requirements.

- The Navy acknowledges that under Virginia law, property owners may not be denied reasonable use of their property and may develop their land without approval by the City Council in accordance with established zoning regulations.

    - The Navy and the City acknowledge that they differ in their application of "residential density" when it is used in the context of encroachment and incompatible development. Specifically:

    - The Navy uses "residential density" to refer to the number of dwelling units in a defined area actually in existence at the time that area is discussed.

    - The City uses the term "residential density" to refer to the number of dwelling units in a defined area that would exist if that area were developed to the extent allowed by existing zoning.

    - The General Assembly has enacted legislation requiring disclosure in *any* sale or lease of residential real estate. All disclosures pertaining to Navy aircraft operations contained in any type of real estate or business transaction or agreement must be written in a straightforward, clear and otherwise unambiguous manner. In this regard, the Navy and the City agree to immediately initiate a working group to work in conjunction with the Virginia Real Estate Board to review and, if necessary, re-draft all disclosures currently in use, and to determine whether there exist any instances where disclosures are needed where none now are employed.

- The City has instituted an effective residential sound attenuation program and legislation allowing it to expand this program to certain non-residential uses has been enacted by the General Assembly. Personnel associated with the program must be

fully aware of the varying efficacy of sound attenuation practices, as measured by sound transmission class indicators, when confronted with different sound frequencies generated by Navy aircraft. Greater effort will be made to educate the public, in general, and property owners, in particular, regarding the difference between average noise designations shown on the AICUZ map and event noise experienced in real life. The Navy and the City agree to work collaboratively to assist each other in matters of technical information and instruction in this regard.

2. With regard to the U.S. Navy and NAS Oceana:

- NAS Oceana is the most encroached-upon military airfield in the United States. Encroachment has occurred since the installation's inception, and includes the type of high-density, residential and commercial development that now threatens the viability of the station's mission.

- NAS Oceana officials have discouraged incompatible development around the station since at least the 1960s. Navy policy, as published in pertinent instructions, has also consistently discouraged incompatible development around air installations since before the Noise Control Act of 1972.

- During the late 1970s and early 1980s, the Navy and the federal government undertook a program to buffer the installation from encroachment by purchasing property outright and by purchasing and acquiring easements on surrounding properties in the form of development rights. The Navy acquired these property interests publicly, sometimes in coordination with initiatives of the City of Virginia Beach Development Authority.

- With respect to accommodating the sensibilities of the surrounding communities, NAS Oceana officials have voluntarily modified flight arrival and departure procedures. These modifications have resulted in flight procedures/training that do not replicate actual aircraft carrier operating procedures.

- NAS Oceana is a pre-eminent Navy installation. It is also now, however, a vital component in the architecture of the Defense Department's joint service method of operational planning and execution and in the newly-emerging inter-agency approach to meeting homeland defense requirements.

3. With regard to the City of Virginia Beach and AICUZ-related initiatives:

- The City, since adopting its first Comprehensive Plan in 1979, has worked with the Navy to ensure that the initiatives of the AICUZ program have been included in each subsequent plan amendment.

- Before the revision of the OPNAV Instruction in December 2002, the City made adjustments to the City Zoning Ordinance to bring land use regulations more in line with the requirements of the AICUZ program.

- The City relocated two schools to conform to the Draft F/A –18 C/D Environmental Impact Statement.

- The City secured state enabling legislation requiring sound attenuation in residential structures and has implemented an effective residential sound attenuation program.

- In 2005, proposed legislation requiring Noise Zone/APZ disclosures in all residential real estate transactions and requiring sound attenuation in certain non-residential structures was enacted by the General Assembly.

4. With regard to the City of Virginia Beach and the oceanfront area:

- The establishment of a first class resort at the oceanfront is a strategic priority for the City of Virginia Beach. The principal initiative in this regard has been the investment in the new 19th Street Convention Center. This project is expected to be followed by the adoption of an Old Beach District Plan, as well as a revised the Oceanfront Resort Area Concept Plan, updating that adopted in 1994.

    - Over the past fifteen years, the City of Virginia Beach has invested in other major public projects at the oceanfront resort area including:

    - upgrades to Atlantic Avenue-area streets, sidewalks, utilities and park blocks;

    - the widening of more than three miles of boardwalk and the expansion of the beach for hurricane protection;

    - the expansion of the Virginia Aquarium and Marine Science Center;

    - Old Beach-area neighborhood improvements including major street and utility upgrades; and

    - the construction of a new police precinct, fire and rescue station and public library.

- As a result of these initiatives, the City of Virginia Beach is a major competitor in the tourist and convention industry and strives to maintain its standing. While significant advancements have been made, land use planning and economic goals have only been partially realized, however. The overall aspiration is the rejuvenation of the oceanfront into an area containing neighborhoods and businesses more compatible with a first-class resort and convention destination, consistent with the principles of the Comprehensive Plan. To this end, public and private investment – both in the hundreds of millions of dollars - in the oceanfront area are intended to catalyze further community revitalization and economic growth.

- The retail presence in the oceanfront area consists of many more seasonal than year-round businesses. The City of Virginia Beach believes that seasonal businesses alone do not support the vision of a first-class resort and convention destination.

Accordingly, when the Oceanfront Resort Area Concept Plan is revised, city officials intend to include a reasonable increase in the number of residential units in the oceanfront area, a number sufficient to support quality year-round retail development. This number is anticipated to be less than the aggregate additional number of units allowed by current oceanfront area zoning.

- The current number of units in this area of the City is approximately 7,000. Under current zoning, the maximum number of units allowed is more than double this figure, approximately 16,000.

- The City understands that the Navy is deeply concerned about the impact of aircraft operations on the proposed development of the resort area. The City of Virginia Beach will address these concerns to the greatest extent possible by inviting the Navy, as well as other stakeholders, to participate in the process of drafting the Oceanfront Resort Area Concept Plan. The City recognizes that, in order to meet the objectives of both the City and the Navy, the applicable zoning regulations must be totally restructured. Among the City's objectives is an increase in the number of residential units currently existing, but substantially less than currently allowed.

5. With regard to the City of Virginia Beach and the western portion of the Transition Area, e.g., that portion of the Transition Area west of West Neck Creek, also known as the Interfacility Traffic Area:

- Both the Navy and the City understand the importance of this portion of the Transition Area in any discussion of encroachment in two key regards:

    - this area is largely undeveloped and thus presents the best opportunity to prevent, to the greatest degree possible, further incompatible development; and

    - this area lies beneath the airspace most commonly used by Navy aircraft not only arriving and departing from NAS Oceana, but also transiting between NAS Oceana and NALF Fentress at lower altitudes.

- With regard to particular means to restrain encroachment and incompatible development inside the Transition Area:

    - The Navy acknowledges that the Virginia Beach Comprehensive Plan now contemplates development with residential density not to exceed one residential dwelling unit per developable acre, but that with few exceptions current zoning does not allow this density.

- The Navy and the City further acknowledge that, according to AICUZ restrictions, residential development in areas of 65dB DNL and greater is not compatible with airfield operations. The City proposes the following:

- For those portions of the Interfacility Traffic Area that lie within the greater than 75 dB DNL Noise Zone, the City reaffirms existing planning policy that no additional residential units above those allowed by right should be permitted. In Agricultural Zoning Districts, the maximum by-right density is one residential lot per 15 acres of land.

- For those portions of the Interfacility Traffic Area that lie within the 70-75 dB DNL Noise Zone, the City will amend its Comprehensive Plan to reflect the need to retain predominantly agricultural zoning, in which residential density not exceeding one dwelling unit per five acres is allowed by conditional use permit.

- For those portions of the Interfacility Traffic Area that lie within the 65-70 dB DNL Noise Zone, the Comprehensive Plan will continue to contemplate residential density not exceeding one unit per developable acre.

- The Navy and the City acknowledge that preserving undeveloped property in the Transition Area is a major priority. Any initiatives of other agencies that advance mutually beneficial outcomes, including environmental protection and wetland mitigation, should be vigorously explored.

6. With regard to other AICUZ-related issues:

- The Navy and the City recognize that "by-right" development, e.g., development allowed without the approval by the City Council, sometimes results in development that is incompatible with military operations.

- The Navy acknowledges that the City has certain legal responsibilities regarding "by-right" development (i.e., development that is allowed without *specific* approval of the City Council) and that, in such cases, review and approval is ministerial, not discretionary. In those cases in which development is not "by-right," thus requiring approval City Council, the Navy also acknowledges that the City must permit a reasonable use of the property.

- The Navy and the City recognize that transportation is an issue of significant concern. Future development contemplated in the Comprehensive Plan will require a range of alternative transportation improvements, which are recommended as part of the Master Transportation Plan. The Navy and the City believe that strategic growth management plans should focus on three approaches concerning transportation:

    - Public facility improvements are prioritized and implemented as quickly as possible per available federal, state and local funds so that that adequate public facilities and services are available before, during and immediately after development to accommodate inter-installation movement by large vehicles.

    - Growth and development are oriented to appropriately designated areas; and

- The public and the Navy are effectively involved in any planning process, as described herein.

APPENDIX 6
Federal Sources of Funding

The United States Government offers a variety of programs that can be used to fund open space and conservation lands implementation. These are described as follows:

Community Development Block Grant Program
http://www.hud.gov/progdesc/cdbgent.cfm
The U.S. Department of Housing and Urban Development (HUD) offers financial grants to communities for neighborhood revitalization, economic development, and improvements to community facilities and services, especially in low and moderate-income areas. Several communities have used HUD funds to develop greenways. Grants from this program range from $50,000 to $200,000 and are either made to municipalities or non-profits. There is no formal application process.

Conservation and Reinvestment Act (CARA)
Federal conservation funds are available through the Conservation and Reinvestment Act (CARA). CARA will provide $12 billion over six years beginning in FY 2002. Funding for each CARA category is subject to annual appropriations, however minimum levels have been guaranteed. A sample of federal funding sources is discussed below. Additional programs are described on the EPA website (http://www.epa.gov/owow/watershed/wacademy/fund.html).

Conservation Reserve Program
http://www.fsa.usda.gov/dafp/cepd/crp.htm
The U.S. Department of Agriculture, through its Agricultural Stabilization and Conservation Service, provides payments to farm owners and operators to place highly erodible or environmentally sensitive landscapes into a 10-15 year conservation contract. The participant in return for annual payments during this period, agrees to implement a conservation plan approved by the local conservation district for converting these sensitive lands to a less intensive use. Individuals, associations, corporations, estates, trusts, cities, counties and other entities are eligible for this program. This program can be used to fund the maintenance of open space and non-public use greenways along water bodies and ridge lines.

Environmental Quality Incentive Program (EQUIP)
The Environmental Quality Incentive Program (EQUIP) is a federal program authorized in the 1996 Farm Bill that provides assistance to agricultural producers in complying with federal, state, and other environmental laws. Assistance provided through this program may be in the form of technical, cost-sharing, financial incentives, and producer education related to a broad range of soil, water, air, wildlife, and related natural resource concerns. The EQUIP assistance programs are available to crop, forage and forest products producers

as well as wetlands and wildlife landowners who choose to enter into 5- and 10-year contracts based on conservation plans for their operations. These conservation plans may include a combination of structural, vegetative, and land management components. The program prioritization is led, coordinated, and implemented on the local level.

Farmland Protection Program

The Federal Farmland Protection Program (FPP) was created in the 1996 Farm Bill. This program is administered by the Natural Resources Conservation Service (NRCS) and provides federal matching funds for state and local farmland protection efforts. Funds are used to help purchase development rights to keep productive farmland in agricultural uses. Through this program, the USDA provides up to 50 percent of the fair market easement value to acquire conservation easements or other interests from farmland owners. To be eligible for funding, a state, county or local jurisdiction must have a complementary program of funding for the purchase of conservation easements, and grants are awarded competitively through the USDA's Natural Resources Conservation Service (NRCS). (For more information visit http://www.info.usda.gov/nrcs/fpcp/fpp.htm).

Hazardous Mitigation Grant Program

This program provides financial assistance to state and local governments for projects that reduce or eliminate the long-term risk to human life and property from the effects of natural hazards. The grant program has 75 percent federal and 25 percent local contribution. The nonfederal share may be met with local cash contributions, in-kind services, or certain other grants such as Community Development Block Grants. The Federal Emergency Management Agency makes the final decisions on project eligibility, but the state agencies administer the program. Eligible projects include acquisition of property, retrofitting of buildings, development of standards with implementation as an essential component, and structural hazard control or protection measures such as dams and sea walls.

Land and Water Conservation Fund

(http://www.ncrc.nps.gov/programs/lwcf/)

The Land and Water Conservation Fund is the largest source of federal money for park, wildlife, and open space land acquisition. The program's funding comes primarily from offshore oil and gas drilling receipts, with an authorized expenditure of $900 million each year. However, Congress generally appropriates only a fraction of this amount.

LWCF funds are apportioned by formula to all 50 states, the District of Columbia and territories. Cities, counties, state agencies, and school districts are eligible for LWCF fund monies. These funds can be used for outdoor recreation projects, including acquisition, renovation, and development. Projects require a 50 percent match.

For more information contact:
U.S. Department of the Interior
National Park Service, Recreation Programs, Room MIB-MS 3622
1849 C Street NW
Washington, DC 20240
(202) 565-1200
http://www.ncrc.nps.gov/lwcf/

Nonpoint Source Implementation Grants (319 Program)

The 319 Program provides formula grants to states so that they may implement nonpoint source mitigation projects and programs in accordance with section 319 of the Clean Water Act (CWA). Nonpoint source pollution reduction projects can be used to protect source water areas and the general quality of water resources in a watershed. Examples of previously funded projects include installation of best management practices (BMPs) for animal waste; design and implementation of BMP systems for stream, lake, and estuary watersheds; and basin-wide education programs. These grants allow for 60 percent of the cost of the project to be funded federally with a 40 percent local match. For more information contact:
U.S. Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
Nonpoint Source Control Branch (4503F)
Ariel Rios Bldg., 1200 Pennsylvania Ave., NW,
Washington, DC 20460
(202) 260-7100
http://aspe.os.dhhs.gov/cfda/p66460.htm
http://www.epa.gov/owow/nps/

Pittman-Robertson Act

The Federal Aid in Wildlife Restoration Act, popularly known as the Pittman-Robertson Act, provides funding for the selection, restoration, rehabilitation, and improvement of wildlife habitat, and wildlife management research. Funds from an 11-percent excise tax on sporting arms and ammunition are appropriated to the Secretary of the Interior and apportioned to states on a formula basis for covering costs (up to 75 percent) of approved projects. The program is cost-reimbursement in nature, requiring states to apply for reimbursement of up to 75 percent of project expenses. At least 25 percent of the project costs must be provided by the state and originate from non-federal sources.

Rivers, Trails, and Conservation Assistance Program

The National Parks service operates this program aimed at conserving land and water resources for communities. Eligible projects include conservation plans for protecting these resources, trail development, and greenway development.
http://www.ncrc.nps.gov/programs/rtca/ContactUs/cu_apply.html

Transportation and Community and System Preservation Pilot Program (TCSP)
The TCSP provides funding for a comprehensive initiative including planning grants, implementation grants, and research to investigate and address the relationships between transportation and community and system preservation and to identify private sector-based initiatives. The TCSP is a Federal Highway Administration program being jointly developed with the Federal Transit Administration, the Federal Rail Administration, the Office of the Secretary, the U.S. Department of Transportation, and the U.S. EPA. This program has been authorized $20 million for 1999, and $25 million is authorized for each of the years 2000-2003. States, MPOs, and local governments are eligible to receive planning and implementation grants for projects that: reduce impacts of transportation on the environment, reduce the need for costly future infrastructure investments, and improve the efficiency of the transportation system. Projects involving partnerships among public and private sectors are given priority.
http://www.fhwa.dot.gov/tcsp/

Transportation Equity Act for the 21st Century Funding Programs
While generally a transportation-based program, the Transportation Equity Act for the 21st Century (TEA-21) funds programs to protect the environment. Through increased funding to the Surface Transportation Program (STP) and the National Highway System (NHS), TEA-21 allows for more environmental projects. States may spend up to 20 percent of their STP dollars (used for transportation facility reconstruction, rehabilitation, resurfacing, or restoration projects) for environmental restoration and pollution abatement projects. Additionally, each state sets aside 10 percent of STP funds for transportation enhancement projects, which can include acquisition of conservation and scenic easements, wetland mitigation, and pollution abatement, as well as scenic beautification, pedestrian and bicycle trails, archaeological planning, and historic preservation. For more information contact:
http://www.istea.org/
U.S. Department of Transportation
Federal Highway Administration
400 7th Street, SW, Washington, DC 20590
(202) 366-5004
http://www.fhwa.dot.gov/tea21/

Watershed Protection and Flood Prevention (Small Watersheds) Grants
The USDA Natural Resources Conservation Service (NRCS) provides funding to state and local agencies or nonprofit organizations authorized to carry out, maintain and operate watershed improvements involving less than 250,000 acres. The NRCS provides financial and technical assistance to eligible projects to improve watershed protection, flood prevention, sedimentation control, public water-based fish and wildlife enhancements, and recreation planning. The NRCS requires a 50 percent local match for public recreation, and fish and wildlife projects.
http://www.epa.gov/owow/watershed/wacademy/fund/prevent.html

Wetlands Reserve Program

The Wetlands Reserve Program is administered through the Department of Agriculture's Natural Resources Conservation Service. This program provides landowners with financial incentives to restore and protect wetlands in exchange for retiring marginal agricultural land. Landowners may sell a permanent or a 30-year conservation easement, or they may enter into a cost-share restoration agreement for a minimum of 10-years. Participating landowners voluntarily limit future agricultural use of the land. They continue to own and control access to the land, and they may lease the land for recreational activities. The amount of funding available in a given fiscal year depends on the amount of acres Congress permits to be enrolled in the program, and a per acre value is assigned in each state. For more information contact:

U.S. Department of Agriculture
Natural Resources Conservation Service
Watersheds and Wetlands Division
P.O. Box 2890, Washington, DC 20013
(202) 690-0848
http://www.wl.fb-net.org
http://aspe.os.dhhs.gov/cfda/p10072.htm
http://www.nrcs.usda.gov/programs/wrp/
http://www.ngpc.state.ne.us/wildlife/wrp.html