



MILITARY FAMILY HOUSING STANDARDS STUDY



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EXECUTIVE SUMMARY

United States Code 10, Section 2684, enacted by Congress in 1973 and later referred to as the Military Construction (MILCON) Codification Act, established statutory maximum size limits for the construction, acquisition, and improvement of military family housing units by pay grade and number of bedrooms. These maximum net square foot size standards have remained unchanged since their development nearly 30 years ago and have been an essential part of the construction and renovation plans of the Military Services. In 2001, in an attempt to bring military family housing standards closer to equivalent units in the private sector, Congress redefined military housing policy through Section 2803 of the National Defense Authorization Act. The most significant change in the policy specifically suggested that newly constructed and/or renovated military family housing units reflect local “room pattern and floor area” standards, but the policy did not further define the acceptable segments of the local residential construction market to be targeted.

The new congressional language revoking the statutory size limits has left the Military Services without a benchmark with which to program and budget construction and renovation funds. The language has also left the Military Services without guidance in determining and recognizing what is considered adequate and what is the private sector target size for military family housing. Thus, the broad reference to the local housing market triggered the present study, within the scope of the congressional language. The study is aimed at providing a better-defined programming benchmark based on private sector standards and trends.

This study analyzes in depth detail the size and the amenities built into private sector homes. Since the inception of the congressional statutory limits in 1973, the median size of new single-family homes in the private sector has increased by over 42 percent, such that military family housing standards, for most grades, are noticeably lower than their private sector counterparts. The main objective of the study is to develop military family housing standards that reflect comparable private sector homes based on equivalent social categories similar to the pay and grade structure of the Military Services.

To analyze the private sector data properly, age and education of the head-of-household were selected as the parameters for categorizing private sector civilians into equivalent social groups comparable to the military grade group structure. These social characteristics, as structured in each military grade group, best correspond with the social characteristics of private sector civilians. Included is total family household income, which most strongly relates to affordability and a household’s ability to purchase or rent housing. The results of these analyses established the proposed size standards for the construction, renovation, and assessment of military family housing by grade group and bedroom count as presented in the Executive Summary Table.

Executive Summary Table of Proposed Military Construction Size Standards in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Renovation Minimum Adequacy	Construction/Replacement Minimum	Construction Programming Benchmark	Construction Maximum^{a,b}
E1-E3 (JENL) E4-E6 (JNCO)	2	1,080	1,180	1,340	1,500
	3	1,370	1,490	1,630	1,760
	4	1,530	1,670	1,950	2,220
	5	1,760	1,920	2,300	2,670
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,080	1,180	1,490	1,790
	3	1,530	1,670	1,860	2,050
	4	1,650	1,800	2,150	2,500
	5	1,760	1,920	2,510	3,090
E9 (SNCO) W4-W5 (WO)	3	1,590	1,740	2,020	2,300
	4	1,760	1,920	2,310	2,700
O4-O5 (FGO)	3	1,590	1,740	2,020	2,300
	4	1,760	1,920	2,310	2,700
O6 (SO)	4	1,930	2,110	2,520	2,920
O7-O10 (GO)	4	2,380	2,600	3,330	4,060

^a The maximum gross floor area may be increased by 10 percent for housing units of an officer holding a special command position, for the commanding officer of a military installation, and for the senior noncommissioned officer of a military installation.

^b The maximum gross floor area may be increased by 300 square feet for family housing units in locations where harsh climatological conditions severely restrict outdoor activity for a significant part of each year.

The proposed standards include sizes for new construction and replacement as well as guidelines for measuring minimum acceptable sizes for renovation. The proposed military construction size standards are based on private sector data for both new and existing homes of equivalent civilians. These numbers establish a construction range that defines an acceptable segment of the private sector market on which to base military family housing. The proposed construction numbers also establish a programming benchmark at the midpoint between the maximum and minimum of the construction ranges. These mid-point numbers provide standard square foot benchmark sizes to which military family housing construction funds are programmed and budgeted. With funds also programmed to standard square foot sizes by grade and bedroom count, builders/developers will have the opportunity to construct homes up to the corresponding maximum or down to but not below the corresponding minimum. Such flexibility will allow military family housing to reflect variations in local construction practices.

The proposed standards also establish minimum adequacy standards with which to assess existing military housing inventories and set forth minimum sizes for evaluating acceptable off-base rental housing. These new minimum adequacy sizes determine the functional and adequate size of existing on-base housing and help define and guide military renovation policy. The sizes ensure that military family housing units recently constructed and/or slightly smaller than the minimum of the construction ranges remain adequate in size, thereby avoiding small but costly additions to military family housing units when such additions are not necessary to meet functional space requirements.

The availability of designated amenities in private sector homes is also analyzed, specifically dining rooms, family rooms, bathrooms, washers/dryers, dishwashers, air conditioning, and garages and carports. Once the availability rates for these amenities were calculated, they were compared against existing military standards and few differences were observed. The most notable change to existing military amenity standards is the inclusion of a two-car garage in the construction of single-family units in accordance with the high rate at which this amenity occurs in the private sector. On the other hand, the requirement that clothes washers and dryers must be present in military family housing units, or that the presence of air conditioning depends on climate and location, remains unchanged.

The proposed military construction size and amenity standards are accompanied by three additional recommendations as follows:

❑ *Gross Square Feet*

Modify the Military Service's and Department of Defense policy to reflect square foot calculations in gross square foot measurements, establishing a direct comparison with the private sector's measurement of space. A universal system of measurement will ensure that private sector builders/contractors and the Military Services follow a consistent approach in the way they measure housing area, thus simplifying any subsequent updates to the size standards.

❑ *Apartment/Multifamily Units*

Earlier congressional statutory limits were universal in that they applied to all military housing units regardless of type. However, with significant differences in single-family and apartment/multifamily (apartment) units, the present study analyzed and considered different standards for each of these unit types. The private sector data revealed that the sizes of apartment units are only slightly smaller than the smallest single-family homes. Given that the Military Services typically own the land on which they build housing, the cost to construct and maintain similarly sized apartment units is greater than the cost to construct single-family detached and attached units. Therefore, the Military Services should consider not building apartment units unless restricted by site constraints, base limitations, or other factors justifying their need.

❑ *E9 Senior Noncommissioned Officers and W4/W5 Warrant Officers*

A review of the factors associated with length of time in service, level of responsibility, and age raised the question of whether the E9 and W4/W5 pay grades were properly categorized among the other ranks when accounting for changes in family housing standards. The private sector findings for a combined E9/W4/W5 grade group were nearly identical to those of the FGO grade group. Thus, based on private sector findings, the proposed size standards for a newly established E9/W4/W5 grade category are recommended to be identical to those recommended for the FGO grade group.

The size and amenity standards proposed in this study are comparable to those housing units constructed and available in the private sector in the United States. The recommendations are in line with the significant increase in the median size of new and existing private sector housing units constructed over the last three decades. The recommendations also allow the Military Services to keep a conservative and fiscally prudent pace with the housing trends of private sector individuals of comparable social status.

MILITARY SERVICES FAMILY HOUSING STANDARDS STUDY

INTRODUCTION

In 1973, Congress set size limits regarding “the construction, acquisition, and improvement” of military family housing units.¹ The limits, codified in United States Code 10, Section, 2684, later referred to as the MILCON Codification Act, specifically set statutory maximum limits on the net square foot requirements for living areas by pay grade and allowable number of bedrooms. The maximum standards have remained unchanged since their inception and have been integrated into the construction and renovation plans of each of the Military Services for nearly 30 years.

Chapter 13 of Military Handbook 1190, dated September 1987, further establishes the standards and criteria regarding the acquisition, design, construction, and improvement of military family housing. It describes limits on space and cost, design standards and criteria, utilities, project development, and school facilities.² It reiterates the congressional guidance on maximum statutory size limits for all pay grades and bedroom requirements, but also specifies the number of bathrooms based on living unit size or rank designation and number of floors. It also provides criteria for other authorized amenities such as storage, car shelters, and outdoor living space, for example.

In September 1993, the Department of Defense published DoD Manual 4165.63-M entitled *DoD Housing Management*, providing policy guidance on the procedures and responsibilities relating to military family housing.³ The manual specifies the characteristics of housing facilities and services that are to be provided for military members and their families. It directs that “family housing facilities shall be operated and maintained to a standard that protects the facilities from deterioration and provides safe and comfortable places for our people to live.”⁴ More specifically, it states that “communities near installations are relied upon as the primary source of housing for DoD personnel.”⁵ The manual directs even further that “military family housing amenities and services should reflect contemporary U.S. living standards for similar categories of housing.”⁶

Central to family housing policy, *DoD Housing Management* prescribes the parameters and procedures for assessing the number of houses required to house military service personnel on base. As such, the manual specifies the minimum adequacy standards for “community” housing, which include minimum sizes in net square feet by number of bedrooms and pay grade.⁷ When adequate

¹ United States Congressional Code Title 10, Section 2684, added by Public Law 93-166, Title V, Section 509(a), November 29, 1973, also referred to as the MILCON Codification Act. The provisions of Section 2684 were the basis of United States Congressional Code Title 10, Section 2826, added by Public Law 97-214, Section 2(a), July 12, 1982. Section 2826 incorporated the space limitation provisions of Section 2684 without policy changes, but with some technical/clerical revisions.

² Military Handbook 1190 (MIL-HDBK-1190), *Facility Planning and Design Guide*, September 1, 1987.

³ Department of Defense Manual 4165.63-M, *DoD Housing Management*, June 1966. Reissued September 1993 under authority of DoD Directive 4165-63, *DoD Housing*, July 20, 1969, and implements DoD Directive 4001.1 concerning “all matters associated with family housing, unaccompanied personnel housing, and temporary lodging facilities.”

⁴ *DoD Housing Management*, Chapter 1, Title C: Policy Guidance, Paragraph 2.b., page 1-3.

⁵ *DoD Housing Management*, Chapter 1, Title C: Policy Guidance, Paragraph 2.a., page 1-1.

⁶ *DoD Housing Management*, Chapter 1, Title C: Policy Guidance, Paragraph 2.b., page 1-3.

⁷ *DoD Housing Management*, Chapter 2, Title D: Military Family Housing Requirements, Paragraph 3.c, page 2-5.

housing is deemed unavailable in the community, the Military Services are then authorized to construct family housing units on base.

Subsequently, in 1999, the Office of the Secretary of Defense (OSD), with congressional statutory legislation, established new procedures for establishing Basic Allowances for Housing (BAH). BAH is an important element in the overall OSD housing process. The amount of BAH earned by a member of the military determines whether that member is able to gain access to adequate and affordable housing in the local community. The 1999 legislation, for the first time, attempted to identify regional housing costs based on comparable civilian expenditures. It also attempted to institute an equitable system to ensure that military members, regardless of location, spend approximately the same amount out-of-pocket for housing expenses. Congress authorized the Military Services to reduce out-of-pocket housing expenses to 15 percent. The Secretary of Defense, intent on instituting a three-part initiative for improving housing, announced that out-of-pocket expenses would be reduced to zero by 2005. Concurrently, the Department of Defense would pursue revitalization of inadequate on-base housing units through the military construction program and an aggressive privatization effort.

With the passage of the National Defense Authorization Act for Fiscal Year 2001, Congress revoked the statutory size limitations under House Resolution 5408, Section 2803. This section specifically amended Title 10 USC Section 2826 to read, “Military family housing: local comparability of room patterns and floor areas.”⁸ It provides that when military family housing units are constructed or renovated, they should reflect the “room patterns and floor areas” found in comparable private sector houses built within a respective locality. The nonspecific congressional language left the Military Services without a defined benchmark with which to program and budget funds for the construction and renovation of military family housing. The ambiguous reference to floor area also left the Military Services without guidance in determining what is adequate and to what target size the private sector should be constructing family housing. Thus, the vagueness of the congressional language pertaining to military family housing motivated the conduct of the present study.

PURPOSE OF STUDY

The construction and maintenance of adequately sized military family housing units for military members and their families is a primary quality-of-life initiative for the Department of Defense. Some view improved family housing as a means of increasing morale, meeting Military Service retention goals during periods of economic expansion, and competing with the private sector for educated and motivated individuals. Thus, to attract and retain qualified service members, the Military Services must keep pace with what is occurring in the private sector housing market by constructing and maintaining homes that, at the least, are equivalent to those offered and/or obtained by civilians in the private sector.

⁸ House Resolution 5408, *The Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001*, Section 2803, Paragraph (a), page 431, October 6, 2000. The resolution states that “in the construction, acquisition, and improvement of military family housing, the Secretary shall ensure that the room patterns and floor areas of military family housing in a particular locality are similar to room patterns and floor areas of similar housing in the private-sector in that locality.”

As established by *DoD Housing Management* and congressional statutes, the Military Services are required to provide housing on base that is comparable to that available in the local community. The comparability requirement defines the first objective of this study, or Phase I. While housing quality has undergone change in the United States since the congressionally mandated size limits of 1973, the congressional statutory standards have not changed. Phase I of this study, then, analyzes in depth the unit size and the amenities built into private sector homes. Phase I also compares the previously mandated military construction and design standards with those “standards” now built into private sector units in U.S. society at large. Analyzing existing private sector housing data provides a basis for recommending contemporary size and amenity standards for adoption by the Department of Defense for consistent application to all Military Services for the construction and renovation of on-base housing and for the evaluation of off-base housing.

The second objective of this study, addressed in Phase II, is to analyze actual housing market data to assess the number of housing units within a local community that comply with the standards established in Phase I. The data are gathered from local housing markets around military installations located across the country and will subsequently identify the required Basic Allowance for Housing (BAH) needed to achieve the standards. Phase II also determines the recommended methodologies and factors for estimating the needed number of housing units and the appropriately adjusted local BAH. Specifically, Phase II makes recommendations based on local, regional, and/or national corrections to BAH source data so as to provide a quality comparison of off-base housing units to on-base housing standards.

SECTION I

MILITARY AND PRIVATE SECTOR CONSTRUCTION STANDARDS

This section presents the data and information gathered and analyzed under the tasks specified in Phase I of the study. Following the description of an earlier study as background to the present study, the section discusses the methodologies used to complete the study. The section then presents the findings specific to size and amenities in single-family and apartment/multifamily (apartment) units. Subsequently, the report outlines recommendations for applying these findings to the construction and renovation of military family housing.

Once the new standards have been established, Section II presents the recommended methods for determining national and regional variations in housing size and rental cost. The methods will be important in determining the proper assessment of the size and cost of housing located near military installations. To this end, the project conducted additional and more detailed surveys and analyses within respective regions and/or census divisions to obtain more statistically accurate data more representative of the localities surrounding military installations.

BACKGROUND

In 1990, the National Association of Home Builders (NAHB) Research Center, Inc. (Research Center), was approached by the Department of Defense Military Services to conduct a study organized around the tasks set forth in Phase I of the present study. The title of that final report was *Comparison of Military Housing Size to Equivalent Private-Sector Housing*. The primary purpose of the study was to compare the net square foot living space limits for military family housing, as mandated by Congress in 1973 with the gross square foot living areas of comparable houses in the private sector. More specifically, the study compared military family housing with private sector homes built for and obtained by civilians of similar social status. The overarching goal of the 1990 study was to provide both the Secretary of Defense and Congress with an accurate and reliable analysis of the inequities found between the standards of military family housing and the “standards” used in the construction of comparable private sector homes.

The 1990 study used age and education of the head-of-household for determining the social groups into which the civilian population could be categorized. The private sector categorizations correlated well with the categories established by military grade and house size. The results of the 1990 study revealed that military family housing units were both smaller and larger than houses built for civilian families of similar social status in the private sector. For example, two- and three-bedroom homes of military enlisted personnel tended to be somewhat larger than the homes built for the equivalent private sector group. Conversely, four- and five-bedroom military houses tended to be smaller than comparable private sector units. The greatest difference obtained was in General and Flag Officer Quarters (GFOQ) where units were found to be over 1,000 net square feet smaller than equivalent units in the private sector. The final report for the 1990 study recommended updating the existing military construction standards to reflect the median gross square foot size of comparable private sector homes by grade. The Department of Defense never implemented the study’s recommendations.

It is assumed that the analyses and recommendations in the 1990 study were inclusive of all unit types, that is, all private sector housing units as a whole. The study prepared no separate analysis of both single-family homes and apartment units. As a result, when considered separately, equivalent private sector two- and three-bedroom junior enlisted units were probably smaller than the units required by existing military standards. Regardless, to obtain a more accurate and more equitable comparison to the private sector, the present study analyzes single-family homes and apartment units separately.

With the pending revocation of the congressionally mandated statutory size limits by the National Defense Authorization Act for Fiscal Year 2001, the Military Services again approached the Research Center to take a second look at the issue of private sector housing size and amenity standards. The robust economic climate of the last ten years has translated into changes in the availability, size, and amenities of homes in the private sector market. Accordingly, the last decade's economic climate points to the need for an accurate analysis of the new homes built in the private sector rather than merely an "updating" of the findings and recommendations of the 1990 study.

Changes in Private Sector Housing Size in the United States

The Research Center's 1990 study found that, from 1972 through 1988, the median size of new single-family units in the private sector increased by 28.8 percent, or 1.8 percent annually. Over the same period, the size of new apartment units increased by 5.4 percent, an average three-tenths of 1 percent annually. The ten-year period following the 1990 study, which relied on data from 1989 through 1998, saw an additional 10.5 percent increase in the median size of new single-family homes as well as an additional 8.5 percent increase in the median size of apartment units.

Figure 1 presents the median gross square foot size of new single-family units and new apartment units reported over the 26-year period from 1972 through 1998. The median gross square foot sizes represent all units in their respective category, either single-family or apartment, regardless of number of bedrooms. Presented for comparison purposes along with the median gross square foot sizes of new units are the median gross square foot sizes of existing housing units. The data are calculated from the *American Housing Survey* available every other year since 1985. Appendix A includes a single, standalone copy of Figure 1.

Figure 1: Median Size of New and Existing Housing Units in the United States

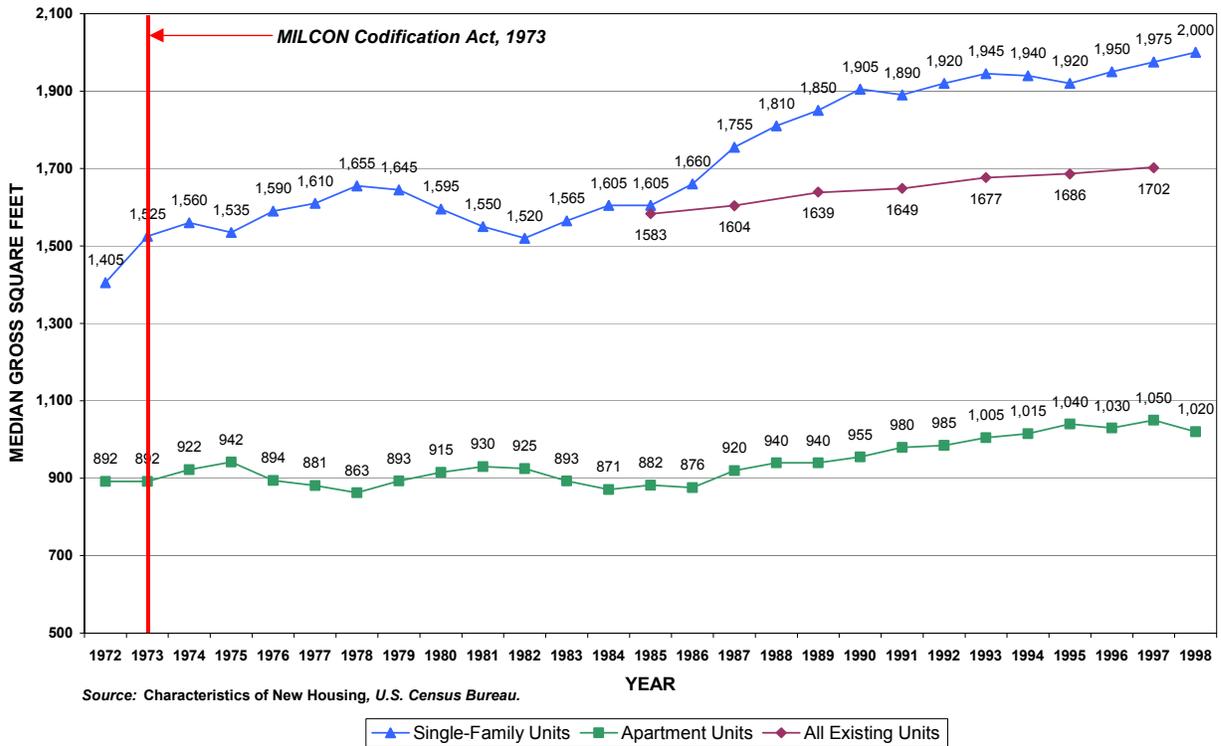


Figure 1 reveals an overall increase of 42.3 percent in the median square foot size of new single-family homes, or an average annual increase of 1.6 percent. Over that same period, the median size of new apartment units increased by 14.3 percent, or an average increase of six-tenths of 1 percent annually. These overall increases are equal to a 595-square-foot addition to a single-family home and a 128-square-foot addition to an apartment unit. From 1985 to 1997, the median gross square foot size of existing housing units increased by 119 square feet, or 7.5 percent.⁹ Over the same period, the median size of new single-family homes increased by 370 square feet, or 23.1 percent. Given the notable size increases in new housing over the last three decades, we infer that the standards for military family housing units have become increasingly smaller as private sector housing units have become increasingly larger.

Table A-1 in Appendix A presents the annual percent changes and square foot differences in the median size of new single-family and new apartment units in the United States since 1972. Tables A-2 and A-3 follow with the annual percent changes and square foot differences for the periods 1972 through 1988 and 1988 though 1998, comparing changes in size recorded both before and after the 1990 study. Table A-4 presents the median size of all existing homes in the private sector compared with the median size of new homes recorded since 1985.

⁹ Median gross square foot sizes are calculated from data published every other year in the *American Housing Survey* and are not available for years before 1985.

Measuring Housing Size in the Department of Defense and the Private Sector

The Military Services and Department of Defense measure the square feet of floor area differently than the private sector. As established by Congress in 1973, the Department of Defense calculates the floor area of housing units as a measurement of net square feet. On the other hand, the private sector calculates the floor area of housing units as a measurement of gross square feet. An explanation of the differences between the two measurements and the methodology for converting net square foot measurements into gross square foot measurements follows. Following is a discussion of the “minimum” adequacy standards used by the Department of Defense to determine the suitability of private sector rental housing and the statutory “maximum” limits.

NET SQUARE FEET VERSUS GROSS SQUARE FEET

The net square foot measurement of living areas is exclusively a Department of Defense-wide standard that differs significantly from the gross square foot measurements used in private sector construction and the real estate industry. In addition, nearly all other federal departments and agencies use the gross square foot measurement, including the Department of Housing and Urban Development and the Census Bureau. With the elimination of the congressional statutory limitations in October 2001, the Military Services and the Department of Defense are further encouraged to shift all measurements related to the construction, replacement, and renovation of family housing units to the gross square foot measurement.

Section 2826 of U.S. Code 10 specifically established the maximum net square foot floor areas for military family housing units. It also further defined the term “net square feet” as the “number of square feet of floor space inside the exterior walls of a structure.”¹⁰ Specifically, this definition of “net square feet” excludes

- exterior and party walls;
- half the thickness of interior walls adjacent to excluded areas;
- utility and laundry rooms;
- interior and exterior bulk storage;
- washer and dryer closets over 30 square feet;
- furnace, domestic water heater, and solar equipment spaces;
- stairwells;
- landings over ten square feet;
- walls and interior spaces specifically designed for passive solar systems, other than required habitable areas;
- weather vestibules that exceed 16 square feet and shelter the main entry;
- unfinished attic and basement spaces;
- patios, balconies, and terraces;
- carports and garages;
- increases to meet accessibility standards; and
- open or screened porches without heating, air-conditioning, or interior-type finishes.¹¹

¹⁰ U.S. Congressional Code, Title 10, Section 2826, Paragraph (h).

¹¹ Military Handbook 1035 (MIL-HDBK-1035), *Family Housing*, Section 2: Basic Considerations and Applicability, Paragraph 2.1.1: Net Area Definition, page 3, June 15, 1989.

The measurement of gross square feet, on the other hand, is calculated to include the exterior walls of a house, basements, finished attics, storage and mechanical spaces, washer and dryer space, and stairwells. Excluded are unfinished attics, carports, attached garages, and open porches. To conduct an effective comparison between the standards for military family housing units and private-sector housing units, a conversion factor had to be established. This factor converts the military net square foot measurement into an equivalent private sector gross square foot measurement, thereby creating a direct relationship for an equivalent comparison.

One consideration in establishing the conversion factor is the addition to the military net square foot measurements of square foot measurements for exterior, interior, and party walls; utility and laundry rooms; interior bulk storage; mechanical spaces; stairwells and landings; and unfinished basements. Given that the square foot area of these spaces varies widely in the private sector, the Research Center determined that it was more effective to conduct a different analysis. This analysis, as part of the *Tri-Service Cost Model*, reviewed the habitable floor area measurements of numerous floor plans of single-family homes located both on military installations and in the private sector.¹² The percent difference, or ratio, between the square foot size of single-family homes on military bases and those in the private sector became the basis for determining the conversion factor. The result of the conversion analysis conducted in the cost model revealed an average ratio of 1.24 between the net square foot measurement of military single-family houses and the gross square foot measurement of private sector single-family houses.

For apartment units, a separate analysis was developed to reflect the fact that the most significant difference between apartment units in the military and those in the private sector lies in the treatment of common areas and storage, laundry, and mechanical/utility spaces. These spaces are not included in the gross square foot calculations of apartment units in the private sector. However, the military must include these spaces in the total square foot calculation of a family housing unit if it is to be equitable in the construction and assignment requirements of family housing. Without the inclusion of the square foot calculations of these spaces, private sector apartment units would typically be smaller than the existing military apartment standard.

When not accounting for storage, laundry, and mechanical/utility spaces, the average net square foot to gross square foot conversion factor is calculated to be approximately 1.08. When these spaces are equitably accounted, the average conversion factor is calculated to be 1.24.¹³ Thus, the appropriate conversion factor for adjusting net square foot measurements in military apartment units to an equivalent and equitable gross square foot measurement is 1.24. Though the method of calculating an apartment square foot conversion factor differs slightly, the comparable result is applied to individual housing units. Accounting for additional common spaces in apartment units for programming purposes requires an additional mark-up.

To compare effectively the current size of military family housing units to equivalent gross square foot units in the private sector, the 1.24 conversion factor must be applied to the DoD “minimum” adequacy standards for private sector rental housing. The 1.24 conversion factor must also be applied to the congressional statutory “maximum” limits for military family housing.

¹² *Military Family Housing Tri-Service Cost Model and Site Work Cost Model*, NAHB Research Center, Inc., page 23, May 30, 1997.

¹³ *Army Family Housing Planning Guide*, Whole-Neighborhood Revitalization Program, U.S. Army Engineering and Housing Support Center, May 1993. Analysis based on the minimum required size of each required space in military family housing units.

EXISTING DEPARTMENT OF DEFENSE “MINIMUM” ADEQUACY STANDARDS

As mentioned, Department of Defense Manual 4165.63-M, entitled *DoD Housing Management*, established minimum net square foot sizes for private sector rental housing units by pay grade and number of bedrooms. These minimum sizes, sometimes referred to as the “minimum acceptable” or “minimum adequacy,” were considered adequate for military personnel and their families. They are also used along with other community family housing criteria, including the acceptable location of housing, the minimum number and type of acceptable amenities, and the number of bedrooms. The number of bedrooms is based on family size when assessing rental housing in the private sector. All these factors are part of an overall process of determining housing requirements. Table 1 provides the established “minimum” adequacy standards for single-family units by pay grade and number of bedrooms. It also provides the original net square foot values along with respective gross square foot equivalents based on application of the appropriate 1.24 conversion factor for single-family units.

Table 1: Single-Family “Minimum” Adequacy Sizes and Equivalent Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Minimum Adequacy Sizes in Net Square Feet (NSF)	Minimum Adequacy Sizes in Gross Square Feet (GSF)
E1-E3 (JENL) E4-E6 (JNCO)	2	750	930
	3	960	1,190
	4	1,190	1,480
	5	1,190	1,480
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	750	930
	3	960	1,190
	4	1,190	1,480
	5	1,190	1,480
E9 (SNCO) W4-W5 (WO)	3	960	1,190
	4	1,190	1,480
	5	1,190	1,480
O4-O5 (FGO)	3	960	1,190
	4	1,190	1,480
O6 (SO)	4	1,190	1,480
O7-O10 (GO)	4	1,190	1,480

Net Square Feet Source: Department of Defense Manual 4165.63-M, DoD Housing Management.

Historically, the net square foot minimums applied to all unit types and were intended to measure adequacy and evaluate private sector community housing. Because the minimums did not differentiate between single-family and apartment units, the Military Services never developed a net to gross square foot conversion factor exclusively for apartment units. Given, however, that the present study distinguishes between single-family units and apartment units, it is important to present the numbers for both unit types separately. Thus, Table 2 presents the original net square foot values along with the respective gross square foot equivalents for apartment units by pay grade and number of bedrooms; the appropriate 1.24 conversion factor for apartment units has been applied.

Table 2: Apartment "Minimum" Adequacy Sizes and Equivalent Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Minimum Adequacy Sizes in Net Square Feet (NSF)	Minimum Adequacy Sizes in Gross Square Feet (GSF)
E1-E3 (JENL)	2	750	930
E4-E6 (JNCO)	3	960	1,190

Net Square Feet Source: Department of Defense Manual 4165.63-M, DoD Housing Management.

The minimum adequacy standards are used to measure the acceptable size of for-rent apartment units in the private sector. The Office of the Secretary of Defense (OSD) has determined that for the purposes of evaluating off-base private sector community housing, two-bedroom apartment units are suitable for E1 to E3 junior enlisted and E4 junior non-commissioned officer personnel. This determination by OSD, however, does not prevent these military members from residing in larger units or different types of units. Further, it must be recognized that the *DoD Housing Management Guide* states that the adequacy standards are not intended to be used for the “acquisition, design, construction, or improvement” of military housing units.

EXISTING CONGRESSIONAL STATUTORY “MAXIMUM” LIMITS

The congressional statutory limits set forth in U.S. Code Title 10, Section 2826, established maximum net floor area standards for constructing and renovating military family housing units in accordance with pay grade and number of bedrooms. Traditionally, the military’s construction design standards tended to focus on maximum size allowances and pertained to the design, construction, and renovation of military family housing facilities. The military used the same standards to evaluate the floor plans of older, existing housing units and for other family housing evaluation purposes, including special command positions and harsh climatological conditions.¹⁴ Table 3 provides the established maximum standards for single-family units by pay grade and number of bedrooms. It also presents the original net square foot values along with the respective gross square foot equivalents, with the appropriate 1.24 conversion factor applied.

¹⁴ U.S. Congressional Code Title 10, Section 2826 stipulates in Paragraph (b) that “the maximum net floor area may be increased by ten percent for the housing unit of an officer holding a special command position, for the housing unit of a commanding officer of a military installation, and for the senior noncommissioned officer of a military installation.” Paragraph (d) stipulates that “the maximum net floor area may be increased by 300 square feet for a family housing unit in a location where harsh climatological conditions severely restrict outdoor activity for a significant part of each year, as determined by the Secretary concerned pursuant to regulations prescribed by the Secretary of Defense.”

Table 3: Single-Family Congressional Statutory "Maximum" Limits and Equivalent GSF

Equivalent Rank in Private Sector	Bedroom Count	Congressional Statutory Limits in Net Square Feet (NSF)	Congressional Statutory Limits in Gross Square Feet (GSF)
E1-E3 (JENL) E4-E6 (JNCO)	2	950	1,180
	3	1,200	1,490
	4	1,350	1,670
	5	1,550	1,920
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	950	1,180
	3	1,350	1,670
	4	1,450	1,800
	5	1,550	1,920
E9 (SNCO) W4-W5 (WO)	3	1,350	1,670
	4	1,450	1,800
	5	1,550	1,920
O4-O5 (FGO)	3	1,400	1,740
	4	1,550	1,920
O6 (SO)	4	1,700	2,110
O7-O10 (GO)	4	2,100	2,600

Net Square Feet Source: United States Congressional Code Title 10, Section 2826.

Similar to the minimum adequacy standards, the congressional statutory limits do not differentiate between single-family units and apartment units, but the net square foot maximums do apply to all unit types. As mentioned, the present study distinguishes between single-family units and apartment units and presents the results for both unit types separately. Thus, Table 4 presents the original net square foot values along with the respective gross square foot equivalents by pay grade and number of bedrooms; the appropriate 1.24 conversion factor has been applied.

Table 4: Apartment Congressional Statutory "Maximum" Limits and Equivalent GSF

Equivalent Rank in Private Sector	Bedroom Count	Congressional Statutory Limits in Net Square Feet (NSF)	Congressional Statutory Limits in Gross Square Feet (GSF)
E1-E3 (JENL) E4-E6 (JNCO)	2	950	1,180
	3	1,200	1,490

Net Square Feet Source: United States Congressional Code Title 10, Section 2826.

Table B-1 in Appendix B presents both the minimum adequacy standards and the congressional statutory maximum limitations for single-family units. Table B-2 presents the minimum adequacy standards and the congressional statutory maximum limits for apartment units. The data are provided in both net square foot and gross square foot measurements. Included, too, is the calculated square foot range between the minimum adequacy and congressional statutory maximum numbers.

METHODOLOGY

The present study used the following methodology: first, establish comparable and equivalent social groups; second, establish a direct linkage between the *American Housing Survey* and the *Characteristics of New Housing*; third, address the special considerations regarding family housing needs associated with military responsibilities as they relate to rank; and fourth, discuss the composition of private sector housing and its importance to military family housing construction and renovation. Preceding the discussion of methodology, however, is a review of the primary data sources used in the study.

Primary Data Sources

The present study relied on various data sources. Two documents published by the Census Bureau, however, were the primary sources for obtaining the findings and determining the recommendations of this report: the *1997 American Housing Survey* and the *1998 Characteristics of New Housing*.

1997 AMERICAN HOUSING SURVEY

The first data source used in the study was the *1997 American Housing Survey (AHS)*. The *AHS* is a stratified national sample of households across a number of geographic areas around the country. The Census Bureau collects the data through in-person and telephone interviews conducted every other year and samples four units types: single-family detached (SFD), single-family attached (SFA, including townhouses and duplexes), apartment (APT, including multifamily), and manufactured housing (MH, including HUD-Code and mobile homes). The *AHS* gathers information on the number of full- and half-bathrooms; the number of living and dining rooms; the presence of dishwashers, clothes washers, and dryers; and the presence of air-conditioning. It also gathers data on the persons residing in the surveyed units, including the age, education level, income and marital status of the head-of-household, and whether the occupant was an owner or a renter. Finally, the *AHS* gathers information on the gross square foot size of the surveyed unit, the total family household income, the geographic location of the unit, and the mortgage amount, mortgage type, and monthly payment.

SHORTFALLS OF THE AHS AS THE PRIMARY DATA SOURCE

Although the *1997 American Housing Survey* includes data on over 58,000 new and existing homes and respective households, only about 2,300 units were newly constructed and directly comparable to military families and military family housing based on the criteria of age and education of head-of-household. The limited number of data points made it difficult to obtain a sufficiently large sample by grade and thus arrive at relevant findings for the present study. Therefore, the *AHS* was linked to a larger database, the *1998 Characteristics of New Housing (CNH)*, by using the age and education of the head-of-household and, later, total family household income calculated by equivalent military grade group. The linked information allows for a more effective analysis of single-family housing construction data in the *1998 Characteristics of New Housing*.

1998 CHARACTERISTICS OF NEW HOUSING

The *1998 Characteristics of New Housing* is published jointly by the U.S. Department of Commerce, the Census Bureau, and the U.S. Department of Housing and Urban Development (HUD).¹⁵ It provides data on the approximately 1.5 million housing units built across the United States in 1998. In addition, it includes annual estimates on selected physical and financial characteristics of new single-family detached and new single-family attached housing units built in a given year. More specifically, it presents information on the sales price, gross square foot area of the unit and lot, number of bedrooms, number of full- and half-bathrooms, parking, and air conditioning. Additional characteristics include information on closing costs, financing, heating and fuel systems, decks and patios, and geographic location of the constructed units.

The *Characteristics of New Housing* was relied on to gather additional and more detailed information on new single-family homes built in the United States for the purpose of comparison to *American Housing Survey* data and military family housing standards. The most significant difference between the *CNH* and the *AHS* is that the former is a survey of the new single-family homes constructed by builders, whereas the *AHS* is a survey of new and existing housing units and the persons residing within them.

Establishing Equivalent Social Categories

As mentioned, military family housing units are compared with private sector housing units by categorizing private sector civilians into equivalent social groups similar to the military's pay grade/grade group structure. The comparative social characteristics in each respective military grade group were chosen so as best to correspond with the social characteristics of civilians in the private sector who most strongly related to an ability to purchase or rent housing.

Thus, age and highest level of education earned by military personnel in their respective pay grades corresponded to the head-of-household in the private sector sample. Table 5 presents the typical ranges of age and highest level of education earned by military members, by grade group. Age and education levels were established by analyzing military service personnel data and through a consensus of the Military Services.

¹⁵ The data were obtained from the Census Bureau's *Survey of Construction*, *Survey of New Placement of HUD-Code Manufactured Homes*, and *Survey of Market Absorption*, all or part of which are cosponsored by the U.S. Department of Housing and Urban Development (HUD).

Table 5: Age and Education Level Earned by Military Grade Group

Equivalent Rank in Private Sector	Age Range	Level of Education Earned
E1-E3 (JENL)	18 - 21	High School Diploma
E4-E6 (JNCO)	22 - 28	High School Diploma Vocational, Technical Certification Associate's Degree
E7-E8 (SNCO)	29 - 49	High School Diploma Vocational, Technical Certification Associate's Degree Bachelor's Degree
O1-O3 (CGO) W1-W3 (WO)	22 - 31	Bachelor's Degree
E9 (SNCO) W4-W5 (WO)	36 - 55	Bachelor's Degree Master's Degree
O4-O5 (FGO)	32 - 43	Bachelor's Degree Master's Degree
O6 (SO)	44 - 53	Bachelor's Degree Master's Degree Professional Degree Doctoral Degree
O7-O10 (GO)	54 - 60	Master's Degree Professional Degree Doctoral Degree

Source: Consensus of Military Services based on U.S. Air Force Service Member Data.

The established ranges of age and highest level of education attained by military personnel by grade group correspond well with the gross square foot size and housing unit type obtained by private sector civilians. The groups, coupled with total family household income, allow the establishment of a direct relationship between the *AHS* and *CNH* surveys.

Establishing a Direct Relationship between the AHS and the CNH

To establish a direct relationship between the *AHS* and the *CNH*, total family household income data was extracted from the *American Housing Survey* by the established equivalent social groups of age and highest level of education. For each of the groups of data points, a median total family household income and an average total family household income was calculated for the purpose of establishing income ranges for each grade. We used the income ranges in turn to establish ranges of housing affordability essential for extracting relevant price points from the *Characteristics of New Housing*.

The income ranges can be established either by calculating the standard deviation of the average family household income or taking an equivalent percent of median household income. Calculating the standard deviation is a logical choice for establishing an income range for each grade group. The standard deviation is a statistical calculation used to measure the variation of data points

around the mean, or average, within a set of data.¹⁶ After adding and subtracting one full standard deviation to and from the mean, respectively, a set of income ranges for each grade group can be established. However, this statistical calculation should be applied only to the mean, or average, because this method assumes a normal distribution of data, or perfect bell curve. The present study, however, cannot assume a normal distribution in that it maintains an actual set of data points; in this case, by statistical definition, the median number (the home at the 50th percentile) is more representative and a better gauge of what is typical in the data set. Thus, calculating the standard deviation is not a feasible application for skewed data.

Given that the data supporting the study do not assume a normal distribution, the equivalent percent of one standard deviation, or 34 percent, can be applied to the median number in the original data set of total family household income. The calculation would then establish the income range for each grade group based on total family household income, from the income amount reported at the 16th percentile to the income amount reported at the 84th percentile. The income range would be more reflective of the nonnormal distribution of the actual set of data points reported.

For most grade groups, it was deemed that the resulting income ranges were so wide that the total family household incomes reported at the 25th and the 75th percentiles were instead used. Thus, the minimums of these income ranges for each grade group are equivalent to the income reported at the 25th percentile. Likewise, the maximums of these income ranges for each grade group are equivalent to the income reported at the 75th percentile. The total family household income ranges resulting from these calculations by equivalent grade group represent the middle 50 percent of each population group. Table 6 provides the calculations and resulting income ranges by grade group.

Table 6: Median Total Family Household Income and Income Range

Equivalent Rank in Private Sector	Median Household Income	Income at 25th Percentile	Income at 75th Percentile	Minimum Income Middle 50% of Population	Maximum Income Middle 50% of Population
E1-E3 (JENL)	\$28,800	\$20,200	\$47,000	\$20,200	\$47,000
E4-E6 (JNCO)	\$44,000	\$31,000	\$58,019	\$31,000	\$58,000
E7-E8 (SNCO)	\$62,000	\$45,000	\$85,000	\$45,000	\$85,000
O1-O3 (CGO) W1-W3 (WO)	\$62,650	\$46,202	\$82,000	\$46,200	\$82,000
E9 (SNCO) W4-W5 (WO)	\$82,875	\$60,400	\$109,000	\$60,400	\$109,000
O4-O5 (FGO)	\$77,800	\$58,000	\$101,228	\$58,000	\$101,200
O6 (SO)	\$89,925	\$64,500	\$116,000	\$64,500	\$116,000
O7-O10 (GO)	\$93,500	\$68,000	\$126,300	\$68,000	\$126,300

Source: American Housing Survey, U.S. Census Bureau.

¹⁶ Shavelson, R. J., *Statistical Reasoning for the Behavioral Sciences*, Third Edition, Boston: Allyn and Bacon. “[T]he standard deviation is an average variability of scores in the distribution measured in the units of the original score scale.” The mean is an average of all scores, with most scores actually deviating from that mean. Some scores deviate considerably above or below the mean, while other scores deviate only slightly from the mean. A rough average of such deviations is represented by the ‘standard deviation.’

With the income ranges calculated for each grade group, ranges were computed for determining housing affordability. Housing affordability is an estimation of the price range of homes that persons in each grade group, or equivalent private sector social group, can afford to purchase. Housing affordability is commonly based on total family household income and other home loan qualification criteria defined by agencies such as FannieMae, the Federal Housing Administration (FHA), and the Department of Veterans Affairs (VA). One common rule used in measuring home loan qualification is that a monthly mortgage must be no more than 28 percent (in some cases more) of total gross monthly family household income. This measurement is based on a fixed interest rate loan measured at 7.95 percent and amortized over a standard term, typically 30 years.¹⁷ Therefore, for the purpose of this study, 28 percent of total gross monthly family household income is assumed spent on mortgage costs, with no additional debt carried by the household. Table 7 presents the resulting ranges of housing affordability for each equivalent grade group.

Table 7: Family Household Income Range, Monthly Payment, and Affordability Range

Equivalent Rank in Private Sector	Minimum Income	Maximum Income	Minimum Monthly Payment	Maximum Monthly Payment	Minimum Affordable Home	Maximum Affordable Home
E1-E3 (JENL)	\$20,200	\$47,000	\$446	\$1,072	\$61,120	\$146,750
E4-E6 (JNCO)	\$31,000	\$58,000	\$698	\$1,328	\$95,630	\$181,890
E7-E8 (SNCO)	\$45,000	\$85,000	\$1,025	\$1,958	\$140,360	\$268,160
O1-O3 (CGO) W1-W3 (WO)	\$46,200	\$82,000	\$1,053	\$1,888	\$144,190	\$258,580
E9 (SNCO) W4-W5 (WO)	\$60,400	\$109,000	\$1,384	\$2,518	\$189,560	\$344,840
O4-O5 (FGO)	\$58,000	\$101,200	\$1,328	\$2,336	\$181,890	\$319,920
O6 (SO)	\$64,500	\$116,000	\$1,480	\$2,682	\$202,660	\$367,210
O7-O10 (GO)	\$68,000	\$126,300	\$1,562	\$2,922	\$213,840	\$400,120

Source: American Housing Survey, U.S. Census Bureau.

We subsequently used the ranges of home affordability to extract applicable data on new homes falling within the above price ranges in the *1998 Characteristics of New Housing* by grade group. We extracted the data by price of home to identify the median size and availability of certain amenities of new single-family homes built in the private sector.

The size of a housing unit acquired by an individual is typically a function of location, mortgage amount, and total family household income. Though total family household income for private sector civilians can be obtained from the Census Bureau, the census does not maintain income data specifically for military families. Thus, while data regarding the percent of working spouses in military families are available, that spouse’s actual income is difficult to determine. Furthermore, by using total family household income, the results are less conservative for a military household in

¹⁷ The 30-year fixed-rate mortgage loan of 7.95 percent is based on the average weekly fixed rates reported by FreddieMac during the second quarter of 1997. The rate corresponds with total family household incomes extracted from the *1997 American Housing Survey*. Comparatively, the average 30-year fixed-rate mortgage reported for the second quarter of 1999 was 7.24 percent.

that these families are essentially compared and grouped with similar civilian families that might have two household incomes. These results are moderated by using age and education as the primary criteria for establishing equivalent social groups.

Special Considerations Regarding Family Housing

Recognizing that some military ranks by definition carry greater prestige and social responsibilities than other ranks, the study addressed some special considerations to account for these factors and for any potential variations in military family housing standards. The first consideration was how to handle the categorization of the E9 and W4/W5 ranks. Many years ago, for example, the Air Force eliminated warrant officer ranks and passed the associated managerial responsibilities on to senior noncommissioned officers. Subsequently, it created a W5 rank while earlier congressional statutory limits grouped the E9 and W4/W5 ranks with other enlisted or officer members based on type and size of home authorized. Acknowledging the need for special consideration, the Military Services asked for the creation of a separate group for these three pay grades for purposes of analysis in this report. The new category would account for the high levels of responsibility, time in service, age, and education level associated with a small percentage of personnel who are at the top of the enlisted force. Comparably, the second consideration accounts for the extraordinary responsibilities of the General and Flag Officers and the need to establish a means of identifying comparable units in the private sector for these high-ranking officials.

SENIOR NONCOMMISSIONED OFFICER E9 AND WARRANT OFFICER W4/W5 PERSONNEL

As mentioned, the congressional statutory limits in place for nearly 30 years established net square foot limits on the size of military family housing units by grade group. The limits categorized E7 to E9 senior noncommissioned officers and W1 to W5 warrant officer personnel into a single category that included O1 to O3 company grade officers. At the same time, assignment policy in the Army, for example, set different designation standards for placing senior noncommissioned officer and warrant officer personnel in military family housing.¹⁸ More specifically, the assignment policy shifted W4/W5 warrant officers into the higher O4/O5 field grade officer category and maintained the placement of W1/W2/W3 warrant officers within the O1 to O3 company grade officer category. The assignment policy also relegated E7 to E9 senior noncommissioned officer personnel into a general enlisted/noncommissioned officer category but maintained options for separating these members from E1 to E6 junior personnel. Though vague, the assignment policy has generally allowed E7 to E9 senior noncommissioned officer personnel to have access to military housing of the same size standard as the W1 to W3 warrant officer and O1 to O3 company grade officer category.

These inconsistent policies result in variable application of the housing standards for some military members. A review of the factors associated with length of time in service, level of responsibility, and age raised the question of whether the higher enlisted ranks were properly categorized to account for modern-day military family housing standards. More specifically, the special

¹⁸ Department of the Army Regulation AR 210-50, *Housing Management*, Chapter 3, Section II: Assignment of Family Housing, Paragraph 3-4, page 12, September 1, 1997. Designation of housing states “the installation commander designates housing for occupancy by personnel in various pay grade groups. Family housing should be designated for occupancy as follows: (1) General and Flag officers (O7 through O10); (2) Senior grade officers (O6); (3) Field grade officers (O4, O5, W4, and W5); (4) Company grade officers (O1-O3, W1-W3); (5) Enlisted personnel (E1-E9); may be further categorized, that is, senior noncommissioned officers (NCOs)(E9 through E7)/junior NCOs and junior enlisted (E6 and below); may be even further categorized based upon the needs of the installation.”

considerations prompted a separate analysis of E9 senior noncommissioned officer personnel and their inclusion among company grade officers or other senior noncommissioned officer personnel. We applied the same analysis to W4 and W5 warrant officer personnel and assessed the equity of their inclusion among company grade officers under the terms of congressional statutory limits and among field grade officers under the terms of assignment policy.

The present study reveals, based on private sector data, that E9 and W4/W5 military personnel have been improperly, albeit historically, categorized among other grade groups. The study also demonstrated that the other grade groups among which these members were categorized might not have been truly representative of the earning power of comparable civilians in the private sector. Ultimately, the report presents the recommendations for E9/W4/W5 personnel separately from the recommendations for the larger category inclusive of E7 and E8 senior noncommissioned officers, W1 to W3 warrant officers, and O1 to O3 company grade officers. The analysis conducted herein will produce results indicating that these individuals should be subject to housing standards comparable to those of O4 and O5 field grade officers.

EXTRAORDINARY RESPONSIBILITIES OF GENERAL OFFICERS AND GFOQ HOUSING

Analysis of General and Flag Officer housing requirements indicates that simply comparing the median size of private sector homes is inappropriate for this grade group. Personnel of this rank are selected through a process that includes committee and personal review by at least six screening boards spanning a service period of as much as three decades. Less than the top 1 percent of the highest-performing individuals demonstrate the proven leadership and management talents to be chosen for these exclusive positions. While the purpose of this study is not to justify the proper or improper size of a GFOQ unit, an analysis that considers the extraordinary status of General and Flag Officers is necessary.

In private sector terms, General and Flag Officers can be considered comparable to the most senior-level executives of an extremely large and complex corporation. Given the extraordinary responsibilities and experience of General and Flag Officers, as well as their need for additional entertainment space and their age and years of service, the housing requirements of these senior members cannot be compared with the “median” or average standards of equivalent private sector individuals.

At first, the median size of new private sector single-family homes was calculated for the equivalent General and Flag Officer personnel. However, for these military members, age, education level, and, subsequently, median total family household income are not sufficient for comparison to equivalent private sector civilians. Therefore, the study needed to account for the fact that senior executives of comparable age and education levels in the private sector are not subject to the same income ceilings or limits as these high-ranking military members. In simpler terms, the incomes of General and Flag Officers are not commensurate with their level of responsibility and experience. Conversely, the incomes of private sector senior executives generally have no limits and reflect the executives’ level of responsibility and experience.

Regardless of the limit on military income, housing requirements for General and Flag Officers should be established by using data that are more representative of or comparable to homes of successful senior executives in the private sector who earn at least comparable pay. By using the same data extracted for determining the median size of new private sector homes occupied by civilians of comparable background, the data was further analyzed to identify the size of homes at the 90th and the 95th percentiles for this equivalent grade group.

An analysis of the comparable private sector homes at the 90th and 95th percentiles suggested that homes at the 50th percentile provided an insufficient amount of living space to meet the extraordinary needs of General and Flag Officer personnel. These homes, which were only about 50 gross square feet larger than equivalent homes found for O6 Senior Officers, did not sufficiently represent occupants’ extraordinary responsibilities and experience or reflect the need for additional entertainment space or the age and years of service of General and Flag Officers. At the same time, private sector homes reported at the 95th percentile were too few in number and extremely large to be considered representative of senior military personnel. Instead, the study defaulted to homes reported at the 90th percentile where ample data existed. Consequently, data at the 90th percentile is used to establish an executive housing standard for General and Flag Officers.¹⁹

Composition of Private Sector Housing

As noted, the *American Housing Survey* was the initial database used in the study; it represents data in four housing categories: single-family detached (SFD), single-family attached (SFA, including townhouses and duplexes), apartment (APT, including multifamily), and manufactured housing (MH, including HUD-Code and mobile homes). All four unit types are visible across the housing market and reveal characteristics of the civilians residing in them. The data from the *AHS* show the distribution of equivalent private sector individuals in the four unit types by military grade group as presented in Table 8.

Table 8: Composition of Civilian Residents in Private Sector Housing by Unit Type

Equivalent Rank in Private Sector	SFD		SFA		APT		MH		HOUSING TOTAL	
	#	%	#	%	#	%	#	%	#	%
E1-E3 (JENL)	11	26.2%	2	4.8%	19	45.2%	10	23.8%	42	0.3%
E4-E6 (JNCO)	294	48.1%	44	7.2%	202	33.1%	71	11.6%	611	4.1%
E7-E8 (SNCO)	6,238	80.6%	358	4.6%	797	10.3%	346	4.5%	7,739	51.4%
O1-O3 (CGO) W1-W3 (WO)	299	60.8%	51	10.4%	131	26.6%	11	2.2%	492	3.3%
E9 (SNCO) W4-W5 (WO)	2,339	87.3%	116	4.3%	200	7.5%	24	0.9%	2,679	17.8%
O4-O5 (FGO)	1,387	83.8%	87	5.3%	172	10.4%	10	0.6%	1,656	11.0%
O6 (SO)	1,373	89.1%	56	3.6%	99	6.4%	13	0.8%	1,541	10.2%
O7-O10 (GO)	267	88.1%	18	5.9%	16	5.3%	2	0.7%	303	2.0%
TOTAL	12,208	81.0%	732	4.9%	1,636	10.9%	487	3.2%	15,063	100.0%

Source: American Housing Survey, U.S. Census Bureau.

¹⁹ The home at the 90th percentile suggests that 90 percent of the homes within the set range of criteria are smaller than the home reported at the 90th percentile; the supplemental ten percent are larger than the home reported at the 90th percentile.

Recognizing again the relatively few number of data points in the *American Housing Survey*, the data was compared to single-family housing data in the *Characteristics of New Housing (CNH)*. The *CNH* contains a much larger number of data points but excludes manufactured housing and mobile home units as well as apartment units. Nonetheless, after establishing the direct relationship between the two databases and extracting the appropriate data from the *CNH*, a compatible representation was obtained of civilians residing in single-family detached and single-family attached housing. Table 9 presents the resultant data.

Table 9: Composition of Civilian Residents in Private Sector Single-Family Housing

Equivalent Rank in Private Sector	Single-Family Detached		Single-Family Attached		HOUSING TOTAL	
	#	%	#	%	#	%
E1-E3 (JENL)	253,125	88.0%	34,631	12.0%	287,756	10.2%
E4-E6 (JNCO)	518,446	89.7%	59,215	10.3%	577,661	20.5%
E7-E8 (SNCO)	446,045	92.4%	36,448	7.6%	482,493	17.1%
O1-O3 (CGO) W1-W3 (WO)	416,197	92.9%	31,806	7.1%	448,003	15.9%
E9 (SNCO) W4-W5 (WO)	253,370	93.6%	17,310	6.4%	270,680	9.6%
O4-O5 (FGO)	291,271	93.2%	21,348	6.8%	312,619	11.1%
O6 (SO)	206,918	93.6%	14,056	6.4%	220,974	7.8%
O7-O10 (GO)	207,513	93.6%	14,290	6.4%	221,803	7.9%
TOTAL	2,592,885	91.9%	229,104	8.1%	2,821,989	100.0%

Source: Characteristics of New Housing, U.S. Census Bureau.

The data indicate the composition of civilians in the United States by type of home and grade group. Analyzing the distribution of civilians by grade group is important for comparing the construction and renovation of military family housing with private sector housing activity. Building to the median private sector home ensures that the Military Services are responding to personnel needs and providing family housing that is comparable to homes built for and obtained by equivalent private sector civilians.

A survey conducted in 1999 by the Research Center found that, in 1998, 35.5 percent of new homes were considered starter homes, 49.1 percent move-up homes, and 15.4 percent luxury homes.²⁰ Accordingly, approximately one-half of single-family homes built in the United States are move-up homes and are thus considered the type most closely representative of the median and/or average home.

²⁰ NAHB Research Center, Inc., *1998 Builder Practices Report*, Appendix A, page 1. The *Builder Practices Reports* are published annually and are based on data gathered from the *Annual Builder Practices Survey*. The annual survey represents an average 2,000 home builders constructing approximately 45,000 units across the United States.

Unlike private sector builders, the Military Services are responsible for the maintenance of family housing. Targeting military construction to the median size and standard of private sector homes is a means of addressing life-cycle costs and is a long-term investment the Military Services must make. Thus, the Military Services should make the investment needed to “step up” the standards of military family housing by constructing and renovating homes representative of the median-type private sector home. Median-type homes are comparable to private-sector move-up homes and represent the largest percentage of equivalent private sector homes in which civilians reside. Upgrading military construction standards to the median move-up home will yield a higher-quality home that offers a longer life cycle.

In the end, this report will propose size standards for military family housing that are comparable to the median size units constructed in the private sector. These recommendations will be in line with the significant increase in the median size of private sector housing units reported over the past three decades and will allow the Military Services to keep pace with the housing of equivalent civilians and the trends of the private sector.

PRIVATE SECTOR STANDARDS ANALYSIS AND RECOMMENDATIONS

This section begins with the findings and recommendations for equivalent private sector single-family and apartment units. The analysis of these unit types focuses on sizes and amenities gathered from the separate studies of single-family detached and single-family attached homes, as well as apartment units existing in the private sector. The private sector findings are compared with existing military family housing units and the congressional statutory limits, after which recommendations for the application of the new standards are offered.

The new standards include revised minimum adequacy renovation and evaluation sizes, revised construction and replacement minimum sizes, and revised construction and replacement maximum sizes. They also consider the inclusion of some types of amenities found in private sector housing. Presented separately are the findings and subsequent recommendations separately for single-family units and apartment units. The findings and recommendations for single-family units, however, are more representative in meeting the goals of the military family housing program in that the Military Services construct predominantly single-family residences. Nonetheless, discussed first are the findings and recommendations for apartment units.

Apartment Units

The discussion begins by presenting special considerations regarding the functionality and construction of apartment units and the need to account for these units when comparing off-base and on-base housing standards. The discussion next explores the size and amenity findings for apartment units extracted from the *1997 American Housing Survey*. Given the limitations of the data in the *American Housing Survey*, data has been reviewed for all reported apartment units regardless of grade group and number of bedrooms. In other instances, data extracted from other sources is presented, including the *1994 Property Owners and Managers Survey (POMS)*.²¹ Though this data source does not provide information on the gross square foot size of apartment units, it does present findings for specific amenities such as parking, laundry facilities, and central air conditioning. To analyze the data in the *POMS* accurately, the monthly affordable rent payment ranges calculated by grade group as presented in Table 7 is used.

FUNCTIONALITY AND CONSTRUCTION OF APARTMENT UNITS

When setting basic allowances for housing (BAH), the Department of Defense designates two- and three-bedroom apartment units as the acceptable unit types for meeting the minimum housing standards for E1 to E4 junior enlisted personnel.²² Unfortunately, the findings and recommendations presented in the 1990 study do not indicate that single-family units or apartment units were considered independently of one another. Although apartment units are designated as acceptable in meeting the minimum housing standards for the E1 to E4 junior ranks, the relatively low number of apartment data points poses a challenge in conducting an accurate analysis of these unit types in the private sector.

²¹ The *Property Owners and Managers Survey* is conducted and maintained by the Census Bureau. Data are gathered for the purpose of developing information on both the rental housing market in the United States and the policies of property owners and managers who rent out and maintain units.

²² *Regular Military Compensation and Housing Standards by Pay Grade With and Without Dependents*, DoD Defense Technical Information Center, February 16, 2001. The data are calculated from income-based minimum housing standards that are used to establish a direct relationship between the cost of housing and pay grade. The standards are civilian standards and are based on housing choices made by civilians of comparable income.

Furthermore, a relatively few number of apartment units actually exist as part the on-base continental United States (CONUS) military family housing stock. Apartment units are, however, an important part of the housing inventory in the private sector. For special consideration, then, the data reveal the increased expense, on a per gross square foot basis, of constructing apartment units. This consideration makes it difficult to justify the Military Services' construction of apartment units.

Further supporting this special considerations are data demonstrating the increased per gross square foot expense of constructing apartment units, particularly when land cost is not a factor for the Military Services. An analysis of the data gathered from R.S. Means shows that, in 1999, the basic cost of constructing an average-size wood-frame house was approximately \$67 per square foot. By comparison, the basic cost of constructing a three-story wood-frame apartment building was approximately \$77 per square foot, a difference of 15 percent.²³ In most cases, the increased cost of building apartment units declines somewhat when the cost of land becomes the primary factor in cost estimating. The role of land costs is especially pronounced in urbanized areas where land is more expensive and denser development practices are needed to offset land costs.

The special considerations for apartment units begin to suggest that it is less costly for the Military Services to construct single-family units instead of apartment units. And because the Military Services own the land on which family housing is built, the construction of single-family units is more cost-effective than the construction of apartment units. Of course, special circumstances such as site constraints, installation limitations, or other locational factors, occasionally necessitate the construction of apartment units. Thus, the size and amenity standards of apartment units do need to be addressed and established, not only for special circumstances, but also for the evaluation of BAH standards in private sector off-base housing units.

SIZE STANDARDS ANALYSIS

To establish a new maximum size standard, we analyzed the median size of private sector apartment units in the *1997 American Housing Survey*. Data was extracted for all two- and three-bedroom apartment units together, and then separately for new two- and three-bedroom apartment units.²⁴ Due to the relatively low number of data points reported for apartment units in the *AHS*, the data was extracted regardless of grade group, marital status, or age and education level. The findings are reported, however, only for E1 to E6 junior enlisted/noncommissioned officer personnel. From this information, results were established for determining new construction and replacement minimums.

²³ *Square Foot Costs*, R.S. Means Company, Inc., 20th Annual Edition, 1998. Calculations for single-family homes are based on the R.S. Means "average" 1,800-square-foot home of simple design from standard plans, including average materials and workmanship, one full bathroom, and one kitchen. The calculations for apartment units are based on a basic three-story, 30-foot-high building with average materials and workmanship. Basic amenities, upgrades, and infrastructure expenditures are not included in these cost figures.

²⁴ For the purposes of the study, new apartment units are inclusive of those constructed from 1992 to 1997.

Maximum Construction Size and the Median of Apartment Units

One of the most important matters addressed in this study is how the previously established congressional statutory limits compare with the size of new housing units in the private sector. In this case, new housing units are apartment units. Due primarily to the large sizes reported, the median sizes that represent private sector apartment units will be used to establish the new maximum sizes for construction and renovation purposes.

Regardless of the limitations imposed on the data, the number of data points representing all two- and three-bedroom units totals 141 when all apartment units in the *AHS* are included. When only new units built after 1992 are counted, the total sample size is reduced to 56. The total count may be important when determining which set of numbers is used, especially given that the gross square feet reported for new three-bedroom apartment units is approximately 80 square feet smaller than the gross square feet reported for all three-bedroom apartment units. The calculations for two-bedroom apartment units yield different results, with new units reported to be approximately 30 gross square feet larger than all units reported. Table 10 presents the findings from the *AHS* by bedroom count.

Table 10: Median Size of Private Sector Apartment Units in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Median Size of NEW Apartment Units in Gross Square Feet	Total Count in AHS	Median Size of ALL Apartment Units in Gross Square Feet	Total Count in AHS
E1-E3 (JENL)	2	1,037	44	1,004	115
E4-E6 (JNCO)	3	1,250	12	1,331	26
Total Count Inclusive of All Persons			56		141

Source: American Housing Survey, U.S. Census Bureau.

For comparison purposes, additional sources were reporting the median sizes of apartment units were used. For example, though the *1998 Characteristics of New Housing* does not provide information on new apartment units by bedroom count, it does report overall size, noting that in 1990 the median gross square foot size of apartment units was 955. This number peaked at 1,050 gross square feet in 1997 and decreased to 1,020 gross square feet in 1998. The same data, also reported and cited by the National Association of Home Builders (NAHB), is considered slightly less representative of two- and three- bedroom units because it reflects the median of all apartment units, including studio and one-bedroom units as well as two- and three-bedroom units.

In addition to the general apartment sizes obtained from the *Characteristics of New Housing*, comparable information was obtained from the Urban Land Institute (ULI) and representative data gathered from field visits. A ULI study conducted in 1999 found that the median size of new two-bedroom apartments was 930 square feet and 1,177 square feet for three-bedroom apartments. Representative data gathered from field visits conducted by the Research Center are inclusive of apartment units from 20 locations across the United States and revealed a median size of 960 gross square feet for all two-bedroom apartment units and 1,250 gross square feet for all three-bedroom

apartment units.²⁵ Table 11 presents the findings from these two data sources for two- and three-bedroom apartment units and compares them with the size findings extracted from the *AHS*.

Table 11: Additional Median Sizes of Private Sector Apartment Units in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Median Size New Apartments 1997 AHS	Median Size All Apartments 1997 AHS	Median Size All Apartments 1999 ULI	Median Size All Apartments 2000 Field Visits
E1-E3 (JENL)	2	1,037	1,004	930	960
E4-E6 (JNCO)	3	1,250	1,331	1,180	1,250

Sources: *AHS* - American Housing Survey, U.S. Census Bureau; *ULI* - Urban Land Institute.

Given the variations in the results from the above data sources, the Research Center decided to use the median reported for all apartment units in the *American Housing Survey* to establish the maximum size for military construction purposes. The medians are 1,004 gross square feet and 1,331 gross square feet for two- and three-bedroom apartment units, respectively. The selection of these maximum sizes keeps consistent the use of the *American Housing Survey* as one of the primary data sources used in this study.

As mentioned, the most significant difference between apartment units in the military and those in the private sector relates to the treatment of common areas and storage, laundry, and mechanical/utility spaces. The private sector generally does not include these spaces in the gross square foot measurement of apartment units. The military, however, must include such spaces in the total square foot calculation of a family housing unit if such housing is to be equitable in terms of family housing requirements. Especially with the exclusion of the square foot calculations of these living spaces, private sector apartment units are typically smaller than military apartment units.

To correct for the unaccounted spaces, it would be inappropriate to alter the primary source data in the *AHS* to make the information equivalent with military units. It is appropriate, however, to account for storage, laundry, and mechanical/utility spaces after analyzing the data by simply adding the required minimum net square footage of these spaces to the resulting data. To account for such spaces properly, an analysis was conducted based on the functional minimum required size for these spaces as specified in the *Army Family Housing Planning Guide*.²⁶ Two-bedroom apartment units include an estimated 187 square feet of unaccounted space. Three-bedroom units include an estimated 207 square feet of unaccounted space. Adding these spaces onto the median size of private sector apartment units ensures that private sector units are equivalent and equitable in terms of the Military Services' space provisions. Table 12 provides the modified median size of private sector two- and three-bedroom apartment units by bedroom count.

²⁵ The 20 locations include Fairfield, Oceanside, and San Diego, California; Fort Walton Beach, Florida; Boston, Massachusetts; Biloxi and Pascagoula, Mississippi; Fayetteville, Goldsboro, and Havelock/New Bern, North Carolina; Grand Forks and Minot, North Dakota; Newport, Rhode Island; Clarksville, Tennessee; San Antonio, Texas; Ogden, Utah; Norfolk and Hampton/Newport News, Virginia; and Bremerton/Bangor and Tacoma, Washington.

²⁶ *Army Family Housing Planning Guide*, Whole-Neighborhood Revitalization Program, U.S. Army Engineering and Housing Support Center, May 1993. The analysis is based on the minimum size of each required space in military family housing units. The minimum total space required for mechanical/furnace, washer/dryer, storage, and exterior wall space is estimated to be 187 square feet in two-bedroom apartment units and 207 square feet in three-bedroom apartment units.

Table 12: Total Median Size of Apartment Units with Unaccounted Spaces in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Median Size All Apartments 1997 AHS	Square Feet of Unaccounted Spaces	TOTAL Median Apartment Size
E1-E3 (JENL)	2	1,004	187	1,190
E4-E6 (JNCO)	3	1,331	207	1,540

Sources: AHS - American Housing Survey, U.S. Census Bureau; Unaccounted Space - Army Family Housing Planning Guide.

The median size of apartments plus the minimum square feet of unaccounted spaces will be used for establishing the total maximum sizes to which the Military Services would build two- and three-bedroom apartment units. These sizes will also be considered for use as the maximum size to which the Military Services will evaluate off-base private sector rental housing for the junior enlisted/noncommissioned officer grade group.

Minimum Adequacy Size and the Standard Deviation of Median Units

Aside from the maximum size standard for military apartment units, it is imperative to establish minimum adequacy sizes with which to evaluate the existing inventory of military apartment units and off-base apartment rental units. These new square foot values will replace the previous DoD minimums for off-base housing by establishing new and updated criteria for measuring adequacy in apartment units. They will also provide a “safety net” of numbers to avoid small but costly additions to apartment units when such additions are not necessary to meet functional space requirements. These numbers will ensure that recently constructed and/or recently renovated apartment units slightly under the congressional statutory limits will still be adequate.

To establish a new set of minimum adequacy sizes for apartment units, another analysis of the units in the *1997 American Housing Survey* was conducted. It was determined that the mean, or average, size for the sample’s two- and three-bedroom units, excluding all apartment units falling below the previous DoD square foot minimum adequacy sizes. From these representative units, the standard deviation was calculated and applied to the respective mean (average) for each grade group. A weighted average was also derived based on the total count in the sample. The resulting 72.2 percent weighted average was then applied to the congressional statutory limits by grade group and bedroom count. Appendix C includes a table showing these calculations and the results.

The final numbers establish preliminary minimum adequacy sizes representative of private sector apartment units but do not include the required minimum area of unaccounted space. After adding the 187 square foot of unaccounted space in two-bedroom units and the 207 square feet of unaccounted space in three-bedroom units, the sizes will be considered the new minimum adequacy sizes for the renovation and evaluation of military apartment units. Table 13 presents these final calculations and findings for two- and three-bedroom units as reported for the junior enlisted/noncommissioned officer grade group. The final values have been rounded to the nearest ten square feet.

Table 13: Apartment Unit Mean (Average), Standard Deviation, and Minimum Adequacy

Equivalent Rank in Private Sector	Bedroom Count	Mean (Average) Apartment Size	One Standard Deviation from Mean	Congressional Statutory Limit	Minimum with 72.2% Weighted Average	New Minimum Adequacy with Unaccounted Space
E1-E3 (JENL)	2	1,115	854	1,180	852	1,040
E4-E6 (JNCO)	3	1,494	1,063	1,490	1,076	1,280

Source for Mean (Average): American Housing Survey, U.S. Census Bureau.

The 72.2 percent weighted average was applied to the congressional statutory limit for the junior enlisted grade group and for two- and three-bedroom units. The percentage is justifiable based on a comparable analysis performed on the data for private sector housing units gathered from the assigned field visits already mentioned. Data gathered from the field visits was inclusive of apartment units from 20 locations across the country. These calculations were conducted specifically to provide a cross-reference for the calculations performed on the *American Housing Survey* data. The result was a comparable weighted average of 72.2 percent. Appendix C includes a table showing the calculations and results for both data sets of apartment units.

Summary of Size Findings

For the development of new size standards for the construction and evaluation of military apartment units, various sources and methodologies were relied upon. The median gross square foot sizes of apartment units and unaccounted spaces are considered for the construction and evaluation maximums for military and off-base apartment units. At the same time, new minimum adequacy sizes are calculated based on the congressional statutory limits, plus unaccounted spaces, to serve as the renovation and evaluation minimums for military and off-base apartment units. For purposes of direct comparison, Table 14 is a summary of the two sets of numbers for the junior enlisted/noncommissioned officer grade group. Appendix D includes a single, standalone copy of the summary table for apartment units.

Table 14: Summary of Findings for Apartment Unit Size Standards by Grade in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	New Minimum Adequacy (Proposed Apartment Renovation Minimum)	Total Maximum Apartment Size (Proposed Apartment Construction Maximum)
E1-E3 (JENL)	2	1,040	1,190
E4-E6 (JNCO)	3	1,280	1,540

The decision to use the above sizes for apartment units will allow for maximum assignment possibilities by the military services.

AMENITIES ANALYSIS

In addition to the size of private sector apartment units, the frequency with which private sector apartment units include amenities such as dining rooms, family rooms, bathrooms, appliances, air conditioning, and garages and carports is also discussed. The findings for each of these amenities are compared to the existing military standard. However, because the *1997 American Housing Survey* contains an insufficient amount of information specifically relating to apartment units, the *1997 Property Owners and Managers Survey* is used to extract sufficient data on some amenities, specifically air conditioning, appliances, and covered parking. For the remaining amenities, specifically dining rooms, family rooms, and bathrooms, data for all housing units in the *American Housing Survey* is analyzed. To analyze these amenities with the greatest number of data points in the *AHS*, no limits were imposed on unit size or the age and education of the head-of-household.

The data extracted from the *POMS* were collected for apartment units built after 1990 but are not categorized by bedroom count. However, the *POMS* does report that 84 percent of the units in the survey are either two- or three-bedroom units, strongly representative of the units considered acceptable for E1 to E6 junior enlisted/noncommissioned officer personnel. The *POMS* database, like the *CNH*, does not contain information on unit occupants. Consequently, the ranges of affordable monthly payment for housing calculated for E1 to E6 junior enlisted/noncommissioned officer equivalents in the private sector are used.

Dining Rooms and Family Rooms

Dining rooms are described as separate or extended rooms located off a kitchen and/or living room for the purpose of serving and consuming meals.²⁷ These rooms typically exist in large homes or housing units where kitchens do not provide sufficient space for dining. A family room, on the other hand, is defined as an informal space used by occupants of the unit for family activity and/or children’s play space.²⁸ These rooms are generally found in larger single-family homes where occupants might need larger spaces in which to entertain; they are not typically found as an amenity in apartment units. Table 15 presents the frequency rates for these two amenities in all apartment units reported in the *1997 American Housing Survey*.

Table 15: Frequency of Rooms in Private Sector Apartment Units

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Dining Rooms	Frequency of Family Rooms	TOTAL Number of Rooms
E1-E3 (JENL)	2	23%	1%	4.3
E4-E6 (JNCO)	3	33%	8%	5.5

Source: American Housing Survey, U.S. Census Bureau.

²⁷ *Army Family Housing Planning Guide*, Whole-Neighborhood Revitalization Program, U.S. Army Engineering and Housing Support Center, Chapter 9: Interior Spaces, Section 9.5: Dining Room, page 145, May 1993.

²⁸ *Army Family Housing Planning Guide*, Whole-Neighborhood Revitalization Program, U.S. Army Engineering and Housing Support Center, Chapter 9: Interior Spaces, Section 9.4: Living Room, page 143, May 1993.

Given the relatively few number of data points, findings are based on all two- or three-bedroom apartment units reported in the *American Housing Survey* irrespective of age and education of the head-of-household. The results extracted for all apartment units are comparable to the results extracted for all unit types for equivalent private sector E1 to E6 junior enlisted/noncommissioned officer personnel.

Bathrooms

The military standard for bathrooms in one-story family housing units is one full-bathroom for two-bedroom units and two full-bathrooms for three-, four-, and five-bedroom units.²⁹ This standard applies to all military family housing units regardless of unit type. Generally, single-family housing units designed and built in the private sector tend to have a slightly higher average number of bathrooms than military family housing units. However, the same may not be necessarily hold for apartment units. The *American Housing Survey* provides information on the number of bathrooms in private sector apartment units as noted in Table 16.

Table 16: Frequency of Bathrooms in Private Sector Apartment Units

Equivalent Rank in Private Sector	Bedroom Count	Average Number of Full-Bathrooms	Percent of Units with Half-Bathrooms
E1-E3 (JENL)	2	1.4	14%
E4-E6 (JNCO)	3	1.6	15%

Source: American Housing Survey, U.S. Census Bureau.

Data in the *AHS* on bathrooms for junior enlisted and junior noncommissioned officer equivalent personnel is insufficient for drawing any confident conclusions. Thus, the proposed recommendations for apartment units for these members are based on findings for all two- and three-bedroom apartment units irrespective of age and education of the head-of-household.

Air Conditioning

No existing national military standard requires the installation of air conditioning in all military family housing units. Rather, the installation of air conditioning depends on the climatological location of a military installation.³⁰ The *1997 American Housing Survey* includes information on the frequency of air conditioning in all private sector housing units, but the data can also be reported more specifically for apartment units. For all housing units in the *AHS*, the survey reported that 85 percent of two-bedroom units and 89 percent of three-bedroom units had some form of air conditioning. For apartment units in the *AHS*, the survey reported that only 20 percent of two-bedroom units and 26 percent of three-bedroom units, respectively, had some form of air conditioning. It is difficult to determine the reliability of these frequency rates because each rate is based on a relatively few number of data points.

²⁹ *Army Family Housing Planning Guide*, Whole-Neighborhood Revitalization Program, U.S. Army Engineering and Housing Support Center, Chapter 9: Interior Spaces, Section 9.6: Bathrooms, page 147, May 1993.

³⁰ *Army Family Housing Planning Guide*, Whole-Neighborhood Revitalization Program, U.S. Army Engineering and Housing Support Center, Chapter 10: Electrical/Mechanical, Section 10.5: Air-Conditioning System, page 183. The regulation specifies that air conditioning will be provided in areas where, during the warmest six months of the year, the dry bulb temperature is 80 degrees Fahrenheit or higher for over 650 hours or the wet bulb temperature is 67 degrees Fahrenheit or higher for over 800 hours.

For comparison purposes, data from the *1994 Property Owners and Managers Survey* for apartment units was analyzed. Though the information cannot be categorized by number of bedrooms, the survey reports that 84 percent of all apartment units are either two- or three-bedroom units. From the *POMS*, then, it was found that 79 percent of apartment units representative of equivalent private sector E1 to E3 junior enlisted personnel housing had air conditioning. The rate was 88 percent for units representative of equivalent private sector E4 to E6 junior noncommissioned officer personnel housing. Table 17 presents the rates.

Table 17: Frequency of Air Conditioning in Private Sector Apartment Units

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Air Conditioning
E1-E3 (JENL)	2	79%
	3	
E4-E6 (JNCO)	2	88%
	3	

Source: Property Owners and Managers Survey, U.S. Census Bureau.

As noted later, the rates for the presence of air conditioning in apartment units, as reported in the *POMS*, are comparable to the rates for single-family units.

Appliances

Regardless of the housing type, the military family housing standard requires all family housing units to include dishwashers and adequate space and/or hook-ups for clothes washers and dryers.³¹ Again, the *1997 AHS* was used to extract information on the inclusion of clothes washers and dryers in apartment units. Due to the relatively few number of data points, frequency rates are based on all two- or three-bedroom apartment units reported in the *AHS*. Table 18 presents the findings.

Table 18: Frequency of Clothes Washers and Dryers in Private Sector Apartment Units

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Clothes Washers	Frequency of Clothes Dryers
E1-E3 (JENL)	2	51%	51%
E4-E6 (JNCO)	3	59%	54%

Source: American Housing Survey, U.S. Census Bureau.

Though not categorized by number of bedrooms, newer private sector apartment units reported in the *POMS* for equivalent E1 to E3 junior enlisted personnel included clothes washers and dryers 56 percent of the time. For equivalent E4 to E6 junior noncommissioned officer personnel, the rate was 76 percent.

³¹ *Army Family Housing Planning Guide*, Chapter 9: Interior Spaces, Section 9.7: Kitchen/Auxiliary Dining Area, page 151; Section 9.8: Laundry, page 155.

Since no information is available in the *POMS* for dishwashers, data only for all two- and three-bedroom apartment units as reported in the *AHS* can be used. The data is presented in Table 19.

Table 19: Frequency of Dishwashers in Private Sector Apartment Units

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Dishwashers
E1-E3 (JENL)	2	64%
E4-E6 (JNCO)	3	69%

Source: American Housing Survey, U.S. Census Bureau.

The frequency rates calculated for apartment units are somewhat lower than those calculated for all private sector housing units, including both apartment units and single-family housing units. The frequency rate for all two-bedroom housing units for equivalent E1 to E6 junior personnel is 70 percent. For all three-bedroom housing units for equivalent E1 to E6 junior personnel, the rate is 92 percent. Regardless of these differences, both frequency rates allow the standard for dishwashers to remain unchanged.

Garages and Carports

The existing military standard for parking requires one covered space and one additional uncovered space per family housing unit.³² In addition, because climate contributes to the necessity of constructing garages versus carports in military family housing units, the frequency of garages varies regionally.

Given that the *American Housing Survey* does not provide information on garages or carports, data was instead extracted from the *1994 Property Owners and Managers Survey* to assess the type of parking available in two- and three-bedroom units for equivalent E1 to E6 private sector civilians. The *AHS*, however, categorizes parking as either covered or uncovered, which includes both carports and garages and is representative of the type of parking generally available to residents of apartment units. The database further specifies where parking is available and whether a fee is charged. To be consistent with the needs of the study, the analysis focuses on the frequency with which complimentary parking is available to the residents of apartment units. Table 20 presents the findings extracted from the *POMS*.

Table 20: Frequency of Covered Parking in Private Sector Apartment Units

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Free Covered Parking
E1-E3 (JENL)	2 3	42%
E4-E6 (JNCO)	2 3	43%

Source: Property Owners and Managers Survey, U.S. Census Bureau.

³² *Army Family Housing Planning Guide*, Chapter 5: Lot and Landscaping, Section 5.2: Driveways/Parking, page 77; Chapter 6: Exterior Structures, Section 6.1: Garage, page 85; Section 6.2: Carport, page 87.

Data from the *POMS* survey show that free covered parking was available in 42 percent of apartment units representative of E1 to E3 junior enlisted private sector equivalents. For apartment units representative of E4 to E6 junior noncommissioned officer equivalents, the frequency of free and available covered parking was 43 percent. Both rates are significantly lower than the rates of garages in private sector single-family units.

RECOMMENDATIONS FOR APARTMENT UNITS

Surveys such as the *American Housing Survey* and the *Characteristics of New Housing* demonstrate that specific data and information for apartment units are relatively difficult to obtain. The *Property Owners and Managers Survey* is an additional source for data and information, but even it has limitations. Still other data on the median size of apartment units are available from other organizations. However, due to the low reliability of the data gathered from various sources, it is difficult to draw a reliable conclusion as to the comparable size of two- and three-bedroom apartment units in the private sector.

Current military standards suggest that most of the amenities discussed in this report should be included in the construction of new or the renovation of existing military family housing units. In fact, most of the amenities discussed in this report are present in nearly all newly constructed and existing private sector housing units. However, the frequency with which these amenities are present in private sector apartment units representative of E1 to E6 junior personnel falls short of current practice.

The present report suggests that the findings for single-family units are particularly relevant to the housing goals and housing needs of the military family housing program. At the same time, the Military Services should abandon plans for constructing apartment units as part of routine practice for the simple reason that such units are not representative of the general housing needs of the military housing program. Even though the Department of Defense and the Military Services own the land on which family housing units are constructed and taking into consideration infrastructure costs, it is generally more expensive to build apartment units than single-family units.

The above statement does not mean that apartment units should not be constructed. Rather, it recognizes the high cost of land and does not take into account unusual or special circumstances such as site constraints, base limitations, or other factors that justify the need for apartment unit construction. In any event, the size and amenity standards of apartment units need to be addressed because these units are an important part of the private sector housing inventory. Accordingly, a full analysis of apartment unit types is important.

Unusual or special circumstances still make apartment units subject to certain size and amenity standards. These standards should not exceed those established for single-family units, but they should not reduce the current amenity standards earned by military personnel at all levels. These standards should also be used to measure the adequacy of off-base apartment units and to assess unit availability in a local rental market and the true value of BAH expenditures. Thus, though it is suggested that the Military Services not construct apartment units except in the case of unusual or special circumstances, recommendations are nonetheless made for apartment unit size and amenity standards.

Minimum Adequacy and Maximum Apartment Construction Size Standards

The new maximum sizes for the construction and evaluation of military apartment units should be the median size of apartment housing units calculated from private sector findings plus unaccounted space. At the same time, to evaluate apartment units adequately, a new set of minimum adequacy sizes are established by analyzing private sector apartment units and applying a weighted average to the congressional statutory limits and by including unaccounted spaces. Table 21 presents the proposed size standards for the construction and evaluation of both on- and off-base apartment units in the private sector. The proposed minimum adequacy and maximum sizes are compared to the previous minimum adequacy sizes and congressional statutory limitations, respectively, and present the percent delta increases between the sets of numbers. Appendix H includes a single, standalone copy of the recommended size standards for apartment units. The recommendation regarding apartment minimum adequacy and maximum sizes calls for updating current policies to reflect a distinction between apartment units and single-family units.

Table 21: Proposed Apartment Size Standards by Grade in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Previous DoD Minimum Adequacy	Proposed Apartment Minimum Adequacy	Percent Delta Increase	Previous Statutory Limit	Proposed Apartment Construction Maximum	Percent Delta Increase
E1-E3 (JENL)	2	930	1,040	11.8%	1,180	1,190	0.8%
E4-E6 (JNCO)	3	1,190	1,280	7.6%	1,490	1,540	3.4%

DoD Minimum Adequacy Source: DoD Manual 4165.63-M, DoD Housing Management.

Statutory Limit Source: United States Congressional Code Title 10, Section 2826.

Subsequently, the apartment minimum adequacy and maximum sizes will be used to evaluate off-base apartment units for meeting private sector housing needs and for standards in setting BAH.

Apartment Amenity Standards

Pursuant to existing military standards, most of the amenities discussed in this report must be included in new or existing to-be-renovated military family housing units. Moreover, most of the amenities are available in nearly all private sector housing units. However, the rate with which some of the amenities are provided in apartment units, representative of E1 to E6 junior enlisted/noncommissioned officer grade groups, are not as common. Some amenities, specifically air conditioning and parking, fluctuate by region due to climatic differences, construction practices, and simple necessity.

Though our findings are generally consistent with existing military standards, some differences are reported. The recommendations for amenities in apartment units generally reflect those of single-family units, with the exception of parking, dining room, and family room spaces. Because it is difficult to present the proposed amenity standards in a single chart, two tables are used to array the proposed amenities for apartment units. Table 22.1 provides a summary of the proposed standards for room- or space-related amenities, specifically dining rooms, family rooms, bathrooms, and parking. Table 22.2 summarizes the proposed standards for the mechanical amenities, specifically air conditioning, dishwashers, clothes washers, and dryers. Appendix H includes a single, standalone copy of these recommended amenities for apartment units.

Table 22.1 : Proposed Apartment Dining Room, Family Room, Bathroom, and Parking Standards

Equivalent Rank in Private Sector	Bedroom Count	Dining Room^a	Family Room^b	Bathroom^c	Parking^b
E1-E3 (JENL)	2	Included	Not included	1 full	Noncovered
E4-E6 (JNCO)	3	Included	Not included	2 full	Noncovered

^a Proposed standard applies to all military family housing units; in apartment units, this standard is represented by an eat-in kitchen.

^b Proposed standard applies to military apartment units.

^c Proposed standard applies to all one-story military family housing units.

Table 22.2: Proposed Apartment Air Conditioning, Dishwasher, and Washer/Dryer Standards

Equivalent Rank in Private Sector	Bedroom Count	Air Conditioning^d	Dishwasher^d	Clothes Washer^d	Clothes Dryer^d
E1-E3 (JENL)	2	Based on climate	Included	Included	Included
E4-E6 (JNCO)	3	Based on climate	Included	Included	Included

^d Proposed standard applies to all military family housing units.

The final recommendation regarding apartment units holds that such units should not be considered for construction unless required by special circumstances. The proposed sizes will be used primarily for the evaluation of off-base housing rental units and the establishment of BAH standards for respective personnel within the junior enlisted/non-commissioned officer grade. The findings and recommendations for single-family units will be considered as the basis for establishing the new construction and renovation standards for military family housing.

Single-Family Housing Units

This section begins by presenting the size and amenity findings for private sector single-family housing units as calculated from the *1997 American Housing Survey* and the *1998 Characteristics of New Housing*. Data on new single-family homes are extracted primarily from the *CNH* and, when necessary, distinguish between single-family detached and single-family attached units. Data regarding amenities in single-family units were extracted from both the *AHS* and the *CNH*. However, given that the *CNH* provides more data, it was the predominant source of amenity findings.

SIZE STANDARDS ANALYSIS

To establish a new maximum size standard, the median size of private sector single-family homes reported in the *1998 Characteristics of New Housing* was analyzed. To determine median sizes, data were extracted for two-, three-, four-, and five-bedroom single-family homes reported for each equivalent grade. In some instances, the *CNH* disaggregated the data and presented information for single-family detached and single-family attached units. From this information, new construction and replacement minimums, as well as programming benchmarks, were established.

Maximum Construction Size and the Median of New Single-Family Homes

One of the most important issues addressed in this study is how the previously established congressional statutory limits compare with the size of new single-family homes in the private sector. Given the larger sizes reported in the private sector, the median sizes for new private sector single-family homes will become the basis for establishing the new maximum sizes for construction and replacement.

Because these private sector homes in the *CNH* are newly constructed, data are not yet available on the persons residing in or purchasing them. Therefore, data on sizes and amenities for a set of homes is analyzed through sale price and home value, extracted with the ranges of housing affordability by grade group established earlier. Table 23 presents the median sizes in each data set of homes by equivalent grade group and bedroom count. The data are compiled separately for single-family detached and single-family attached units and collectively for all single-family housing units.

Table 23: Median Size of New Private Sector Single-Family Homes in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Median GSF Size of NEW Detached Homes	Median GSF Size of NEW Attached Homes	Median GSF Size of ALL NEW Single-Family Homes	Total Count in CNH
E1-E3 (JENL)	2	1,373	1,350	1,353	541,957
	3	1,621	1,609	1,620	
	4	2,104	1,903	2,103	
	5	2,312	no data	2,312	
E4-E6 (JNCO)	2	1,530	1,448	1,500	607,920
	3	1,766	1,711	1,764	
	4	2,224	2,308	2,224	
	5	2,670	no data	2,670	
E7-E8 (SNCO)	2	2,230	1,620	1,786	511,701
	3	2,028	2,040	2,028	
	4	2,500	2,405	2,500	
	5	3,132	2,553	3,132	
O1-O3 (CGO) W1-W3 (WO)	2	1,907	1,641	1,793	472,872
	3	2,047	2,040	2,046	
	4	2,500	2,449	2,500	
	5	3,099	2,553	3,089	
E9 (SNCO) W4-W5 (WO)	3	2,384	2,391	2,384	293,341
	4	2,787	3,102	2,789	
	5	3,433	3,780	3,433	
O4-O5 (FGO)	3	2,307	2,268	2,300	274,408
	4	2,700	2,449	2,700	
O6 (SO)	4	2,906	3,098	2,915	146,642
O7-O10 (GO)	4	4,103	3,956	4,064	140,673

Source: Characteristics of New Housing, U.S. Census Bureau.

Given the large housing sizes extracted for new single-family homes in the private sector, the median sizes become the basis for establishing the maximum sizes to which the Military Services should build. For comparison purposes, Appendix E provides the median sizes of new single-family homes in each of the nine census divisions.

Minimum Construction Size and the Median of All Single-Family Homes

If new maximum sizes are established for the construction and replacement of military family housing units, then minimum sizes should also be established. To be consistent with determining the maximum sizes for construction and replacement, the median sizes extracted for all existing single-family homes by grade would become the basis for establishing construction and replacement minimums. Accordingly, data in the *1997 American Housing Survey* were analyzed to determine the median size of all existing housing units constructed after 1952 by equivalent grade and bedroom count. After extracting the necessary data from the database, it was observed that the median sizes were, in most cases, much larger than the earlier congressional statutory limits. Moreover, there were no consistent variations between the median sizes calculated and the congressional statutory limits. Table 24 presents the median sizes of all single-family homes in the *1997 American Housing Survey* by equivalent grade and bedroom count. It also presents the

respective congressional statutory limits for each respective grade and the gross square foot and percent differences between the two numbers.

Table 24: Median Size of All Existing Private Sector Housing Units in Gross Square Feet

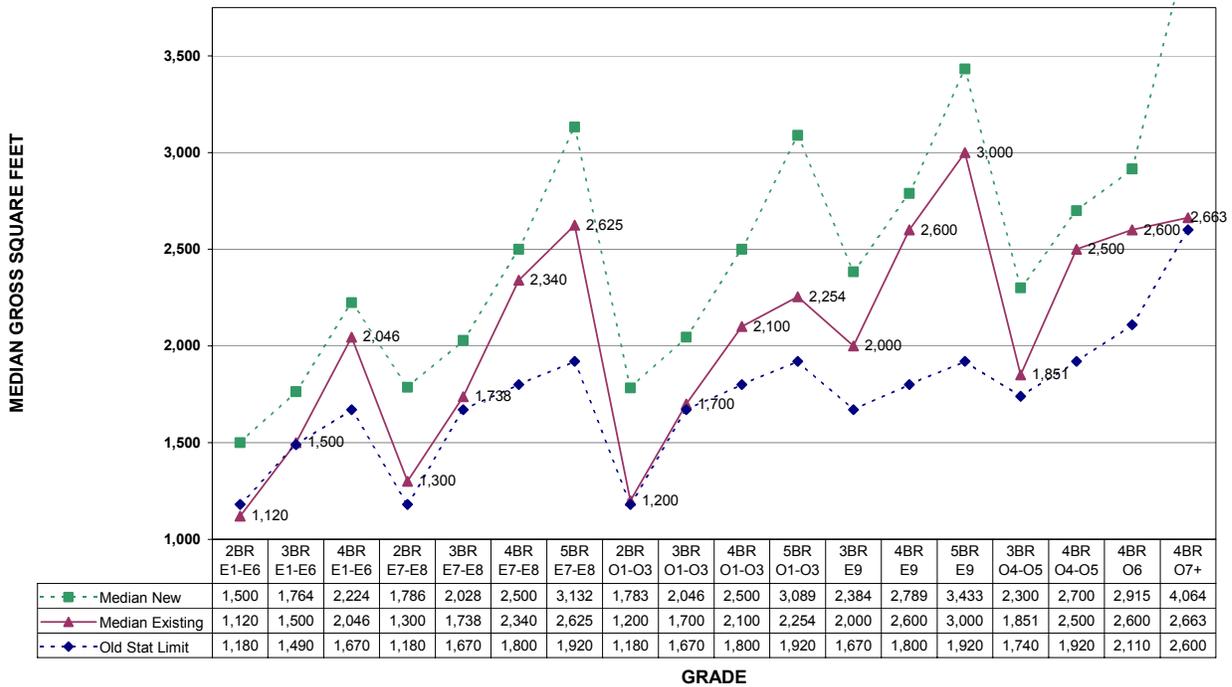
Equivalent Rank in Private Sector	Bedroom Count	Congressional Statutory Limits in Equivalent GSF	Median GSF Size of ALL Existing Housing Units	GSF Delta	Percent Delta	Total Count in AHS
E1-E3 (JENL) E4-E6 (JNCO)	2	1,180	1,120	-60	-5.1%	267
	3	1,490	1,500	10	0.7%	
	4	1,670	2,046	376	22.5%	
	5	1,920	no data	no data	no data	
E7-E8 (SNCO)	2	1,180	1,300	120	10.2%	5,390
	3	1,670	1,738	68	4.1%	
	4	1,800	2,340	540	30.0%	
	5	1,920	2,625	705	36.7%	
O1-O3 (CGO) W1-W3 (WO)	2	1,180	1,200	20	1.7%	273
	3	1,670	1,700	30	1.8%	
	4	1,800	2,100	300	16.7%	
	5	1,920	2,254	334	17.4%	
E9 (SNCO) W4-W5 (WO)	3	1,670	2,000	330	19.8%	1,845
	4	1,800	2,600	800	44.4%	
	5	1,920	3,000	1080	56.3%	
O4-O5 (FGO)	3	1,740	1,851	111	6.4%	1,010
	4	1,920	2,500	580	30.2%	
O6 (SO)	4	2,110	2,600	490	23.2%	470
O7-O10 (GO)	4	2,600	2,663	63	2.4%	90

Source: American Housing Survey, U.S. Census Bureau.

It is important to note that the table combines the E1 to E3 junior enlisted and the E4 to E6 junior noncommissioned officer categories. Not only did the previous congressional statutory limits traditionally combine these two pay grades, but the number of data points extracted from the *American Housing Survey* for the combined grade category is increased and thus better represents junior military personnel. What is more important, however, is that E1 to E3 junior enlisted members remain in this grade for a relatively short time. Therefore, establishing one single grade group, inclusive of E1 through E6 personnel, enables efficient use of the housing inventory and avoids relocation costs associated with grade changes. The rest of the report will present the two pay grades as a single combined E1 to E6 grade.

In view of the noticeably larger median sizes of existing private sector housing units, the Research Center and the Military Services decided to retain the previous congressional statutory limits and establish those numbers as the new construction and replacement minimums. The inconsistent variations in the differences between the median of all existing private sector homes and the congressional statutory limits further support that decision. Figure 2 presents these variations more markedly and shows that setting the minimum construction size equal to the previous congressional statutory limit captures a large portion of comparable existing homes falling between the congressional statutory limit and the median size of new home range in the private sector. Appendix F includes a single, standalone copy of Figure 2.

Figure 2: Median Size of Existing Housing versus Congressional Statutory Limits



Source: Characteristics of New Housing and American Housing Survey, U.S. Census Bureau.

As Figure 2 demonstrates, four- and five-bedroom private sector units are generally larger than the four- and five-bedroom standard for military housing units. Establishing construction and replacement minimums that are equal to the median size of all existing units in the private sector inventory would dramatically increase the size requirements for all military units. At the same time, it would increase the expenditures needed to meet the new standards. Thus, it is deemed more beneficial for the Military Services to “fall back” to the congressional statutory limits for establishing new construction and replacement minimums. Falling back to the congressional statutory limits maintains a level of familiarity and establishes a more conservative approach for setting military construction (MILCON) minimums. More important, however, the numbers assume that all units newly constructed and renovated to the previous congressional statutory limits will remain adequate.

Programming Benchmarks for New Construction and Replacement

The Military Services agreed that there was a need to establish a set of numbers with which to program funds for the construction and replacement of military family housing. It is important to remember that the median size of new single-family homes will be established as the size to which the Military Services should build. At the same time, the congressional statutory limits will be established as the new construction and replacement minimums. The programming benchmark, then, is simply the mid-point of these two sets of numbers. Table 25 presents the mid-point numbers by equivalent grade and bedroom count with the corresponding “proposed” construction and replacement maximums and “proposed” construction and replacement minimums. All numbers are rounded to the nearest ten square feet.

Table 25: Programming Benchmarks for Military Family Housing Construction in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Congressional Statutory Limits (Proposed Minimum)	Mid-Point (Programming Benchmark)	Median Size of New Single-Family Homes (Proposed Maximum)
E1-E3 (JENL) E4-E6 (JNCO)	2	1,180	1,340	1,500
	3	1,490	1,630	1,760
	4	1,670	1,950	2,220
	5	1,920	2,300	2,670
E7-E8 (SNCO)	2	1,180	1,490	1,790
	3	1,670	1,850	2,030
	4	1,800	2,150	2,500
	5	1,920	2,530	3,130
O1-O3 (CGO) W1-W3 (WO)	2	1,180	1,490	1,790
	3	1,670	1,860	2,050
	4	1,800	2,150	2,500
	5	1,920	2,510	3,090
E9 (SNCO) W4-W5 (WO)	3	1,670	2,030	2,380
	4	1,800	2,300	2,790
	5	1,920	2,680	3,430
O4-O5 (FGO)	3	1,740	2,020	2,300
	4	1,920	2,310	2,700
O6 (SO)	4	2,110	2,520	2,920
O7-O10 (GO)	4	2,600	3,330	4,060

Source: Characteristics of New Housing, U.S. Census Bureau.

For programming purposes, the mid-point numbers allow the services to establish a standard gross square foot size as a benchmark to which construction costs, based on area cost factors, can be set. The locally adjusted funding amount will be directly tied to the proposed benchmark size but will allow the private sector builder/contractor to build within an entire size range, from the new construction minimum to the new construction maximum. In other words, the funds programmed and set aside for construction and replacement will be set to the benchmark. The builder/developer will have the opportunity to construct homes up to the construction maximum (the median of new single-family private sector homes) or down to but not below the construction minimum (congressional statutory limits). Given that area cost factors account for regional variations in construction costs, the programming benchmarks and new size ranges allow private sector homes to reflect the variations in local and regional median sizes and construction practices.

Minimum Adequacy Size and the Standard Deviation of Median Homes

Apart from the construction and replacement of military family housing units, there is a need to establish minimum adequacy sizes with which to evaluate the existing inventory of military single-family housing units and off-base single-family rental units. The new square foot values will replace the previous DoD minimums for off-base housing by establishing new and updated criteria for measuring adequacy in military single-family housing units. The establishment of new minimum adequacy sizes for renovation and evaluation will also provide a “safety net” of numbers to avoid small but costly additions to military family housing units when such additions are not necessary to meet functional space requirements. The values will also ensure that recently

constructed and/or recently renovated single-family housing units slightly under the congressional statutory limits will still be adequate in size.

To establish a new set of minimum adequacy sizes for the renovation and evaluation of single-family units, another analysis was conducted of the homes in the *1997 American Housing Survey*. Calculated was the mean, or average, size for two-, three-, four-, and five-bedroom homes in the sample by grade and bedroom count, excluding all single-family homes falling below the previous DoD square foot minimum adequacy sizes. From these representative homes, the standard deviation was calculated and applied to the corresponding mean (average) for each grade. A weighted average was also derived based on the total count in each of the representative grades. The resulting 91.6 percent weighted average was then applied to all congressional statutory limits by grade and bedroom count. The resulting calculations are to be considered as the new minimum adequacy sizes for renovation of military family housing units. Table 26 presents the calculations and findings by equivalent grade and bedroom count; the final values are rounded to the nearest ten square feet.

Table 26: Single-Family Housing Mean (Average), Standard Deviation, and Minimum Adequacy

Equivalent Rank in Private Sector	Bedroom Count	Mean (Average) Single-Family Home Size	One Standard Deviation from Mean	Congressional Statutory Limits	New Minimum Adequacy with 91.6% Weighted Average
E1-E3 (JENL) E4-E6 (JNCO)	2	1,484	940	1,180	1,080
	3	1,812	1,235	1,490	1,370
	4	2,380	1,683	1,670	1,530
	5	no data	no data	1,920	1,760
E7-E8 (SNCO) O1-O3 (CGO) W1-W3 (WO)	2	1,650	1,022	1,180	1,080
	3	1,979	1,357	1,670	1,530
	4	2,497	1,859	1,800	1,650
	5	2,768	2,092	1,920	1,760
E9 (SNCO) W4-W5 (WO)	3	2,130	1,506	1,670	1,530
	4	2,685	2,046	1,800	1,650
	5	2,999	2,340	1,920	1,760
O4-O5 (FGO)	3	2,059	1,431	1,740	1,590
	4	2,652	2,014	1,920	1,760
O6 (SO)	4	2,705	2,083	2,110	1,930
O7-O10 (GO)	4	2,720	2,057	2,600	2,380

Source for Mean (Average): American Housing Survey, U.S. Census Bureau.

The 91.6 percent weighted average applied to the congressional statutory limits is justifiable based on a comparable analysis of data on single-family units gathered from the field visits to 20 locations across the country. The rents obtained for the units were normalized to a national average by using a private sector correction factor from the Institute of Real Estate Management (IREM).³³ These calculations were performed specifically to provide a cross-reference to the calculations performed on the *American Housing Survey* data. The result was a comparable weighted average of 90.4 percent. Appendix C includes a complete table of the results showing the calculations and the results as conducted on both data sets of single-family units.

³³ *Income Expense Analysis: Conventional Apartments*, Institute of Real Estate Management, 1999 edition.

Summary of Size Findings

For the development of new size standards for the construction, renovation, and evaluation of military single-family housing units, various sources and methodologies are utilized. The median gross square foot sizes of single-family homes extracted from the *1998 Characteristics of New Housing* are considered for the construction and replacement maximums for military single-family housing units and the evaluation maximums for off-base single-family rental units. At the same time, the congressional statutory limits are considered for the construction and replacement minimums. From both sets of numbers, programming benchmarks are developed for use in fund allocation. Finally, new minimum adequacy sizes are calculated based on the congressional statutory limits to serve as the renovation minimums for military single-family housing units and evaluation minimums for off-base single-family rental units. For purposes of direct comparison, Table 27 summarizes all sets of numbers by grade and bedroom count. Appendix D provides a single, standalone copy of the summary table for single-family units.

Table 27: Summary of Findings for Single-Family Size Standards by Grade in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Minimum Adequacy (Proposed Renovation Minimum)	Congressional Statutory Limits (Proposed Construction Minimum)	Mid-Point (Programming Benchmark)	Median Size New Single-Family Homes (Proposed Maximum)
E1-E3 (JENL) E4-E6 (JNCO)	2	1,080	1,180	1,340	1,500
	3	1,370	1,490	1,630	1,760
	4	1,530	1,670	1,950	2,220
	5	1,760	1,920	2,300	2,670
E7-E8 (SNCO) O1-O3 (CGO) W1-W3 (WO)	2	1,080	1,180	1,490	1,790
	3	1,530	1,670	1,860	2,050
	4	1,650	1,800	2,150	2,500
	5	1,760	1,920	2,510	3,090
E9 (SNCO) W4-W5 (WO)	3	1,530	1,670	2,030	2,380
	4	1,650	1,800	2,300	2,790
	5	1,760	1,920	2,680	3,430
O4-O5 (FGO)	3	1,590	1,740	2,020	2,300
	4	1,760	1,920	2,310	2,700
O6 (SO)	4	1,930	2,110	2,520	2,920
O7-O10 (GO)	4	2,380	2,600	3,330	4,060

It is important to note that the E1 to E3 junior enlisted and E4 to E6 junior noncommissioned officer categories have been combined into a single category representing E1 to E6 junior enlisted/noncommissioned officer personnel. Though the data are presented separately, the combination of categories in part reflects both military construction policy and military assignment policy. More important, though, the data, when calculated as a single group, yield results that approximate those numbers of the E4 to E6 non-commissioned officer grade group exclusively. Thus, the recommended sizes presented for the combined E1 to E6 category match those of the E4 to E6 category.

Given the special consideration for E9 senior noncommissioned officers and W4/W5 warrant officers set forth earlier, the study recognizes the need for a separate category that reflects these military members' length of time in the service, level of experience and responsibility, and age and education level. The results indicate housing sizes for E9 senior noncommissioned officers and W4/W5 warrant officers that are comparable to O4 and O5 field grade officers. The numbers calculated for E9/W4/W5 personnel are closer to those of field grade officers than senior noncommissioned/company grade officers. Consequently, the new size standards established for E9 senior noncommissioned and W4/W5 warrant officer personnel should match those of field grade officers. This will also allow for maximum assignment possibilities by the Military Services.

AMENITIES ANALYSIS

In addition to the size of private sector single-family homes, it is also important to discuss the frequency with which amenities such as dining rooms, family rooms, bathrooms, appliances, air conditioning, and garages and carports are found in private sector homes. The *1997 American Housing Survey* was one of the primary sources used to extract data by grade and bedroom count regarding the frequency rate of amenities in single-family housing units. To analyze the amenities with the greatest number of data points, no limits were set on the size or type of unit. To meet the needs of the amenities discussion, data was considered for single-family detached and single-family attached units only.

Specifically, the *American Housing Survey* contains data on the frequency of dining rooms, living rooms, bathrooms, air conditioning, dishwashers, clothes washers, and dryers in single-family housing units. However, given the relatively low number of data points in the *AHS*, data for bathrooms and air conditioning was analyzed from the *1998 Characteristics of New Housing*. For the remaining amenities, garages and carports, data was analyzed for both for single-family detached and single-family attached units in the *1998 Characteristics of New Housing*.

Dining Rooms and Family Rooms

As mentioned in the apartment section, dining rooms are defined as separate or extended rooms located off a kitchen and/or living room for serving and consuming meals.³⁴ They typically exist in larger homes where kitchens alone do not provide sufficient space for dining. In smaller homes occupied by smaller families, eat-in kitchens are more common, providing adequate dining space. Although larger homes often include dining rooms, dining rooms occur more frequently in military family housing than in private sector housing.

While the military family housing standard requires housing units, regardless of size, to include a separate dining room, families residing in smaller homes may find other uses for this space. Private sector data indicate that the frequency of dining rooms increases as grade level increases. For example, the frequency of dining rooms in single-family E1 to E6 junior enlisted/non-commissioned officer equivalent is 39 percent for three-bedroom units and increases to 49 percent for E7 and E8 senior noncommissioned officer equivalent homes, 55 percent in O1 to O3 company grade officer equivalent homes, and 63 percent in O4 and O5 field grade officer equivalent homes.

³⁴ *Army Family Housing Planning Guide*, Chapter 9: Interior Spaces, Section 9.5: Dining Room, page 145.

A family room, on the other hand, is defined as an informal space used by occupants of the housing unit for family activity and/or children’s play space.³⁵ These spaces are more frequently found in larger homes where the occupants might need larger spaces to entertain; generally, larger homes that must accommodate larger families are constructed include a family room. Military family housing does not require a family room in two-bedroom housing units while similarly equivalent two-bedroom homes in the private sector do not report a high frequency for family rooms. By comparison, military family housing does require a family room in all three-, four-, and five-bedroom units while equivalent homes in the private sector, more representative of higher military grade groups, report a higher frequency rate for this space. Table 28 shows the frequency of both dining and family rooms for each equivalent grade and bedroom count.

Table 28: Frequency of Rooms in Private Sector Single-Family Housing

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Dining Rooms	Frequency of Family Rooms	TOTAL Number of Rooms
E1-E3 (JENL) E4-E6 (JNCO)	2	25%	17%	4.7
	3	39%	36%	5.8
	4	60%	80%	7.6
	5	no data	no data	no data
E7-E8 (SNCO)	2	27%	38%	5.0
	3	49%	46%	6.3
	4	75%	75%	8.2
	5	75%	77%	9.5
O1-O3 (CGO) W1-W3 (WO)	2	50%	77%	5.0
	3	55%	49%	6.3
	4	70%	83%	7.9
	5	100%	100%	10.0
E9 (SNCO) W4-W5 (WO)	3	65%	57%	6.8
	4	81%	81%	8.7
	5	89%	78%	9.9
O4-O5 (FGO)	3	63%	52%	6.7
	4	79%	79%	8.3
O6 (SO)	4	91%	84%	9.2
O7-O10 (GO)	4	75%	75%	8.8

Source: American Housing Survey, U.S. Census Bureau.

Total Number of Rooms

Another option for analyzing dining and family room data is to consider the total number of rooms in a home. This option reflects the fact that families often define rooms differently according to their preference or use of space. Consequently, the actual frequency of dining rooms and family rooms may be inaccurate. Consideration of the total number of rooms can demonstrate that as homes become larger, the number of rooms increased.

³⁵ Army Family Housing Planning Guide, Chapter 9: Interior Spaces, Section 9.4: Family Room, page 143.

Logically, the total number of rooms reported in single-family homes increases for each grade category and as the number of bedrooms increases. For example, the average number of rooms reported in E7/E8 equivalent private sector two-bedroom homes is five. In equivalent three-bedroom homes, the average number is 6.3; in four-bedroom homes, 8.2; and in five-bedroom homes, 9.5. This increase shows that larger homes, and larger homes with more bedrooms, are built with more rooms regardless of how space is used or defined.

Such information is important for determining whether a house should be constructed to include a family room. If the recommendations for dining rooms and family rooms are based on the total number of rooms in a home, then a three-bedroom house in the private sector must have a minimum of seven rooms to meet the existing military standard. A minimum of seven rooms would have to include three bedrooms, a kitchen, dining room, living room, and one additional living space. Even though the user determines how the additional living space is used, the space is presumably a family room or den. Thus, for the purposes of this report, the additional space is counted as a living room.

Bathrooms

The military standard for bathrooms in family housing is one full-bathroom in two-bedroom units and two full-bathrooms in three-, four-, and five-bedroom units. If applicable, an additional requirement calls for one half-bathroom on the ground floor of two-story units.³⁶ Both the *American Housing Survey* and the *Characteristics of New Housing* provide information on the number of full bathrooms in new single-family homes. The *Characteristics of New Housing* provides additional data on the frequency at which half-bathrooms are available in new single-family homes. Given that the sample size in the *CNH* is notably larger than that of the *AHS*, data extracted from the former is analyzed.

Nationally, the average number of full-bathrooms in new E1 to E6 equivalent three-bedroom single-family homes is two. As expected, the average number of full-bathrooms decreases to 1.8 in two-bedroom homes and increases to 2.2 and 2.8 in four- and five-bedroom homes, respectively. In calculating the frequency of half-bathrooms in new single-family homes, such bathrooms are observed to be included in approximately 50 percent of new E1 to E6 equivalent four-bedroom homes, but in only 37 percent of new E1 to E6 equivalent three-bedroom homes. Table 29 provides the results for both full-bathrooms and half-bathrooms in private sector single-family housing by grade and bedroom count.

³⁶ *Army Family Housing Planning Guide*, Chapter 9: Interior Spaces, Section 9.6: Bathrooms, page 147.

Table 29: Frequency of Bathrooms in Private Sector Single-Family Housing

Equivalent Rank in Private Sector	Bedroom Count	Number of Full-Baths in New Single-Family Units	Frequency of Half-Baths in New Single-Family Units
E1-E3 (JENL) E4-E6 (JNCO)	2	1.8	29%
	3	2.0	37%
	4	2.2	51%
	5	2.8	44%
E7-E8 (SNCO)	2	1.9	37%
	3	2.0	55%
	4	2.3	69%
	5	2.9	45%
O1-O3 (CGO) W1-W3 (WO)	2	1.9	39%
	3	2.1	57%
	4	2.3	70%
	5	2.9	45%
E9 (SNCO) W4-W5 (WO)	3	2.2	70%
	4	2.4	80%
	5	3.1	51%
O4-O5 (FGO)	3	2.0	68%
	4	2.3	78%
O6 (SO)	4	2.4	80%
O7-O10 (GO)	4	2.4	80%

Source: Characteristics of New Housing, U.S. Census Bureau.

The data for half-bathrooms indicate that the frequency of the bathroom progressively increases in two- and three-bedroom homes and peaks in four-bedroom homes. The frequency of half-bathrooms generally decreases to approximately 50 percent or less in five-bedroom homes in all grade groups but is offset in these units by the increased frequency of full-bathrooms.

Air Conditioning

Military family housing sets no national standard for air conditioning in single-family units. Instead, the requirement for air conditioning depends on the climatological location of a military installation.³⁷ With wide variation in climate across the United States, it is difficult to disaggregate the different regions across the country to assess air-conditioning data accurately. Thus, the data reflect a national frequency rate at which air conditioning exists or is installed in new single-family units.

Though the sample count in the *Characteristics of New Housing* is significantly higher than that in the *AHS*, data from both surveys is presented to provide the fullest possible evaluation of the frequency of air conditioning in private sector single-family housing. For both surveys, the data was extracted and sorted by grade and bedroom count. Table 30 reports the results of the calculations.

³⁷ *Army Family Housing Planning Guide*, Chapter 10: Electrical/Mechanical, Section 10.5: Air-Conditioning System, page 183. The regulation specifies that air conditioning will be provided in areas where, during the warmest six months of the year, the dry bulb temperature is 80 degrees Fahrenheit or higher for over 650 hours or the wet bulb temperature is 67 degrees Fahrenheit or higher for over 800 hours.

Table 30: Frequency of Air Conditioning in Private Sector Single-Family Housing

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Air Conditioning in Single-Family Units in AHS	Frequency of Air Conditioning in Single-Family Units in CNH
E1-E3 (JENL) E4-E6 (JNCO)	2	100%	81%
	3	86%	83%
	4	100%	89%
	5	no data	90%
E7-E8 (SNCO)	2	53%	80%
	3	79%	77%
	4	84%	85%
	5	88%	91%
O1-O3 (CGO) W1-W3 (WO)	2	83%	80%
	3	84%	76%
	4	78%	85%
	5	100%	91%
E9 (SNCO) W4-W5 (WO)	3	82%	78%
	4	86%	83%
	5	97%	91%
O4-O5 (FGO)	3	78%	77%
	4	88%	84%
O6 (SO)	4	88%	84%
O7-O10 (GO)	4	100%	83%

Sources: American Housing Survey and Characteristics of New Housing, U.S. Census Bureau.

The data reveal a general upward trend in the frequency of single-family housing units built with air conditioning as the number of bedrooms and grade level increase. In the *CNH*, for example, at least 75 percent of new single-family housing units are constructed with air conditioning. In those instances where little or no air conditioning is reported, regional differences in climate are assumed to explain the variation.

Appliances

Regardless of the size of a family housing unit, the military standard requires the inclusion of dishwashers and the provision of adequate space and/or hook-ups for occupant-provided clothes washers and dryers.³⁸ Most new private sector single-family homes surveyed in the *American Housing Survey* report a high frequency for all three of these appliances. There is generally an upward trend in the inclusion rate of these appliances as the number of bedrooms and grade increase. As seen with the other analyses, however, an insufficient amount of data is available to represent new E1 to E6 junior enlisted/noncommissioned officer equivalent units. Nonetheless, Table 31 presents results for all three of these amenities.

³⁸ *Army Family Housing Planning Guide*, Chapter 9: Interior Spaces, Section 9.7: Kitchen/Auxiliary Dining Area, page 151; Section 9.8: Laundry, page 155.

Table 31: Frequency of Appliances in Private Sector Single-Family Housing

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Dishwashers in Single-Family Units	Frequency of Clothes Washers in Single-Family Units	Frequency of Clothes Dryers in Single-Family Units
E1-E3 (JENL) E4-E6 (JNCO)	2	83%	100%	100%
	3	97%	97%	97%
	4	100%	100%	100%
	5	no data	no data	no data
E7-E8 (SNCO)	2	82%	96%	96%
	3	93%	99%	98%
	4	98%	98%	98%
	5	100%	98%	98%
O1-O3 (CGO) W1-W3 (WO)	2	100%	100%	100%
	3	93%	98%	98%
	4	100%	100%	100%
	5	100%	100%	100%
E9 (SNCO) W4-W5 (WO)	3	98%	99%	99%
	4	99%	99%	99%
	5	97%	97%	97%
O4-O5 (FGO)	3	99%	98%	97%
	4	99%	98%	98%
O6 (SO)	4	98%	100%	100%
O7-O10 (GO)	4	100%	100%	100%

Source: American Housing Survey, U.S. Census Bureau.

According to the data, all three appliances are included at a high frequency rate in nearly all single-family units at all grade levels and bedroom count.

Garages and Carports

Though climate contributes to the necessity of building garages versus carports, the standard regarding the parking amenity in military family housing calls for one covered space per unit plus one uncovered space.³⁹ Despite regional variation in parking requirements in the private sector, the frequency of parking accommodation is generally high enough that conducting a regional analysis would reveal only small shifts in the frequency rates and yield no basis for altering the standard for each region.

Given that the *American Housing Survey* does not gather information on parking or, more specifically, garages and carports, data were instead extracted from the *1998 Characteristics of New Housing*. The data pertain to off-street parking, carports, one-car garages, two-car garages, and three-car garages and are calculated separately for single-family detached and single-family attached units and collectively for all single-family units. Each parking type was assessed to determine the rate at which each is available by equivalent grade and bedroom count.

³⁹ *Army Family Housing Planning Guide*, Chapter 5: Lot and Landscaping, Section 5.2: Driveways/Parking, page 77; Chapter 6: Exterior Structures, Section 6.1: Garage, page 85; Chapter 6, Section 6.2: Carport, page 87.

Based on CNH data, at least 70 percent of new homes include either a two- or a three-car garage. In fact, as house size increases, the frequency of two-car garages increases and holds constant until higher-end homes are analyzed; in higher-end homes, two-car garages are offset by a higher frequency of three-car garages. The highest percentage of one-car garages exists in smaller two-bedroom homes. However, even in these homes, two- and three-car garages are present three times as often as one-car garages. Carports are nearly nonexistent in new single-family homes – less than 1 percent in both detached and attached units. The frequency rates for carports are even lower than those for off-street parking. Table 32 presents the findings for the garage and carport analyses in all single-family units by grade and bedroom count.

Table 32: Frequency of Garages and Carports in Private Sector Single-Family Housing

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Off-Street Parking	Frequency of Carports	Frequency of One-Car Garages	Frequency of Two-Car Garages	Frequency of Three-Car Garages
E1-E3 (JENL) E4-E6 (JNCO)	2	7%	1%	22%	64%	6%
	3	7%	1%	7%	79%	7%
	4	2%	0%	3%	82%	13%
	5	0%	no data	2%	66%	31%
E7-E8 (SNCO)	2	5%	1%	15%	71%	8%
	3	4%	0%	6%	77%	13%
	4	1%	0%	2%	75%	22%
	5	1%	0%	1%	55%	43%
O1-O3 (CGO) W1-W3 (WO)	2	5%	1%	15%	71%	8%
	3	4%	0%	5%	77%	14%
	4	1%	0%	1%	75%	23%
	5	1%	0%	1%	56%	43%
E9 (SNCO) W4-W5 (WO)	3	2%	0%	4%	71%	22%
	4	0%	0%	1%	65%	34%
	5	0%	1%	1%	40%	58%
O4-O5 (FGO)	3	2%	0%	5%	73%	20%
	4	0%	0%	1%	68%	30%
O6 (SO)	4	0%	0%	1%	61%	38%
O7-O10 (GO)	4	0%	0%	1%	60%	39%

Source: Characteristics of New Housing, U.S. Census Bureau.

The limited size of Table 32 prevented the disaggregation of data for single-family detached and single-family attached units for every grade and bedroom count. However, the data reveal not only a higher frequency of one-car garages in single-family attached units, which includes townhouses and duplexes, but also a surprisingly high rate of two-car garages in the same units. Table 33 provides the frequency rates for off-street parking, carports, and one-, two-, and three-car garages for both single-family detached and single-family attached homes by bedroom count. The data are presented for equivalent O1 to O3 company grade officer personnel only. Appendix G includes the table of frequencies for all grades.

Table 33: Frequency of Garages in Single-Family Detached and Single-Family Attached Homes

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Off-Street Parking	Frequency of Carports	Frequency of One-Car Garages	Frequency of Two-Car Garages	Frequency of Three-Car Garages
Single-Family DETACHED Homes						
	2	5%	1%	6%	75%	12%
O1-O3 (CGO)	3	3%	0%	2%	80%	15%
W1-W3 (WO)	4	1%	0%	1%	75%	23%
	5	1%	0%	1%	55%	43%
Single-Family ATTACHED Homes						
	2	5%	no data	31%	64%	0%
O1-O3 (CGO)	3	16%	1%	34%	48%	no data
W1-W3 (WO)	4	5%	no data	7%	88%	no data
	5	no data	no data	no data	100%	no data

Source: Characteristics of New Housing, U.S. Census Bureau.

As is revealed for equivalent O1 to O3 company grade personnel, the inclusion rate of two-car garages in three-bedroom single-family detached homes is 80 percent and 48 percent in three-bedroom single-family attached homes. However, the difference is offset by the higher frequency of one-car garages in approximately one-third of single-family attached homes. Nonetheless, the frequency rate for two-car garages in single-family attached units is comparable to that for single-family detached units.

RECOMMENDATIONS FOR SINGLE-FAMILY UNIT SIZE STANDARDS

One of the most important issues addressed in this report is the comparison of military family housing standards with the median size of private sector single-family homes and the amenities in those homes.

Maximum Sizes for New Construction and Replacement

The 1990 study conducted by the Research Center revealed that military family housing units were both smaller and larger than private sector units representative of equivalent military grade groups. The findings in this report, however, demonstrate that new private sector single-family homes are noticeably larger than existing military family housing units built to the congressional statutory limits.

In view of the large square foot sizes extracted from the data on the private sector, it is recommended that the median sizes serve as the new maximum construction and replacement size standards for military family housing. Likewise, it is recommended that the median sizes serve as the new maximum evaluation size standards for off-base rental housing units. Table 34 presents a comparison between the congressional statutory limits and the newly recommended maximum (private sector median) sizes by equivalent grade and bedroom count, with the gross square foot delta differences included. The table applies the appropriate 1.24 conversion factor for establishing net square foot and gross square foot equivalent sizes, and all figures are rounded to the nearest ten square feet.

Table 34: Existing and Recommended Construction Maximum Size Standards

Equivalent Rank in Private Sector	Bedroom Count	Existing Maximum		Recommended Construction Maximum			
		All Unit Types (NSF)	All Unit Types (GSF)	New Single-Family Units (NSF)	New Single-Family Units (GSF)	Square Foot Change (GSF)	Percent Change (GSF)
E1-E3 (JENL) E4-E6 (JNCO)	2	950	1,180	1,210	1,500	320	27.1%
	3	1,200	1,490	1,420	1,760	270	18.1%
	4	1,350	1,670	1,790	2,220	550	32.9%
	5	1,550	1,920	2,150	2,670	750	39.1%
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	950	1,180	1,440	1,790	610	51.7%
	3	1,350	1,670	1,650	2,050	380	22.8%
	4	1,450	1,800	2,020	2,500	700	38.9%
	5	1,550	1,920	2,490	3,090	1,170	60.9%
E9 (SNCO) W4-W5 (WO)	3	1,350	1,670	1,850	2,300	630	37.7%
	4	1,450	1,800	2,180	2,700	900	50.0%
O4-O5 (FGO)	3	1,400	1,740	1,850	2,300	560	32.2%
	4	1,550	1,920	2,180	2,700	780	40.6%
O6 (SO)	4	1,700	2,110	2,350	2,920	810	38.4%
O7-O10 (GO)	4	2,100	2,600	3,270	4,060	1,460	56.2%

Existing Maximum Source: United States Congressional Code Title 10, Section 2826.

Table 34 demonstrates that, based on the congressional statutory limits, private sector single-family housing units are significantly larger than equivalent military family units. One of the most significant explanations for the differences relates to how the data were analyzed in the present study versus the 1990 study. With the probable inclusion of apartment data in the overall analysis, the recommendations in the 1990 study may not have been truly representative of private sector single-family homes at the time. The analysis in the present study, however, considered single-family homes and apartment units independently.

Using the results of the present study will noticeably increase the size of military family housing. If, however, the Military Services intend to build new single-family units on post, they will need to construct units to a “standard” comparable to equivalent single-family units in the private sector. Such practice would be consistent with the National Defense Authorization Act for Fiscal Year 2001 and newly constructed private sector single-family homes. Thus, the recommendation pertaining to new maximum sizes for construction and replacement calls for adopting new size standards that reflect the median size of new private sector single-family homes. The new size standards will bring all future military housing units in line with contemporary home sizes in the private sector. While the proposed maximum sizes represent a significant increase over the previous congressional statutory limits, they are consistent, attainable, and appropriate for use in military family housing over the long term.

Minimum Sizes for New Construction and Renovation

Though minimum adequacy sizes have existed for some time in the military family housing program, the numbers were relevant only to the evaluation of off-base rental housing units. With the new maximum sizes, however, new minimum sizes are also needed for developing size ranges for the programming of construction funds and for ensuring flexibility across local markets. At the same time, additional minimum sizes need to be established for evaluating existing military family housing inventories. New minimum sizes that apply to construction and replacement might function as an evaluation measure and underscore the inadequacy of existing military family housing inventories and recently built or renovated military family housing units, thus equating to losses in capital investments and expenditures made to date.

As presented earlier, the medians of all existing private sector single-family units are generally much larger than the congressional statutory limits. Moreover, there are no consistent variations between the median sizes calculated and the congressional statutory limits. As a result, the Research Center and the Military Services agreed that “falling back” to the previous congressional statutory limits was the best choice in determining new minimum construction and replacement sizes. Reliance on the congressional statutory limits is a conservative approach, but more important, it allows all newly constructed and newly renovated housing units to remain adequate in size.

Table 35 presents a comparison between the congressional statutory limits (proposed construction and replacement minimums) and the previous DoD minimum adequacy sizes by grade and bedroom count, with the gross square foot delta differences between these two sets of sizes included. The table applies the appropriate 1.24 conversion factor for establishing net square foot and gross square foot equivalent, and all figures are rounded to the nearest ten square feet.

Table 35: Existing and Recommended Construction Minimum Size Standards

Equivalent Rank in Private Sector	Bedroom Count	Existing Minimum		Recommended Construction Minimum			
		All Unit Types (NSF)	All Unit Types (GSF)	New Single-Family Units (NSF)	New Single-Family Units (GSF)	Square Foot Change (GSF)	Percent Change (GSF)
E1-E3 (JENL) E4-E6 (JNCO)	2	750	930	950	1,180	250	26.9%
	3	960	1,190	1,200	1,490	300	25.2%
	4	1,190	1,480	1,350	1,670	190	12.8%
	5	1,190	1,480	1,550	1,920	440	29.7%
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	750	930	950	1,180	250	26.9%
	3	960	1,190	1,350	1,670	480	40.3%
	4	1,190	1,480	1,450	1,800	320	21.6%
	5	1,190	1,480	1,550	1,920	440	29.7%
E9 (SNCO) W4-W5 (WO)	3	960	1,190	1,400	1,740	550	46.2%
	4	1,190	1,480	1,550	1,920	440	29.7%
O4-O5 (FGO)	3	960	1,190	1,400	1,740	550	46.2%
	4	1,190	1,480	1,550	1,920	440	29.7%
O6 (SO)	4	1,190	1,480	1,700	2,110	630	42.6%
O7-O10 (GO)	4	1,190	1,480	2,100	2,600	1,120	75.7%

Existing Minimum Source: Department of Defense Manual 4165.63-M, DoD Housing Management.

Despite the existence of minimum numbers, a percentage of military family housing units will still fall below the recommended construction and replacement minimums. Consequently, such units would be deemed inadequate even if newly constructed or newly renovated. Thus, for the purpose of adequately evaluating existing housing stock and off-base rental housing units, an additional set of minimum adequacy sizes were established. As discussed previously, a 91.6 percent weighted average was applied to the congressional statutory limits. The minimum numbers will allow recently constructed and recently renovated military family housing to remain adequate.

Table 36 compares the congressional statutory limits and newly recommended minimum adequacy sizes by grade and bedroom count, with the gross square foot delta differences between the two sets of numbers included. The table applies the appropriate 1.24 conversion factor for establishing net square foot and gross square foot equivalent sizes, and all figures are rounded to the nearest ten square feet.

Table 36: Existing and Recommended Renovation Minimum Adequacy Standards

Equivalent Rank in Private Sector	Bedroom Count	Existing Minimum		Recommended Renovation Minimum			
		All Unit Types (NSF)	All Unit Types (GSF)	New Single-Family Units (NSF)	New Single-Family Units (GSF)	Square Foot Change (GSF)	Percent Change (GSF)
E1-E3 (JENL) E4-E6 (JNCO)	2	750	930	870	1,080	150	16.1%
	3	960	1,190	1,100	1,370	180	15.1%
	4	1,190	1,480	1,230	1,530	50	3.4%
	5	1,190	1,480	1,420	1,760	280	18.9%
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	750	930	870	1,080	150	16.1%
	3	960	1,190	1,230	1,530	340	28.6%
	4	1,190	1,480	1,330	1,650	170	11.5%
	5	1,190	1,480	1,420	1,760	280	18.9%
E9 (SNCO) W4-W5 (WO)	3	960	1,190	1,280	1,590	400	33.6%
	4	1,190	1,480	1,420	1,760	280	18.9%
O4-O5 (FGO)	3	960	1,190	1,280	1,590	400	33.6%
	4	1,190	1,480	1,420	1,760	280	18.9%
O6 (SO)	4	1,190	1,480	1,560	1,930	450	30.4%
O7-O10 (GO)	4	1,190	1,480	1,920	2,380	900	60.8%

Existing Minimum Source: Department of Defense Manual 4165.63-M, DoD Housing Management.

The recommendation pertaining to new minimum sizes, then, calls for updating current policies by using the previous DoD minimum adequacy sizes to reflect the newly recommended minimum sizes for construction and replacement of military family housing. The new construction and replacement minimums will be applied to new housing units and under-renovation units that are smaller than the recommended minimum adequacy sizes and not inclusive of all necessary functional spaces. The minimum adequacy sizes, or renovation minimum sizes, will apply to all existing military family units that include all necessary functional spaces and are adequately sized. If existing units are smaller than the recommended minimum adequacy sizes but still include all necessary functional spaces, the units will be subject to the minimum adequacy numbers. The minimum adequacy numbers will also be applied to the evaluation of off-base rental housing units for establishing BAH.

RECOMMENDATIONS FOR SINGLE-FAMILY UNIT AMENITY STANDARDS

Pursuant to existing military standards, most of the amenities discussed in this report must be included in new or existing to-be-renovated military family housing units. Moreover, most of the amenities are available in nearly all private sector housing units. However, the rate with which some of the amenities occur in private sector homes representative of E1 to E6 junior enlisted/ noncommissioned officer grade groups is not as frequent. Some of the amenities, specifically air conditioning and parking, fluctuate by region due to climatic differences, construction practices, and simple necessity. Though our findings are generally consistent with existing military standards, some differences were observed. For each of the amenities considered, a table compares the existing military standard with the respective recommended standard.

Dining Rooms and Family Rooms

Table 37 presents the results for both dining rooms and family rooms. These two amenities are considered together based on a methodology using the total number of rooms reported in private sector single-family homes. To meet the existing military standard, for example, a three-bedroom house in the private sector must have a minimum of seven rooms, including three bedrooms, a kitchen, dining room, living room, and one additional living space. That additional living space may be a family room or den but is often defined by the user. Thus, the results suggest the inclusion of that additional living space as a “family room” if its rate of occurrence was over 50 percent or the number of reported rooms totaled at least seven.

Table 37: Existing and Recommended Single-Family Dining and Family Room Standards

Equivalent Rank in Private Sector	Bedroom Count	Dining Room Standard		Family Room Standard	
		Existing for All Units	Proposed for Single-Family Units ^a	Existing for All Units	Proposed for Single-Family Units ^a
E1-E3 (JENL) E4-E6 (JNCO)	2	Included	Included	Not included	Not included
	3	Included	Included	Included	Not included
	4	Included	Included	Included	Included
	5	Included	Included	Included	Included
E7-E8 (SNCO) O1-O3 (CGO) W1-W3 (WO)	2	Included	Included	Not included	Not included
	3	Included	Included	Included	Included
	4	Included	Included	Included	Included
	5	Included	Included	Included	Included
E9 (SNCO) W4-W5 (WO)	3	Included	Included	Included	Included
	4	Included	Included	Included	Included
O4-O5 (FGO)	3	Included	Included	Included	Included
	4	Included	Included	Included	Included
O6 (SO)	4	Included	Included	Included	Included
O7-O10 (GO)	4	Included	Included	Included	Included

^a Recommendations based on American Housing Survey data and applies to all military family housing units.

For dining rooms, there are no recommendations for changing the current standard. That standard is adequate for both newly constructed and existing to-be-renovated military family housing units based on private sector findings.

Based on the results for family rooms, it is recommended that family rooms should not be included in equivalent E1 to E6 junior enlisted/noncommissioned officer two- and three-bedroom units. Given that the total number of rooms is the minimum required seven for these unit types, it is presumed that the “additional living space” or “family room” is not present. Furthermore, although the room count is relatively low for equivalent three-bedroom E7 and E8 senior noncommissioned and O1 to O3 company grade officer units, the percentages calculated from the *American Housing Survey* support the inclusion of a family room. Family rooms should be included in all four- and five-bedroom homes in all grades.

Bathrooms

Table 38 compares the results for bathrooms in both one- and two-story units with the current military standard for bathrooms. The recommended standards reflect the findings for new single-family homes in the *1998 Characteristics of New Housing*.

Table 38: Existing and Recommended Single-Family Bathroom Standards

Equivalent Rank in Private Sector	Bedroom Count	Standard for One-Story Units		Standard for Two-Story Units	
		Existing for All Units	Proposed for Single-Family Units ^b	Existing for All Units ^c	Proposed for Single-Family Units ^b
E1-E3 (JENL) E4-E6 (JNCO)	2	1 Full	1 Full	1 Full + 1 Half	1 Full + 1 Half
	3	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
	4	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
	5	2 Full	3 Full	2 Full + 1 Half	3 Full + 1 Half
E7-E8 (SNCO) O1-O3 (CGO) W1-W3 (WO)	2	1 Full	1 Full	1 Full + 1 Half	1 Full + 1 Half
	3	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
	4	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
	5	2 Full	3 Full	2 Full + 1 Half	3 Full + 1 Half
E9 (SNCO) W4-W5 (WO)	3	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
	4	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
O4-O5 (FGO)	3	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
	4	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
O6 (SO)	4	2 Full	2 Full	2 Full + 1 Half	2 Full + 1 Half
O7-O10 (GO)	4	3 Full ^a	3 Full	3 Full + 1 Half	3 Full + 1 Half

^a All GFOQ housing units are required to have at least three full bathrooms.

^b Recommendations based on *Characteristics of New Housing* data and applies all military family housing units.

^c The existing military standard requires the addition of one half-bathroom on the first floor of two-story family housing units.

In single-story two-, three-, and four-bedroom family housing units, there are no recommended changes to the current military standard for bathrooms. That standard should remain unchanged except in five-bedroom units where the number of full-bathrooms should increase to three full-bathrooms, reflecting findings in the private sector market.

The recommended change suggested for the number of bathrooms in two-story units is similar, remaining unchanged except in five-bedroom units. The number of bathrooms in two-story five-bedroom units should increase from two full-bathrooms and one half-bathroom to three full-bathrooms and one half-bathroom.

Air Conditioning

Table 39 provides the results for the rate of air conditioning in single-family detached and single-family attached units in the private sector. The recommended standards are compared to the existing standards for military family housing units and reflect the findings for single-family units reported in both the *1998 Characteristics of New Housing* and the *1997 American Housing Survey*.

Table 39: Existing and Recommended Single-Family Air Conditioning Standards

Equivalent Rank in Private Sector	Bedroom Count	Existing Standard All Units	Proposed Standard Single-Family Units^a
E1-E3 (JENL) E4-E6 (JNCO)	2	Based on climate	Based on climate
	3	Based on climate	Based on climate
	4	Based on climate	Based on climate
	5	Based on climate	Based on climate
E7-E8 (SNCO) O1-O3 (CGO) W1-W3 (WO)	2	Based on climate	Based on climate
	3	Based on climate	Based on climate
	4	Based on climate	Based on climate
	5	Based on climate	Based on climate
E9 (SNCO) W4-W5 (WO)	3	Based on climate	Based on climate
	4	Based on climate	Based on climate
O4-O5 (FGO)	3	Based on climate	Based on climate
	4	Based on climate	Based on climate
O6 (SO)	4	Based on climate	Based on climate
O7-O10 (GO)	4	Based on climate	Based on climate

^a Recommendations based on American Housing Survey and Characteristics of New Housing data and applies to all military family housing units.

There are no recommended changes to the current standards for air conditioning in military family housing units. The standard is based on varying weather conditions recorded at each installation. No extraordinary or outstanding findings were observed that warranted a change to that standard.

Appliances

Table 40 provides a summary of the results for the inclusion of appliances in single-family housing units. The recommendations for dishwashers and clothes washers and dryers are based on findings for single-family units extracted from the *1997 American Housing Survey*.

Table 40: Existing and Recommended Single-Family Appliance Standards

Equivalent Rank in Private Sector	Bedroom Count	Existing Standard for All Units	Proposed Standard for Single-Family Units		
			Dishwashers ^a	Clothes Washers ^a	Clothes Dryers ^a
E1-E3 (JENL) E4-E6 (JNCO)	2	Included	Included	Included	Included
	3	Included	Included	Included	Included
	4	Included	Included	Included	Included
	5	Included	Included	Included	Included
E7-E8 (SNCO) O1-O3 (CGO) W1-W3 (WO)	2	Included	Included	Included	Included
	3	Included	Included	Included	Included
	4	Included	Included	Included	Included
	5	Included	Included	Included	Included
E9 (SNCO) W4-W5 (WO)	3	Included	Included	Included	Included
	4	Included	Included	Included	Included
O4-O5 (FGO)	3	Included	Included	Included	Included
	4	Included	Included	Included	Included
O6 (SO)	4	Included	Included	Included	Included
O7-O10 (GO)	4	Included	Included	Included	Included

^a Recommendations based on American Housing Survey data and applies to all military family housing units.

There are no recommendations for changing the current standard for appliances in military family housing units. All data findings support the validity of the existing standard as adequate in both newly constructed and to-be-renovated military family housing units.

Garages and Carports

Table 41 compares the results for garages and carports in single-family units with the current military standard for parking. The recommended standards are based on the findings calculated for new single-family detached and single-family attached homes in the *1998 Characteristics of New Housing*.

Table 41: Existing and Recommended Single-Family Parking Standards

Equivalent Rank in Private Sector	Bedroom Count	Existing Standard	Proposed Standard	
		All Units	Single-Family Detached Units ^a	Single-Family Attached Units ^a
E1-E3 (JENL) E4-E6 (JNCO)	2	1 covered + 1 uncovered	2-car garage	2-car garage
	3	1 covered + 1 uncovered	2-car garage	2-car garage
	4	1 covered + 1 uncovered	2-car garage	2-car garage
	5	1 covered + 1 uncovered	2-car garage	2-car garage
E7-E8 (SNCO) O1-O3 (CGO) W1-W3 (WO)	2	1 covered + 1 uncovered	2-car garage	2-car garage
	3	1 covered + 1 uncovered	2-car garage	2-car garage
	4	1 covered + 1 uncovered	2-car garage	2-car garage
	5	2 covered + 1 uncovered	2-car garage	2-car garage
E9 (SNCO) W4-W5 (WO)	3	1 covered + 1 uncovered	2-car garage	2-car garage
	4	1 covered + 1 uncovered	2-car garage	2-car garage
O4-O5 (FGO)	3	1 covered + 1 uncovered	2-car garage	2-car garage
	4	1 covered + 1 uncovered	2-car garage	2-car garage
O6 (SO)	4	1 covered + 1 uncovered	2-car garage	2-car garage
O7-O10 (GO)	4	1 covered + 1 uncovered	2-car garage	2-car garage

^a Recommendations based on Characteristics of New Housing data and applies to all single-family units.

The recommendation for single-family detached housing units calls for a two-car garage in all single-family detached homes. It is based on findings that reveal that no less than 81 percent of new single-family detached homes include at least a two-car garage.

The recommendation for single-family attached housing units calls for no more than a two-car garage in single-family attached homes. It is based on findings that reveal that no less than 74 percent of new single-family attached homes include either a one- or two-car garage. Although one- and two-car garages separately represents slightly more than a third of new single-family attached units, two-car garages are still more frequent than one-car garages in single-family attached homes. On average, two-car garages are constructed in 72 percent of all single-family attached units.

SUMMARY OF PROPOSED MILITARY CONSTRUCTION SIZE AND AMENITY STANDARDS

The summary reviews the proposed size and amenity standards for the construction and renovation of military family housing units and provides a framework for the military construction program. The proposed standards will also be used in the evaluation of off-base rental housing units and the analysis of acceptable BAH rates.

Proposed Military Construction Size Standards

Table 42 presents the proposed size standards for use in the construction and renovation of military family housing and the evaluation of off-base rental housing units. Appendix H presents a single, standalone copy of the proposed size standards for military family housing. All values are presented in gross square feet, which is the unit of measure the Military Services will now use in calculating and programming family housing units.

Table 42: Proposed Military Construction Size Standards by Grade in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Renovation Minimum Adequacy	Construction/Replacement Minimum	Construction Programming Benchmark	Construction Maximum^{a,b}
E1-E3 (JENL) E4-E6 (JNCO)	2	1,080	1,180	1,340	1,500
	3	1,370	1,490	1,630	1,760
	4	1,530	1,670	1,950	2,220
	5	1,760	1,920	2,300	2,670
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,080	1,180	1,490	1,790
	3	1,530	1,670	1,860	2,050
	4	1,650	1,800	2,150	2,500
	5	1,760	1,920	2,510	3,090
E9 (SNCO) W4-W5 (WO)	3	1,590	1,740	2,020	2,300
	4	1,760	1,920	2,310	2,700
O4-O5 (FGO)	3	1,590	1,740	2,020	2,300
	4	1,760	1,920	2,310	2,700
O6 (SO)	4	1,930	2,110	2,520	2,920
O7-O10 (GO)	4	2,380	2,600	3,330	4,060

^a The maximum gross floor area may be increased by 10 percent for housing units of an officer holding a special command position, for the commanding officer of a military installation, and for the senior noncommissioned officer of a military installation.

^b The maximum gross floor area may be increased by 300 square feet for family housing units in locations where harsh climatological conditions severely restrict outdoor activity for a significant part of each year.

The proposed size standards are established in accordance with various methods discussed throughout the report. It is important to note that the proposed size standards for the E9/W4/W5 grade group are identical to those for the FGO grade group. In addition, the Military Services need to make an exception for E9/W4/W5 category personnel, though not establish an entirely separate set of standards. Thus, because of the close match for the two sets of numbers, the Military Services have the flexibility to use the size standards proposed for the E9/W4/W5 grade group as part of a separate category or as part of the FGO category.

It is important to note again the combination of the E1 to E3 junior enlisted and the E4 to E6 junior noncommissioned officer categories. The earlier congressional statutory limits traditionally combined these two pay grades. What is more important, however, is that E1 to E3 junior enlisted members remain in this grade for a relatively short time. Therefore, establishing one single grade group, inclusive of E1 through E6 personnel, enables efficient use of the housing inventory and avoids relocation costs associated with grade changes.

Proposed Military Construction Amenity Standards

The amenities discussed in this report include dining rooms, family rooms, bathrooms, air conditioning, dishwashers, clothes washers, dryers, and garages and carports. Given the diversity of the amenities as well as the diversity of the findings related to the amenities, it is difficult to present the proposed standards in a single chart. Instead, the proposed amenity standards are presented in two separate charts. Table 43 provides a summary of the proposed standards for room- or space-related amenities, specifically dining rooms, family rooms, bathrooms, and garages.

Table 43: Proposed Dining Room, Family Room, Bathroom, and Parking Standards by Grade

Equivalent Rank in Private Sector	Bedroom Count	Dining Room^a	Family Room^b	Bathroom^c	Parking^d
E1-E3 (JENL) E4-E6 (JNCO)	2	<i>Included</i>	<i>Not included</i>	1 full	2-car garage
	3	<i>Included</i>	<i>Not included</i>	2 full	2-car garage
	4	<i>Included</i>	<i>Included</i>	2 full	2-car garage
	5	<i>Included</i>	<i>Included</i>	3 full	2-car garage
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	<i>Included</i>	<i>Not included</i>	1 full	2-car garage
	3	<i>Included</i>	<i>Included</i>	2 full	2-car garage
	4	<i>Included</i>	<i>Included</i>	2 full	2-car garage
	5	<i>Included</i>	<i>Included</i>	3 full	2-car garage
E9 (SNCO) W4-W5 (WO)	3	<i>Included</i>	<i>Included</i>	2 full	2-car garage
	4	<i>Included</i>	<i>Included</i>	2 full	2-car garage
O4-O5 (FGO)	3	<i>Included</i>	<i>Included</i>	2 full	2-car garage
	4	<i>Included</i>	<i>Included</i>	2 full	2-car garage
O6 (SO)	4	<i>Included</i>	<i>Included</i>	2 full	2-car garage
O7-O10 (GO)	4	<i>Included</i>	<i>Included</i>	3 full	2-car garage

^a Proposed standard applies to all military housing units; in two-bedroom units, this standard is represented by an eat-in kitchen.

^b Proposed standard applies to all military housing units.

^c Proposed standard applies to one-story family housing units; include additional one half-bathroom in two-story units.

^d Proposed standard applies to single-family detached housing units; include a one-car garage in single-family attached units.

Table 44 provides a summary of the proposed standards for the remaining amenities, which are mechanical and include air conditioning, dishwashers, clothes washers, and dryers.

Table 44: Proposed Air Conditioning, Dishwasher, and Washer/Dryer Standards by Grade

Equivalent Rank in Private Sector	Bedroom Count	Air Conditioning^a	Dishwasher^a	Clothes Washer^a	Clothes Dryer^a
E1-E3 (JENL) E4-E6 (JNCO)	2	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
	3	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
	4	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
	5	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
	3	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
	4	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
	5	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
E9 (SNCO) W4-W5 (WO)	3	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
	4	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
O4-O5 (FGO)	3	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
	4	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
O6 (SO)	4	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
O7-O10 (GO)	4	<i>Based on climate</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>

^a Proposed standard applies to all military family housing units.

The standard for clothes washers and dryers reflects the actual frequency of these appliances and/or hook-ups in private sector housing units. Although the proposed amenities are presented separately here, Appendix H includes a complete standalone copy of all proposed amenities.

The size and amenity standards proposed for military family housing units are comparable to those for housing units constructed in the private sector in the United States. The recommendations are in line with the significant increase in the median size of new private sector housing units over the last three decades and allow the Military Services to keep pace with the housing of equivalent private sector individuals. At the same time, the proposed standards are sensitive to the economic investments in family housing made by the Military Services. They protect the military’s investments by ensuring that recently constructed and renovated military family housing units remain adequate in size and demand no major modifications.

Figure A-1: Median Size of New and Existing Housing Units in the United States

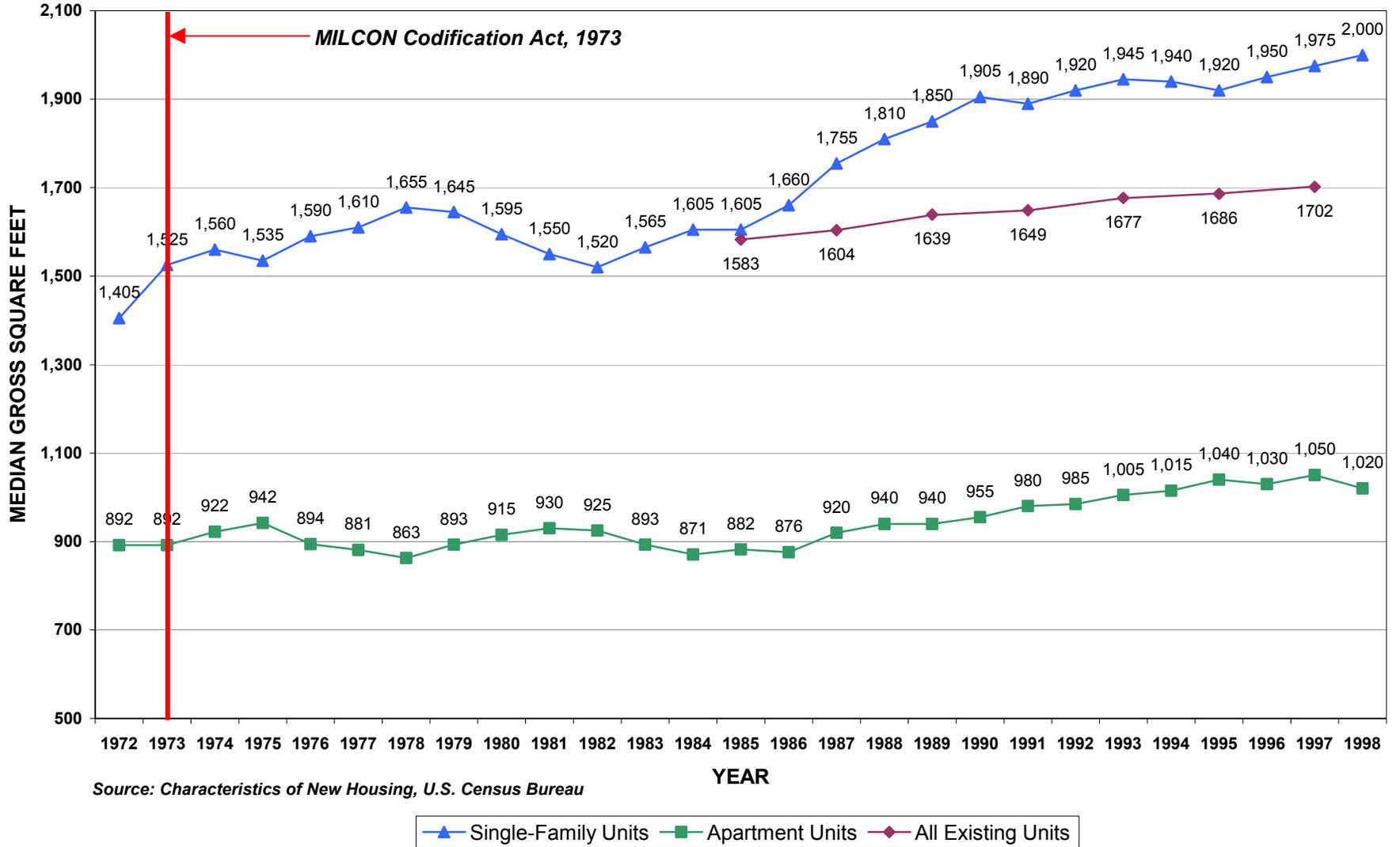


Table A-1: Change in Median Size of New Housing Units in the United States from 1972 to 1998

Year	Single-Family Units		Apartment Units	
	GSF Median Size	Percent Change	GSF Median Size	Percent Change
1972	1,405	N/A	892	N/A
1973	1,525	8.5%	892	0.0%
1974	1,560	2.3%	922	3.4%
1975	1,535	-1.6%	942	2.2%
1976	1,590	3.6%	894	-5.1%
1977	1,610	1.3%	881	-1.5%
1978	1,655	2.8%	863	-2.0%
1979	1,645	-0.6%	893	3.5%
1980	1,595	-3.0%	915	2.5%
1981	1,550	-2.8%	930	1.6%
1982	1,520	-1.9%	925	-0.5%
1983	1,565	3.0%	893	-3.5%
1984	1,605	2.6%	871	-2.5%
1985	1,605	0.0%	882	1.3%
1986	1,660	3.4%	876	-0.7%
1987	1,755	5.7%	920	5.0%
1988	1,810	3.1%	940	2.2%
1989	1,850	2.2%	940	0.0%
1990	1,905	3.0%	955	1.6%
1991	1,890	-0.8%	980	2.6%
1992	1,920	1.6%	985	0.5%
1993	1,945	1.3%	1,005	2.0%
1994	1,940	-0.3%	1,015	1.0%
1995	1,920	-1.0%	1,040	2.5%
1996	1,950	1.6%	1,030	-1.0%
1997	1,975	1.3%	1,050	1.9%
1998	2,000	1.3%	1,020	-2.9%
Total 26-Year Change	+595	42.3%	+128	14.3%
Average Annual Change	+23	1.6%	+5	0.6%

Source: Characteristics of New Housing, U.S. Census Bureau

Green highlighting of 1973 represents year MILCON Codification Act was approved

Table A-2: Change in Median Size of New Housing Units in the United States from 1972 to 1988

Year	Single-Family Units		Apartment Units	
	GSF Median Size	Percent Change	GSF Median Size	Percent Change
1972	1,405	N/A	892	N/A
1973	1,525	8.5%	892	0.0%
1974	1,560	2.3%	922	3.4%
1975	1,535	-1.6%	942	2.2%
1976	1,590	3.6%	894	-5.1%
1977	1,610	1.3%	881	-1.5%
1978	1,655	2.8%	863	-2.0%
1979	1,645	-0.6%	893	3.5%
1980	1,595	-3.0%	915	2.5%
1981	1,550	-2.8%	930	1.6%
1982	1,520	-1.9%	925	-0.5%
1983	1,565	3.0%	893	-3.5%
1984	1,605	2.6%	871	-2.5%
1985	1,605	0.0%	882	1.3%
1986	1,660	3.4%	876	-0.7%
1987	1,755	5.7%	920	5.0%
1988	1,810	3.1%	940	2.2%
Total 16-Year Change	+405	28.8%	+48	5.4%
Average Annual Change	+25	1.8%	+3	0.3%

Source: Characteristics of New Housing, U.S. Census Bureau

Green highlighting of 1973 represents year MILCON Codification Act was approved

Table A-3: Change in Median Size of New Housing Units in the United States from 1988 to 1998

Year	Single-Family Units		Apartment Units	
	GSF Median Size	Percent Change	GSF Median Size	Percent Change
1988	1,810	N/A	940	N/A
1989	1,850	2.2%	940	0.0%
1990	1,905	3.0%	955	1.6%
1991	1,890	-0.8%	980	2.6%
1992	1,920	1.6%	985	0.5%
1993	1,945	1.3%	1,005	2.0%
1994	1,940	-0.3%	1,015	1.0%
1995	1,920	-1.0%	1,040	2.5%
1996	1,950	1.6%	1,030	-1.0%
1997	1,975	1.3%	1,050	1.9%
1998	2,000	1.3%	1,020	-2.9%
Total 10-Year Change	+190	10.5%	+80	8.5%
Average Annual Change	+19	1.0%	+8	0.9%

Source: Characteristics of New Housing, U.S. Census Bureau

Table A-4: Change in Median Size of New and Existing Housing Units in the United States from 1985 to 1997

Year	Single-Family Units		Apartment Units		All Existing Units	
	GSF Median Size	Percent Change	GSF Median Size	Percent Change	GSF Median Size	Percent Change
1985	1,605	n/a	882	n/a	1583	n/a
1986	1,660	3.4%	876	-0.7%	n/a	n/a
1987	1,755	5.7%	920	5.0%	1604	1.3%
1988	1,810	3.1%	940	2.2%	n/a	n/a
1989	1,850	2.2%	940	0.0%	1639	2.2%
1990	1,905	3.0%	955	1.6%	n/a	n/a
1991	1,890	-0.8%	980	2.6%	1649	0.6%
1992	1,920	1.6%	985	0.5%	n/a	n/a
1993	1,945	1.3%	1,005	2.0%	1677	1.7%
1994	1,940	-0.3%	1,015	1.0%	n/a	n/a
1995	1,920	-1.0%	1,040	2.5%	1686	0.5%
1996	1,950	1.6%	1,030	-1.0%	n/a	n/a
1997	1,975	1.3%	1,050	1.9%	1702	0.9%
Total 12-Year Change	+370	23.1%	+168	19.0%	+119	7.5%
Average Annual Change	+31	1.9%	+14	1.6%	+17	0.6%

Source: Characteristics of New Housing and American Housing Survey, U.S. Census Bureau

Table B-1: SINGLE-FAMILY Minimum Adequacy Sizes and Congressional Statutory Maximum Limits

Equivalent Rank in Private Sector	Bedroom Count	DoD Minimum Adequacy Sizes		Congressional Statutory Maximum Limits		Ranges Between Minimums and Maximums	
		NSF	GSF	NSF	GSF	NSF	GSF
E1-E3 (JENL) E4-E6 (JNCO)	2	750	930	950	1,180	200	250
	3	960	1,190	1,200	1,490	240	300
	4	1,190	1,480	1,350	1,670	160	190
	5	1,190	1,480	1,550	1,920	360	440
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	750	930	950	1,180	200	250
	3	960	1,190	1,350	1,670	390	480
	4	1,190	1,480	1,450	1,800	260	320
	5	1,190	1,480	1,550	1,920	360	440
E9 (SNCO) W4-W5 (WO)	3	960	1,190	1,350	1,670	390	480
	4	1,190	1,480	1,450	1,800	260	320
	5	1,190	1,480	1,550	1,920	360	440
O4-O5 (FGO)	3	960	1,190	1,400	1,740	440	550
	4	1,190	1,480	1,550	1,920	360	440
O6 (SO)	4	1,190	1,480	1,700	2,110	510	630
O7-O10 (GO)	4	1,190	1,480	2,100	2,600	910	1,120

Source for DoD Minimum Adequacy: Department of Defense Manual 4165.63-M, DoD Housing Management

Source for Congressional Statutory Maximum Limits: United States Congressional Code Title 10, Section 2826

Table B-2: APARTMENT Minimum Adequacy Sizes and Congressional Statutory Maximum Limits

Equivalent Rank in Private Sector	Bedroom Count	DoD Minimum Adequacy Sizes		Congressional Statutory Maximum Limits		Ranges Between Minimums and Maximums	
		NSF	GSF	NSF	GSF	NSF	GSF
E1-E3 (JENL)	2	750	930	950	1,180	200	250
E4-E6 (JNCO)	3	960	1,190	1,200	1,490	240	300

Source for DoD Minimum Adequacy: Department of Defense Manual 4165.63-M, DoD Housing Management

Source for Congressional Statutory Maximum Limits: United States Congressional Code Title 10, Section 2826

Table C-1: American Housing Survey Data Size Findings for APARTMENT Minimum Adequacy

Equivalent Rank in Private Sector	Bedroom Count	AHS Median	AHS Mean (Average)	One Standard Deviation	One Standard Deviation Number	Old Statutory Limit	Percent Difference Deviation and Stat Limit	MINIMUM Adequacy with Weighted Average	Number Difference Deviation and Stat Limit	DoD Minimum Adequacy per 4165.63-M	
E1-E3 (JENL)	2	1,004	1,115	261	854	1,180	72.4%	852	326	930	
E4-E6 (JNCO)	3	1,331	1,494	431	1,063	1,490	71.3%	1,076	427	1,190	
							Average:	71.9%	376.5		
							Weighted Average:	72.2%	344.6		

Table C-2: Private-Sector Field Data Size Findings for APARTMENT Minimum Adequacy

Equivalent Rank in Private Sector	Bedroom Count	FIELD Median	FIELD Mean (Average)	One Standard Deviation	One Standard Deviation Number	Old Statutory Limit	Percent Difference Deviation and Stat Limit	MINIMUM Adequacy with Weighted Average	Number Difference Deviation and Stat Limit	DoD Minimum Adequacy per 4165.63-M	
E1-E3 (JENL)	2	960	986	136	850	1,180	72.1%	852	330	930	
E4-E6 (JNCO)	3	1,250	1,278	194	1,083	1,490	72.7%	1,076	407	1,190	
							Average:	72.4%	368.1		
							Weighted Average:	72.2%	348.7		

Table C-3: Private-Sector Field Data Size Findings for APARTMENT Minimum Adequacy

Equivalent Rank in Private Sector	Bedroom Count	FIELD Median	FIELD Mean (Average)	One Standard Deviation	One Standard Deviation Number	Old Statutory Limit	Percent Difference Deviation and Stat Limit	MINIMUM Adequacy with Weighted Average	Number Difference Deviation and Stat Limit	DoD Minimum Adequacy per 4165.63-M	
E1-E3 (JENL)	2	963	990	131	859	1,180	72.8%	854	321	930	
	3	1,200	1,230	151	1,079	1,490	72.4%	1,079	411	1,190	
E4-E6 (JNCO)	2	960	986	137	850	1,180	72.0%	854	330	930	
	3	1,248	1,274	196	1,077	1,490	72.3%	1,079	413	1,190	
							Average:	72.4%	368.9		
							Weighted Average:	72.4%	345.7		

Table C-4: American Housing Survey Data Size Findings for SINGLE-FAMILY Minimum Adequacy

Equivalent Rank in Private Sector	Bedroom Count	AHS Median	AHS Mean (Average)	One Standard Deviation	One Standard Deviation Number	Old Statutory Limit	Percent Difference Deviation and Stat Limit	MINIMUM Adequacy with Weighted Average	Number Difference Deviation and Stat Limit	DoD Minimum Adequacy per 4165.63-M	
E1-E3 (JENL) E4-E6 (JNCO)	2	1,290	1,484	544	940	1,180	79.7%	1,080	240	930	
	3	1,600	1,812	577	1,235	1,490	82.9%	1,370	255	1,190	
	4	2,200	2,380	697	1,683	1,670	100.8%	1,530	-13	1,480	
	5	no data	no data	no data	no data	1,920	no data	1,760	no data	1,480	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,500	1,650	628	1,022	1,180	86.6%	1,080	158	930	
	3	1,800	1,979	622	1,357	1,670	81.3%	1,530	313	1,190	
	4	2,400	2,497	638	1,859	1,800	103.3%	1,650	-59	1,480	
	5	2,700	2,768	676	2,092	1,920	109.0%	1,760	-172	1,480	
E9 (SNCO) W4-W5 (WO)	3	2,000	2,130	624	1,506	1,670	90.2%	1,530	164	1,190	
	4	2,600	2,685	639	2,046	1,800	113.7%	1,650	-246	1,480	
	5	3,000	2,999	659	2,340	1,920	121.9%	1,760	-420	1,480	
O4-O5 (FGO)	3	1,900	2,059	628	1,431	1,740	82.2%	1,590	309	1,190	
	4	2,600	2,652	638	2,014	1,920	104.9%	1,760	-94	1,480	
	5	2,983	2,955	722	2,233	n/a	n/a	n/a	n/a	1,480	
O6 (SO)	4	2,650	2,705	622	2,083	2,110	98.7%	1,930	27	1,480	
	5	3,000	3,042	626	2,416	n/a	n/a	n/a	n/a	1,480	
O7-O10 (GO)	4	2,800	2,720	663	2,057	2,600	79.1%	2,380	543	1,480	
	5	3,000	2,845	564	2,281	n/a	n/a	n/a	n/a	1,480	
							Average:	95.3%	71.8		
							Weighted Average:	91.6%	133.2		

Table C-5: Field Data Size Findings for SINGLE-FAMILY Minimum Adequacy

Equivalent Rank in Private Sector	Bedroom Count	FIELD Median	FIELD Mean (Average)	One Standard Deviation	One Standard Deviation Number	Old Statutory Limit	Percent Difference Deviation and Stat Limit	MINIMUM Adequacy with Weighted Average	Number Difference Deviation and Stat Limit	DoD Minimum Adequacy per 4165.63-M
E1-E3 (JENL) E4-E6 (JNCO)	2	1,200	1,264	259	1,005	1,180	85.2%	1,070	175	930
	3	1,600	1,635	316	1,319	1,490	88.5%	1,350	171	1,190
	4	2,000	2,025	335	1,690	1,670	101.2%	1,510	-20	1,480
	5	2,400	2,374	293	2,081	1,920	108.4%	1,730	-161	1,480
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,150	1,261	323	938	1,180	79.5%	1,070	242	930
	3	1,800	1,824	410	1,414	1,670	84.7%	1,510	256	1,190
	4	2,200	2,225	402	1,823	1,800	101.3%	1,630	-23	1,480
	5	2,600	2,641	524	2,117	1,920	110.3%	1,730	-197	1,480
E9 (SNCO) W4-W5 (WO)	3	1,700	1,776	482	1,294	1,670	77.5%	1,510	376	1,190
	4	2,300	2,354	535	1,819	1,800	101.1%	1,630	-19	1,480
	5	2,800	2,939	620	2,319	1,920	120.8%	1,730	-399	1,480
O4-O5 (FGO)	3	1,750	1,802	470	1,332	1,740	76.6%	1,570	408	1,190
	4	2,341	2,370	493	1,877	1,920	97.8%	1,730	43	1,480
	5	2,700	2,847	611	2,236	n/a	n/a	n/a	n/a	1,480
O6 (SO)	4	2,225	2,332	536	1,796	2,110	85.1%	1,910	314	1,480
	5	3,000	2,987	688	2,299	n/a	n/a	n/a	n/a	1,480
O7-O10 (GO)	4	2,203	2,330	548	1,782	2,600	68.5%	2,350	818	1,480
	5	3,000	3,024	722	2,302	n/a	n/a	n/a	n/a	1,480
							Average:	92.4%	132.3	
							Weighted Average:	90.4%	164.1	

Table D-1: Summary of Findings for APARTMENT Unit Size Standards in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	DoD Minimum per 4165.63-M	One Standard Deviation from Mean	AHS Median Apartment Size	AHS Mean (Average) Apartment Size	Minimum with 72.2% Weighted Average and Unaccounted Spaces (Proposed Minimum)	Total Median Apartment Size with Accounted Spaces (Proposed Maximum)
E1-E3 (JENL)	2	930	854	1,004	1,115	1,040	1,190
E4-E6 (JNCO)	3	1,190	1,063	1,331	1,494	1,280	1,540

Source for Median/Mean: American Housing Survey, U.S. Census Bureau.

Table D-2: Summary of Findings for SINGLE-FAMILY Housing Size Standards in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	DoD Minimum per 4165.63-M	One Standard Deviation from Mean	AHS Median Single-Family Home Size	AHS Mean (Average) Single-Family Home Size	Minimum with 91.6% Weighted Average (Proposed Renovation Minimum Adequacy)	Congressional Statutory Limits (Proposed Construction Minimum)	Mid-Point (Proposed Programming Benchmark)	Median Size of New Single-Family Homes (Proposed Maximum)
E1-E3 (JENL) E4-E6 (JNCO)	2	930	940	1,290	1,484	1,080	1,180	1,340	1,500
	3	1,190	1,235	1,600	1,812	1,370	1,490	1,630	1,760
	4	1,480	1,683	2,200	2,380	1,530	1,670	1,950	2,220
	5	1,480	no data	no data	no data	1,760	1,920	2,300	2,670
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	930	1,022	1,500	1,650	1,080	1,180	1,490	1,790
	3	1,190	1,357	1,800	1,979	1,530	1,670	1,860	2,050
	4	1,480	1,859	2,400	2,497	1,650	1,800	2,150	2,500
	5	1,480	2,092	2,700	2,768	1,760	1,920	2,510	3,090
E9 (SNCO) W4-W5 (WO)	3	1,190	1,506	2,000	2,130	1,530	1,670	2,030	2,390
	4	1,480	2,046	2,600	2,685	1,650	1,800	2,300	2,800
	5	1,480	2,340	3,000	2,999	1,760	1,920	2,670	3,410
O4-O5 (FGO)	3	1,190	1,431	1,900	2,059	1,590	1,740	2,020	2,300
	4	1,480	2,014	2,600	2,652	1,760	1,920	2,310	2,700
O6 (SO)	4	1,480	2,083	2,650	2,705	1,930	2,110	2,520	2,920
O7-O10 (GO)	4	1,480	2,057	2,800	2,720	2,380	2,600	3,330	4,060

Source for Median/Mean: American Housing Survey, U.S. Census Bureau.

Table E-1: Median Size of New Private Sector Single-Family Homes in the New England Census Division in GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>New England States: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	1,210	1,540	1.03	13,050
	3	1,420	1,760	1,420	1,600	0.91	
	4	1,790	2,220	1,790	2,400	1.08	
	5	2,150	2,670	<i>no data</i>	<i>no data</i>	<i>n/a</i>	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,420	1,620	0.92	19,030
	3	1,650	2,050	1,650	1,940	0.95	
	4	2,020	2,500	2,020	2,280	0.91	
	5	2,490	3,090	2,490	1,830	0.59	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	1,930	2,100	0.88	17,811
	4	2,260	2,800	2,260	2,410	0.86	
	5	2,750	3,410	2,750	2,800	0.82	
O4-O5 (FGO)	3	1,850	2,300	1,850	2,020	0.88	20,181
	4	2,180	2,700	2,180	2,400	0.89	
O6 (SO)	4	1,900	2,360	1,900	2,480	1.05	9,790
O7-O10 (GO)	4	3,270	4,060	3,270	3,240	0.80	10,176

GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Table E-2: Median Size of New Private Sector Single-Family Homes in the Mid Atlantic Census Division GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>Mid Atlantic States: New Jersey, New York, Pennsylvania</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	1,260	1,560	1.04	40,824
	3	1,420	1,760	1,520	1,890	1.07	
	4	1,790	2,220	1,890	2,340	1.05	
	5	2,150	2,670	2,330	2,890	1.08	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,540	1,910	1.09	28,970
	3	1,650	2,050	1,680	2,080	1.01	
	4	2,020	2,500	2,000	2,480	0.99	
	5	2,490	3,090	2,330	2,890	0.94	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	1,960	2,430	1.02	16,259
	4	2,260	2,800	2,180	2,700	0.96	
	5	2,750	3,410	2,350	2,920	0.86	
O4-O5 (FGO)	3	1,850	2,300	1,930	2,390	1.04	21,296
	4	2,180	2,700	2,160	2,680	0.99	
O6 (SO)	4	1,900	2,360	2,330	2,890	1.22	8,256
O7-O10 (GO)	4	3,270	4,060	2,910	3,610	0.89	8,403

GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Table E-3: Median Size of New Private Sector Single-Family Homes in the East North Central Division in GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>East North Central States: Illinois, Indiana, Michigan, Ohio, Wisconsin</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	1,140	1,410	0.94	56,394
	3	1,420	1,760	1,350	1,680	0.95	
	4	1,790	2,220	1,770	2,200	0.99	
	5	2,150	2,670	2,420	3,000	1.12	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,320	1,640	0.93	66,925
	3	1,650	2,050	1,530	1,900	0.93	
	4	2,020	2,500	1,850	2,290	0.92	
	5	2,490	3,090	2,420	3,000	0.97	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	1,830	2,270	0.95	42,144
	4	2,260	2,800	2,090	2,590	0.93	
	5	2,750	3,410	2,500	3,100	0.91	
O4-O5 (FGO)	3	1,850	2,300	1,740	2,160	0.94	50,703
	4	2,180	2,700	2,000	2,480	0.92	
O6 (SO)	4	1,900	2,360	2,020	2,500	1.06	42,404
O7-O10 (GO)	4	3,270	4,060	2,860	3,550	0.87	19,726

GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Table E-4: Median Size of New Private Sector Single-Family Homes in the West North Central Census Division in GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>West North Central States: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	1,050	1,300	0.87	48,329
	3	1,420	1,760	1,270	1,570	0.89	
	4	1,790	2,220	1,610	2,000	0.90	
	5	2,150	2,670	1,770	2,190	0.82	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,270	1,580	0.90	43,221
	3	1,650	2,050	1,410	1,750	0.85	
	4	2,020	2,500	1,850	2,290	0.92	
	5	2,490	3,090	2,260	2,800	0.91	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	1,850	2,300	0.96	15,201
	4	2,260	2,800	2,090	2,590	0.93	
	5	2,750	3,410	2,580	3,200	0.94	
O4-O5 (FGO)	3	1,850	2,300	1,650	2,050	0.89	20,569
	4	2,180	2,700	2,020	2,500	0.93	
O6 (SO)	4	1,900	2,360	1,950	2,420	1.03	15,902
O7-O10 (GO)	4	3,270	4,060	3,170	3,930	0.97	6,292

GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Table E-5: Median Size of New Private Sector Single-Family Homes in the South Atlantic Census Division in GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>South Atlantic States: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	1,160	1,440	0.96	164,797
	3	1,420	1,760	1,380	1,710	0.97	
	4	1,790	2,220	1,720	2,130	0.96	
	5	2,150	2,670	1,850	2,300	0.86	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,610	2,000	1.14	131,125
	3	1,650	2,050	1,680	2,080	1.01	
	4	2,020	2,500	2,000	2,480	0.99	
	5	2,490	3,090	2,400	2,980	0.96	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	2,100	2,610	1.09	70,097
	4	2,260	2,800	2,320	2,880	1.03	
	5	2,750	3,410	2,740	3,400	1.00	
O4-O5 (FGO)	3	1,850	2,300	2,000	2,480	1.08	75,293
	4	2,180	2,700	2,240	2,780	1.03	
O6 (SO)	4	1,900	2,360	2,400	2,970	1.26	37,184
O7-O10 (GO)	4	3,270	4,060	3,270	4,050	1.00	38,184

GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Table E-6: Median Size of New Private Sector Single-Family Homes in the East South Central Census Division in GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>East South Central States: Alabama, Kentucky, Mississippi, Tennessee</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	1,120	1,390	0.93	27,241
	3	1,420	1,760	1,370	1,700	0.97	
	4	1,790	2,220	1,820	2,260	1.02	
	5	2,150	2,670	<i>no data</i>	<i>no data</i>	<i>n/a</i>	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,360	1,690	0.96	18,031
	3	1,650	2,050	1,600	1,980	0.97	
	4	2,020	2,500	2,090	2,590	1.04	
	5	2,490	3,090	2,820	3,500	1.13	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	1,920	2,380	1.00	7,278
	4	2,260	2,800	2,180	2,700	0.96	
	5	2,750	3,410	2,940	3,640	1.07	
O4-O5 (FGO)	3	1,850	2,300	1,860	2,310	1.00	8,384
	4	2,180	2,700	2,100	2,600	0.96	
O6 (SO)	4	1,900	2,360	2,320	2,880	1.22	3,583
O7-O10 (GO)	4	3,270	4,060	3,920	4,860	1.20	4,342

GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Table E-7: Median Size of New Private Sector Single-Family Homes in the West South Central Census Division in GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>West South Central States: Arkansas, Louisiana, Oklahoma, Texas</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	1,290	1,600	1.07	67,361
	3	1,420	1,760	1,480	1,840	1.05	
	4	1,790	2,220	1,870	2,320	1.05	
	5	2,150	2,670	2,520	3,130	1.17	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,810	2,250	1.28	39,978
	3	1,650	2,050	1,910	2,370	1.16	
	4	2,020	2,500	2,280	2,830	1.13	
	5	2,490	3,090	2,790	3,460	1.12	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	2,340	2,900	1.21	19,264
	4	2,260	2,800	2,700	3,350	1.20	
	5	2,750	3,410	2,940	3,650	1.07	
O4-O5 (FGO)	3	1,850	2,300	2,260	2,800	1.22	19,964
	4	2,180	2,700	2,610	3,240	1.20	
O6 (SO)	4	1,900	2,360	2,810	3,490	1.48	12,114
O7-O10 (GO)	4	3,270	4,060	3,670	4,550	1.12	11,424

GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Table E-8: Median Size of New Private Sector Single-Family Homes in the Mountain Census Division in GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>Mountain States: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	1,030	1,280	0.85	84,784
	3	1,420	1,760	1,250	1,550	0.88	
	4	1,790	2,220	1,660	2,060	0.93	
	5	2,150	2,670	1,700	2,110	0.79	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,290	1,600	0.91	77,584
	3	1,650	2,050	1,530	1,900	0.93	
	4	2,020	2,500	2,000	2,480	0.99	
	5	2,490	3,090	2,610	3,240	1.05	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	1,930	2,390	1.00	32,736
	4	2,260	2,800	2,310	2,860	1.02	
	5	2,750	3,410	2,820	3,500	1.03	
O4-O5 (FGO)	3	1,850	2,300	1,770	2,200	0.96	33,903
	4	2,180	2,700	2,200	2,730	1.01	
O6 (SO)	4	1,900	2,360	2,410	2,990	1.27	12,099
O7-O10 (GO)	4	3,270	4,060	2,990	3,710	0.91	13,127

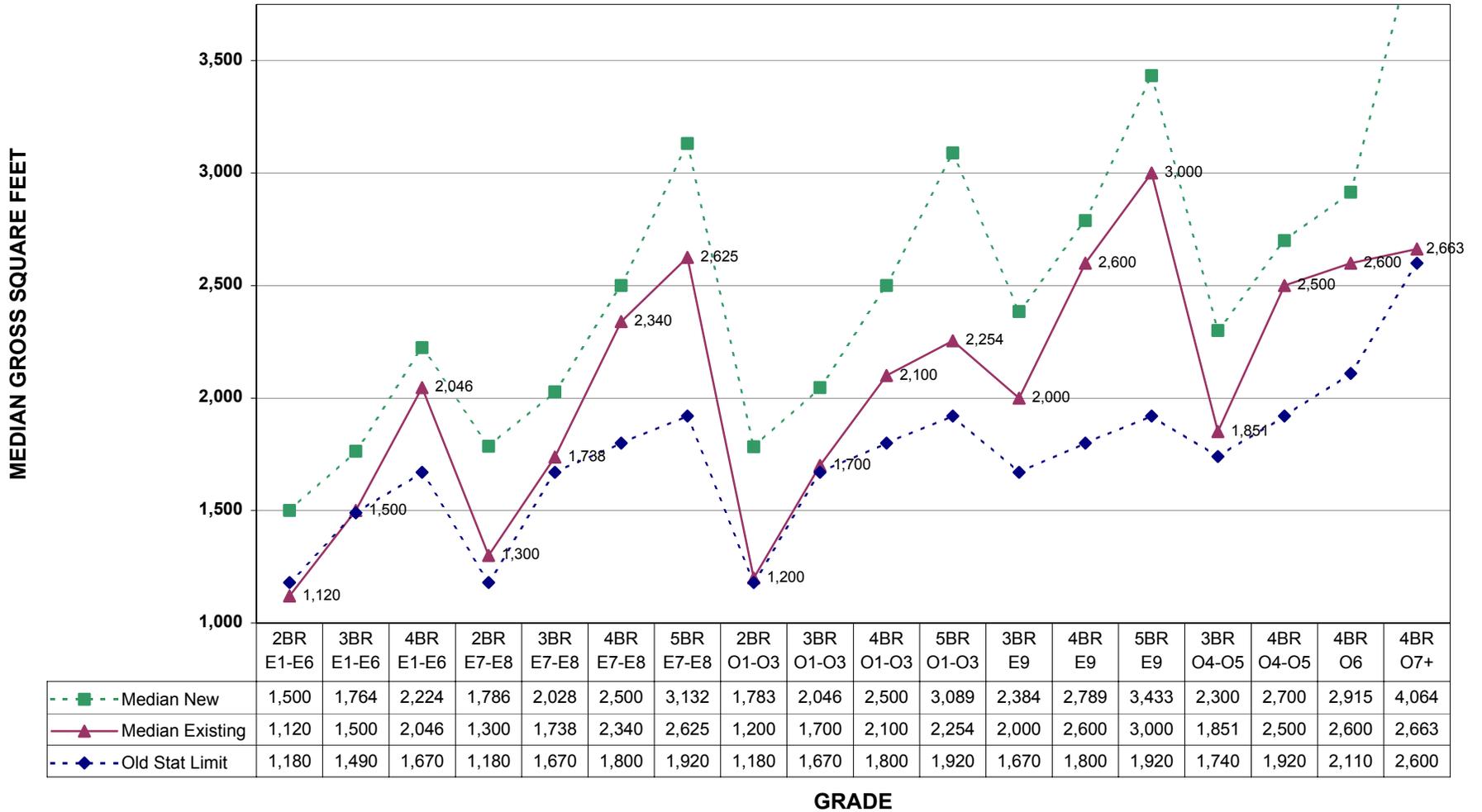
GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Table E-9: Median Size of New Private Sector Single-Family Homes in the Pacific Census Division in GSF

Equivalent Rank in Private Sector	Bedroom Count	Proposed Maximum (National Median)		Equivalent Maximum (Census Division Median)		Census Division Ratio	Sample Size
		NSF	GSF	NSF	GSF	GSF	
<i>Pacific States: Alaska, California, Hawaii, Oregon, Washington</i>							
E1-E3 (JENL) E4-E6 (JNCO)	2	1,210	1,500	960	1,190	0.79	48,849
	3	1,420	1,760	1,230	1,520	0.86	
	4	1,790	2,220	1,460	1,810	0.82	
	5	2,150	2,670	1,720	2,130	0.80	
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,420	1,760	1,310	1,620	0.92	91,393
	3	1,650	2,050	1,450	1,800	0.88	
	4	2,020	2,500	1,730	2,150	0.86	
	5	2,490	3,090	2,160	2,680	0.87	
E9 (SNCO) W4-W5 (WO)	3	1,930	2,390	1,660	2,060	0.86	51,728
	4	2,260	2,800	1,970	2,440	0.87	
	5	2,750	3,410	2,320	2,880	0.84	
O4-O5 (FGO)	3	1,850	2,300	1,600	1,990	0.87	55,193
	4	2,180	2,700	1,910	2,370	0.88	
O6 (SO)	4	1,900	2,360	2,020	2,500	1.06	20,852
O7-O10 (GO)	4	3,270	4,060	2,530	3,140	0.77	23,153

GSF Source: Characteristics of New Housing, U.S. Census Bureau.

Figure F-1: Median Size of Existing Housing versus Congressional Statutory Limits



Source: Characteristics of New Housing and American Housing Survey, U.S. Census Bureau.

Table F-1: Median Size of Existing Private Sector Housing versus Congressional Statutory Limits

Bedroom / Grade Group	Congressional Statutory Limits in GSF	Median Size of Existing Homes in GSF	Median Size of New Homes in GSF
2BR / E1-E6	1,180	1,120	1,500
3BR / E1-E6	1,490	1,500	1,764
4BR / E1-E6	1,670	2,046	2,224
2BR / E7-E8	1,180	1,300	1,786
3BR / E7-E8	1,670	1,738	2,028
4BR / E7-E8	1,800	2,340	2,500
5BR / E7-E8	1,920	2,625	3,132
2BR / O1-O3	1,180	1,200	1,783
3BR / O1-O3	1,670	1,700	2,046
4BR / O1-O3	1,800	2,100	2,500
5BR / O1-O3	1,920	2,254	3,089
3BR / E9	1,670	2,000	2,384
4BR / E9	1,800	2,600	2,789
5BR / E9	1,920	3,000	3,433
3BR / O4-O5	1,740	1,851	2,300
4BR / O4-O5	1,920	2,500	2,700
4BR / O6	2,110	2,600	2,915
4BR / O7+	2,600	2,663	4,064

Source: Characteristics of New Housing and American Housing Survey, U.S. Census Bureau.

Table G-1: Frequency of Garages and Carports in Single-Family Detached and Single-Family Attached Homes

Equivalent Rank in Private Sector	Bedroom Count	Frequency of Off-Street Parking			Frequency of Carports			Frequency of One-Car Garages			Frequency of Two-Car Garages			Frequency of Three-Car Garages		
		SFD	SFA	ALL	SFD	SFA	ALL	SFD	SFA	ALL	SFD	SFA	ALL	SFD	SFA	ALL
E1-E3 (JENL) E4-E6 (JNCO)	2	6%	7%	7%	2%	1%	1%	11%	36%	22%	70%	56%	64%	11%	0%	6%
	3	6%	23%	7%	1%	4%	1%	4%	36%	7%	82%	38%	79%	7%	0%	7%
	4	2%	7%	2%	0%	0%	0%	3%	31%	3%	82%	62%	82%	13%	0%	13%
	5	0%	0%	0%	0%	0%	0%	2%	0%	2%	66%	0%	66%	31%	0%	31%
E7-E8 (SNCO)	2	6%	4%	5%	1%	0%	1%	6%	33%	15%	75%	62%	71%	12%	0%	8%
	3	3%	15%	4%	0%	1%	0%	3%	34%	6%	79%	49%	77%	14%	0%	13%
	4	1%	5%	1%	0%	0%	0%	1%	7%	2%	75%	89%	75%	22%	0%	22%
	5	1%	0%	1%	0%	0%	0%	1%	0%	1%	55%	100%	55%	43%	0%	43%
O1-O3 (CGO) W1-W3 (WO)	2	5%	5%	5%	1%	0%	1%	6%	31%	15%	75%	64%	71%	12%	0%	8%
	3	3%	16%	4%	0%	1%	0%	2%	34%	5%	80%	48%	77%	15%	0%	14%
	4	1%	5%	1%	0%	0%	0%	1%	7%	1%	75%	88%	75%	23%	0%	23%
	5	1%	0%	1%	0%	0%	0%	1%	0%	1%	55%	100%	56%	43%	0%	43%
E9 (SNCO) W4-W5 (WO)	3	2%	6%	2%	0%	0%	0%	2%	23%	4%	71%	71%	71%	25%	0%	22%
	4	0%	0%	0%	0%	0%	0%	1%	6%	1%	65%	94%	65%	34%	0%	34%
	5	0%	0%	0%	1%	0%	1%	1%	0%	1%	40%	100%	40%	59%	0%	58%
O4-O5 (FGO)	3	2%	8%	2%	0%	0%	0%	2%	29%	5%	74%	62%	73%	22%	0%	20%
	4	0%	0%	0%	0%	0%	0%	1%	0%	1%	68%	100%	68%	31%	0%	30%
O6 (SO)	4	0%	0%	0%	0%	0%	0%	1%	5%	1%	60%	95%	61%	38%	0%	38%
O7-O10 (GO)	4	0%	0%	0%	0%	0%	0%	5%	5%	1%	95%	95%	60%	0%	0%	39%

Source: Characteristics of New Housing, U.S. Census Bureau.

Table H-1: Proposed MILITARY CONSTRUCTION Size Standards by Grade in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Renovation Minimum Adequacy	Construction and Replacement Minimum	Construction Programming Benchmark	Construction Maximum^{a,b}
E1-E3 (JENL) E4-E6 (JNCO)	2	1,080	1,180	1,340	1,500
	3	1,370	1,490	1,630	1,760
	4	1,530	1,670	1,950	2,220
	5	1,760	1,920	2,300	2,670
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	1,080	1,180	1,490	1,790
	3	1,530	1,670	1,860	2,050
	4	1,650	1,800	2,150	2,500
	5	1,760	1,920	2,510	3,090
E9 (SNCO) W4-W5 (WO)	3	1,590	1,740	2,020	2,300
	4	1,760	1,920	2,310	2,700
O4-O5 (FGO)	3	1,590	1,740	2,020	2,300
	4	1,760	1,920	2,310	2,700
O6 (SO)	4	1,930	2,110	2,520	2,920
O7-O10 (GO)	4	2,380	2,600	3,330	4,060

^a The maximum gross floor area may be increased by 10 percent for housing units of an officer holding a special command position, for the commanding officer of a military installation, and for the senior noncommissioned officer of a military installation.

^b The maximum gross floor area may be increased by 300 square feet for family housing units in locations where harsh climatological conditions severely restrict outdoor activity for a significant part of each year.

Table H-2: Proposed MILITARY CONSTRUCTION Amenity Standards by Grade

Equivalent Rank in Private Sector	Bedroom Count	Dining Room^a	Family Room^b	Bathroom^c	Parking^d	Air Conditioning^b	Dishwasher^b	Clothes Washer/Dryer^b
E1-E3 (JENL) E4-E6 (JNCO)	2	Included	Not included	1 full	2-car garage	Based on climate	Included	Included
	3	Included	Not included	2 full	2-car garage	Based on climate	Included	Included
	4	Included	Included	2 full	2-car garage	Based on climate	Included	Included
	5	Included	Included	3 full	2-car garage	Based on climate	Included	Included
E7-E8 (SNCO) W1-W3 (WO) O1-O3 (CGO)	2	Included	Not included	1 full	2-car garage	Based on climate	Included	Included
	3	Included	Included	2 full	2-car garage	Based on climate	Included	Included
	4	Included	Included	2 full	2-car garage	Based on climate	Included	Included
	5	Included	Included	3 full	2-car garage	Based on climate	Included	Included
E9 (SNCO) W4-W5 (WO)	3	Included	Included	2 full	2-car garage	Based on climate	Included	Included
	4	Included	Included	2 full	2-car garage	Based on climate	Included	Included
O4-O5 (FGO)	3	Included	Included	2 full	2-car garage	Based on climate	Included	Included
	4	Included	Included	2 full	2-car garage	Based on climate	Included	Included
O6 (SO)	4	Included	Included	2 full	2-car garage	Based on climate	Included	Included
O7-O10 (GO)	4	Included	Included	3 full	2-car garage	Based on climate	Included	Included

^a Proposed standard applies to all military family housing units; in two-bedroom units, this standard is represented by an eat-in kitchen.

^b Proposed standard applies to all military housing units.

^c Proposed standard applies to one-story family housing units; include additional one half-bathroom in two-story units.

^d Proposed standard applies to single-family detached housing units; include a one-car garage in single-family attached units.

Table H-3: Proposed MILITARY APARTMENT Size Standards by Grade in Gross Square Feet

Equivalent Rank in Private Sector	Bedroom Count	Proposed Apartment Minimum Adequacy	Proposed Apartment Construction Maximum
<i>E1-E3 (JENL)</i>	2	1,040	1,190
<i>E4-E6 (JNCO)</i>	3	1,280	1,540

Table H-4: Proposed MILITARY APARTMENT Amenity Standards by Grade

Equivalent Rank in Private Sector	Bedroom Count	Dining Room^a	Family Room^b	Bathroom^c	Parking^b	Air Conditioning^d	Dishwasher^d	Clothes Washer/Dryer^d
<i>E1-E3 (JENL)</i>	2	Included	Not included	1 full	Non-covered	Based on climate	Included	Included
<i>E4-E6 (JNCO)</i>	3	Included	Not included	2 full	Non-covered	Based on climate	Included	Included

^a Proposed standard applies to all military family housing units; in apartment units, this standard is represented by an eat-in kitchen.

^b Proposed standard applies to military apartment units.

^c Proposed standard applies to all one-story military family housing units.

^d Proposed standard applies to all military family housing units.