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Report to the Chairman, Subcommittee on Military Construction, Committee on Appropriations, U.S. Senate

June 1991

ARMY FAMILY HOUSING

Additional Dwelling Units Not Justified at Fort Campbell

144184

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GAO

United States
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Washington, D.C. 20548

National Security and
International Affairs Division

B-239414

June 19, 1991

The Honorable Jim Sasser
Chairman, Subcommittee on
Military Construction
Committee on Appropriations
United States Senate

Dear Mr. Chairman:

As you requested, we evaluated the Army's justification for the construction of 300 additional family housing units at Fort Campbell, Kentucky. In addition, you subsequently asked us to evaluate a 1990 Corps of Engineers' survey of rental housing in the Fort Campbell area and any related justification for additional family housing units. We evaluated only the survey because the Army has not submitted to you a revised housing proposal with a justification incorporating the survey.

Background

The Department of Defense (DOD), on behalf of the Army, in August 1989, requested authority from the Congress to proceed with a contract solicitation under section 801 of the Military Construction Authorization Act of 1984 for a build-to-lease housing project at Fort Campbell for 300 units. A section 801 build-to-lease project is new housing constructed to military specifications and leased by a private developer to the military for up to 20 years. At the end of 20 years, the Army has the right of first refusal to purchase the project.

In the materials submitted to you, the Army justified the 300 additional family housing units by projecting a deficit of nearly 2,000 housing units at Fort Campbell by 1994. To make its projection, the Army used a model for determining the need for housing. In the Army's model, the projected number of private rental units is multiplied by the Army's share in private rental units and subtracted from projected housing requirements (net of Army-owned and controlled housing) by bedrooms and price-matching affordability level.

On the basis of our preliminary findings on the Army's justification for the housing project, you requested in December 1989 that the Army reconsider its need for additional housing for Fort Campbell and deferred new Army section 801 housing proposals until the Army had revised its housing model (which also applies to other types of Army-owned and controlled housing).

We also briefed the Army on our preliminary findings. The Army then asked the Corps of Engineers to conduct a survey of rental housing in the Fort Campbell area.

Results in Brief

The Army has not justified the construction of 300 additional family housing units at Fort Campbell. The Army incorrectly estimated key factors in its model to determine the need for housing. More important, the Army's model for determining housing needs has a basic shortcoming in that it does not allow price to equate the quantity of housing demanded to the quantity supplied and, thus, may indicate a need for housing where none exists.

We met with Army officials to inform them of our views on what could be done to correct the model's basic shortcoming. (Our views are included in appendix I.) The Army is revising its model.

The Corps of Engineers' survey of rental housing appears to have significantly understated existing rental housing in the Fort Campbell area.

Incorrect Estimates of Key Factors

In its justification for the proposed housing project, the Army erroneously estimated key factors in determining Fort Campbell's housing requirements and the number of private rental units. The Army overestimated the number of families requiring housing and underestimated the number of existing and projected private rental units.

Housing Requirements

The Army incorrectly estimated the number of married soldiers to arrive at the number of families requiring housing because its estimates were based on a combination of two data bases that yielded inconsistent results. In 8 of 21 grades, the number of married soldiers at Fort Campbell shown in one data base (covering only a part of the soldiers assigned to the post) exceeded the total number of married and unmarried soldiers assigned to the post shown in the other data base (covering all soldiers assigned to the post).

We reestimated housing requirements by using only the data base for all soldiers at Fort Campbell. Our estimate showed the number of families requiring housing to be less than the Army's estimate.

Existing and Projected Rental Units

The Army understated the number of existing and projected private rental units. In estimating the number of existing units, the Army deviated from its own methodology (which requires that the entire housing market area be included) by including only 4 of Fort Campbell's 18 communities. The Army also underestimated the rate of growth in rental units. On the basis of discussions with local housing experts, the Army estimated the growth rate at 1 percent. The Army was unable to provide documentation supporting the 1-percent estimate.

We reestimated the number of existing rental units by adhering to the Army's methodology. In our estimates, we took into account 15 of Fort Campbell's 18 communities. (We were unable to obtain data on the other 3.) Using building permit data, we estimated a growth rate in rental units of 2 percent.

Basic Shortcoming in Army's Housing Model

The Army's housing model generally shows housing surpluses or deficits where prices should be operating to eliminate them. Housing surpluses or deficits are generated by the model because it is unlikely that the multiplication of the number of private rental units by the Army's share in such units (to arrive at the number of private rental units available to the Army) will just equal housing requirements (net of Army-owned and controlled housing). Although the model includes prices, prices do not change to eliminate these imbalances. The model could indicate housing deficits even where prices match affordability levels.

In practice, a housing surplus or deficit tends to be eliminated because price, in the absence of restrictions on its movement, serves to equate the quantity demanded and the quantity supplied. At the price at which this occurs, any group already part of the market should be able to find housing. If the demand for housing increases, the price of housing may rise to equate the quantity demanded to the quantity supplied.

Corps' Survey Understates Existing Rental Housing

The Corps identified 12,497 rental units in the Fort Campbell area in February 1990. However, we found that the 1980 U.S. Census of Housing identified at least 17,189 units in the same area. Thus, the Census showed about a 38-percent greater amount in 1980, than the Corps showed in 1990. Our review of multi-unit building permits data for the 1981-88 period indicates an expansion of rental housing since 1980, rather than a contraction. If rental housing expanded as indicated by the building permits data, rental units in 1990 would be 68 percent higher than the Corps found.

Agency Comments and Our Evaluation

In commenting on a draft of this report, DOD stated that it concurred or partially concurred with many of our findings and suggestions.

However, DOD did not directly comment on our overall conclusion that the Army failed to justify the proposed Fort Campbell housing project. Instead, it stated that it did not concur with the conclusion that there is not a shortage of adequate, affordable housing at Fort Campbell.

Our report has no such conclusion. While there may be a need for adequate, affordable housing at Fort Campbell, the Army has not provided a justification for it.

Other DOD comments are addressed in appendix IV, where the agency's comments are also reproduced in full.

In-depth coverage of our review of both the Army's justification for additional housing and the Corps of Engineers' survey is presented in appendixes I and II, respectively. Our objectives, scope, and methodology are discussed in appendix III.

We are providing copies of this report to the Chairmen of the House Committee on Appropriations and the House and Senate Committees on Armed Services; the Secretaries of Defense and the Army; the Director, Office of Management and Budget; and other interested parties upon request.

Please call me at (202) 275-4141 if you or your staff have any questions concerning this report. Other major contributors to this report are listed in appendix V.

Sincerely yours,

Richard Davis
Director, Army Issues

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Abbreviations

DOD	Department of Defense
GAO	General Accounting Office

Evaluation of the Army's Justification for Additional Family Housing in Fort Campbell

Summary Findings Using the Army's Model

Table I.1 compares the Army's estimated housing deficits for 1994, the projection year for determining the need for housing, with our 1994 housing surplus/deficit estimates. Our estimates show housing deficits significantly less than those projected by the Army in all four of our variants of the results, and significantly fewer than 300 units in three of our four variants of the results.

Table I.1: Summary Results

	Army		GAO			
	100 percent requirements[a]	90 percent requirements[b]	100 percent requirements		90 percent requirements	
			Option A[c]	Option B[d]	Option A[c]	Option B[d]
On-post housing units plus private rental units available for Army families	11,369	11,369	11,934	13,062	11,934	13,062
Families requiring housing	13,366	12,029	12,634	12,634	11,371	11,371
Surplus				605 [e]	589 [e]	1,715 [e]
Deficit	(1,997)	(660)	(700)	(177)[e]	(26)[e]	(24)[e]

[a]Calculations based on the assumption that all families will require housing.

[b]Calculations based on the assumption that 90 percent of the projected number of families will require housing. It was Army policy in general to assess needs by taking 90 percent of the projected requirements to minimize the possibility of overbuilding. The Army's policy was changed in March 1991. Now the Army's policy restricts housing projects generally to no more than 90 percent of an installation's housing deficit.

[c]Excludes rental units considered adequate by soldier-occupants but considered inadequate by the Army.

[d]Includes rental units considered adequate by soldier-occupants but considered inadequate by the Army.

[e]In the Army's model, surpluses and deficits are calculated separately for groups of soldiers, according to affordability levels and bedroom needs. Deficits of some groups may be offset by surpluses of other groups. In these cases, however, deficits could not be offset by surpluses because of Army regulations on grade and bedroom entitlements.

As discussed in the following sections, we questioned the reasonableness of and support for the Army's estimates of several key factors used to project housing requirements and private rental units for its housing model, substituted what we regarded as more reasonable and documented estimates, and recalculated the Army's model.

Housing Requirements

The Army's projection of the number of families requiring housing is questionable. Table I.2 compares the Army's results with ours.

Table I.2: Housing Requirements

	Army	GAO
Soldiers	22,353	22,353
Married soldiers	14,043	13,444[a]
Less voluntary separations	(677)	(810)
Families requiring housing	13,366	12,634

[a]Includes 187 soldiers residing at Fort Campbell in January 1989 whose spouses had been transferred temporarily to other locations.

The Army's starting point for its estimate is the projected total number of soldiers to be assigned to Fort Campbell, which was taken from a master Army plan for stationing soldiers at installations. However, the plan does not provide data on soldiers by rank or marital status, which is necessary for determining requirements for family housing by rank, according to Army regulations.

To project the number of married soldiers by rank, the Army used two different data bases. From one database, covering the entire population of soldiers at Fort Campbell, the Army obtained the relative number of soldiers at each rank and applied it to the total projected number of soldiers. From the other data base, limited to soldiers authorized and receiving housing allowances (and hence excluding those living on post), it obtained the relative number of married soldiers and applied it to the projected number of soldiers at each rank. However, the data bases were not consistent, and the Army did not reconcile them. For 8 of 21 grades, the number of married soldiers shown in the second data base (which covers fewer soldiers than the first data base) exceeded the number of married and unmarried soldiers assigned to Fort Campbell shown in the first data base. We used the data base for the entire population of soldiers at Fort Campbell to obtain both rank and marriage distribution data to project the number of married soldiers by rank.[1]

From the projected number of married soldiers, the Army subtracted the projected number of voluntary separations (the number of married soldiers who will voluntarily choose not to bring their families to Fort Campbell). In projecting this number, the Army diverged from its guidance by judgmentally altering the current number of voluntary separations. We reestimated the projected number of voluntary separations by applying the current ratio of voluntary separations to married soldiers

[1]The Army used data for January 1989. At the time of our review, data for this period was no longer available, and we therefore used March 1989 data (the earliest date available to us) to establish rank and marital distributions.

to the projected number of married soldiers, in conformance with Army guidance.

Existing Private Rental Units

Our review indicated that the Army underestimated the number of existing (for the year 1989) private rental units. Table I.3 compares the Army's and our estimates of the number of existing private rental units.

Table I.3: Existing Private Rental Units

Units	Army	GAO
Housing units in Fort Campbell housing market area	42,069	47,349
Adequate housing units	37,862	42,614
Existing private rental units	15,174	17,045

The Army's methodology was to begin with the population in the 18 communities within 30 miles or 1-hour's driving time from Fort Campbell. In fact, the Army used only the population in four communities (which totaled 108,490) because it believed that rental housing was restricted to these four communities. We found no documentation justifying this restriction. While we could not obtain information on 3 communities, our calculations take 15 communities into account (which totaled a population of 126,422).

The Army's next step was to estimate the number of households (or housing units) by dividing the population by persons per household, in this case 2.58. However, the Army could not support the person-per-household figure it used. We obtained our figure—2.67—from the 1980 Census of Housing report for the Clarksville-Hopkinsville, Tennessee-Kentucky standard metropolitan statistical area, which encompasses the Fort Campbell housing market area.

The Army then reduced the number of households by 10 percent to allow for inadequate housing. It based this figure on discussions with local housing officials. To obtain the number of rental units, the Army multiplied the estimated number of adequate housing units by the ratio of renter-occupied housing units to the total of owner- and renter-occupied housing units—40 percent—which was supplied by local planning officials.[2] These adjustments appeared reasonable, and their sources were adequately documented. We therefore used the same figures.

[2]When the 37,862 adequate housing units shown in table I.3 as the Army's estimate is multiplied by 0.4, the product is not 15,174 existing private rental units, as shown by the Army. Army officials were unable to explain the difference.

We agree with the Army's estimate of the existing and projected number of on-post housing units (4,153).

Projected Number of Private Rental Units

The Army underestimated the number of future private rental units. Table I.4 compares the Army's and GAO's estimates.

Table I.4: Projected Number of Private Rental Units

Units	Army	GAO
Projected private rental units	15,945	18,777

The Army used a 1-percent growth rate to project the number of rental units to be available in 1994. We were informed that this rate was based on discussions with local housing market experts, but these discussions were not documented.

Using building permit data for multi-dwelling units for 1981 to 1988 (net of permits for destruction), we estimated a growth rate of 2.1 percent per year. To allow for the failure to construct after permits are issued, we reduced the growth rate for our projection to 2 percent.

Projected Private Rental Units for Army Families

The Army projected the number of private rental units available for Army families in accordance with its housing model. In essence, it multiplied the projected number of private rental units in the housing market area by the ratio of private houses owned and occupied by Army families plus private housing units rented by Army families to total private rental units. We refer to this ratio as the Army's share in the housing market area's private rental units. We followed the same procedure.

The Army underestimated the projected number of private rental units available for Army families. Table I.5 compares GAO's and the Army's estimates of the projected number of private rental units available for Army families.

Table I.5: Projected Private Rental Units for Army Families

Units	Army	GAO Option A[a]	GAO Option B[b]
Projected private rental units for Army families[c]	7,216	7,781	8,909

[a]Excludes rental units considered adequate by soldier-occupants but considered inadequate by the Army.

[b]Includes rental units considered adequate by soldier-occupants but considered inadequate by the Army.

[c]Reductions are made for single soldiers living off post.

Our estimates differ from those of Army for the following reasons:

- The Army estimated its share of private rental units as 49 percent, and we estimated it as 44 percent (in option A) and 50 percent (in option B). Our estimates of the share differ because (1) the Army does not have an option B; (2) we used different estimates of existing private rental units (see table I.3); and (3) we rejected the Army's reason for projecting a decline in the share. In accordance with its model, the Army projected a decline in the share because it projected that the rental vacancy rate would decline. However, we found no evidence to support such a decline, and hence we projected an unchanged share.
- We began with a different base for total existing private rental units (see table I.3).
- We used a different growth factor to project the number of private rental units (see table I.4).

Improper Supply and Demand Analysis

The Army's model for determining the need for additional military housing at Fort Campbell and other Army posts has a basic shortcoming. It may indicate a need for housing where there is none.

The basic flaw in the model is that it generally results in housing surpluses or deficits where prices should be operating to eliminate them. In practice, a surplus or deficit tends to be eliminated because price, in the absence of restrictions on its movements, serves to equate the quantity of housing demanded and the quantity of housing supplied.

At the price that equates the quantity supplied and the quantity demanded, any group already part of the market should be able to find housing. If there is an increase in demand—for instance, due to an increase in the number of soldiers stationed at Fort Campbell—there

In addition, the model uses an elaborate set of quantitative coefficients purporting to show the relationship between changes in the Army's share and each of its determinants. However, the model's coefficients have not been estimated on the basis of any data. We were informed that they had been developed by the authors of the model and approved by panels of Army housing experts.

Other Problems With the Army's Housing Model

The model assumes maximum amounts that Army families will be willing to spend for housing, regardless of potential savings from economizing on expenditures on other activities. This is because the model ignores factors such as commuting distance and access to shopping, which influence the choice of housing in addition to the number of bedrooms, price, and affordability.

The model also does not integrate the homeowner and rental housing markets. For instance, although the numerator of the Army's share of housing includes houses owned by military families as well as rental units, the denominator includes only rental units. Furthermore, the model does not recognize that under some conditions houses that are for sale might become rental units.

Suggestions for Correcting the Army's Model

At their request, we met with Army officials to inform them of our views on what could be done to correct the model's basic shortcoming, as discussed in this report. We suggested that the model be revised to provide for the projection of housing prices that equate quantities of housing supplied and demanded and for the projection of housing affordability levels associated with Army grades. A housing shortage would be indicated if a projected housing affordability level were below a projected housing price, and its size would be equal to the projected number of soldiers at such an affordability level. This is in contrast to the present model in which price does not equate the quantity of housing demanded and the quantity of housing supplied, and a housing shortage may be generated even where price matches affordability. The Army is revising its model.

In addition, the model uses an elaborate set of quantitative coefficients purporting to show the relationship between changes in the Army's share and each of its determinants. However, the model's coefficients have not been estimated on the basis of any data. We were informed that they had been developed by the authors of the model and approved by panels of Army housing experts.

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Evaluation of the Corps of Engineers' Survey of Rental Housing in the Fort Campbell Area

The Corps of Engineers survey of rental housing in the Fort Campbell area appears to have significantly understated existing rental housing.

In their justification for more housing units at Fort Campbell, Kentucky, the Army estimated that there were 15,174 private rental units in 1989. We found, however, that the Army erroneously estimated several key factors. We corrected the errors and reestimated the number of existing private rental units, using the same methodology as the Army. Our estimate showed 17,045 private rental units. After we presented our estimate to the Army in December 1989, the Army asked the Corp of Engineers to conduct a survey of rental housing in the Fort Campbell area.

The Corps' approach began with identifying 34 communities that are within 30 miles or 1-hour's driving time from Fort Campbell. These communities cover an area almost the same as that of the 18 communities included in Army's methodology for estimating existing private rental units.

During the first week in February 1990, the Corps contacted rental agents and property managers in the 34 communities. The rental agents and property managers provided the names of the apartment complexes, the number of units, the number of bedrooms, and the rental rates. The Corps recorded this information and visited about 75 percent of the identified rental housing. After completing its count, the Corps added 5 percent to the results in recognition that some rental units may have been overlooked.

In total, the Corps identified 12,497 rental units in the Fort Campbell area. However, we found that the 1980 U.S. Census of Housing identified at least 17,189 units in the same area.[1] Thus, the Census showed about a 38-percent greater amount in 1980 than the Corps showed in 1990.

We examined indicators of change in rental housing in the area to determine if it is likely that such a drastic reduction occurred. We found that 3,079 multi-unit building permits (excluding those for destruction) were issued in Christian County, Kentucky and Montgomery County, Tennessee, which account for the bulk of the rental housing in the Fort Campbell area, in the 1981-88 period. This would indicate an expansion

[1]Excludes any rental units in five communities within the Fort Campbell area that were not recognized as separate geographic entities in the 1980 Census of Housing.

rather than a contraction of rental housing. If rental housing expanded as indicated by the building permit data, (2 percent per year, after allowing for incomplete construction), rental units in 1990 would be 68 percent higher than the Corps found.

We believe the reason for the Corps' likely gross underestimation of rental housing is that it dealt solely with real estate professionals in identifying rental property. Such an approach is unlikely to identify rental units that are made available or managed by other than real estate professionals. This is most likely where houses only have single rental units, and the owners themselves are living in the same houses as their rental units.

Corps officials told us that they did not consider the Census data. They wanted their survey to be an independent one. Furthermore, they do not believe that there are many rentals outside of professional real estate channels. This opinion is based upon their personal observations that personal income in the area is too low to permit many people from investing in one-and two-unit rental properties.

Objectives, Scope, and Methodology

The Chairman of the Subcommittee on Military Construction, Senate Committee on Appropriations, requested us to determine whether the Army had justified the need for a proposed 300-unit family housing project at Fort Campbell.

We used a two-pronged approach to achieve our objective. We assessed whether the data used for the Army's housing model was reasonable and adequately documented, as required by Army housing regulations. When we found that the data was unreasonable or unsupported, we substituted our own data, which we believe was more reasonable and based on documented sources. We then used the model to reestimate the results with the alternative data.

We also evaluated the model itself. We evaluated whether the basic approach used by the Army to determine the need for housing was sound. We based our evaluation of the model on accepted economic principles and factors that affect housing markets.

In the course of our audit, we interviewed officials of

- the Office of the Secretary of Defense;
- Headquarters, Army Corps of Engineers;
- Fort Campbell;
- local real estate companies and government planning agencies; and
- the Army Audit Agency.

We also toured the housing at Fort Campbell and in surrounding local communities.

In response to the Chairman's request, we also separately evaluated a Corps of Engineers' survey of rental housing in the Fort Campbell area. The Army has not submitted a revised housing proposal incorporating this survey.

Our review was performed from September 1989 to August 1990 in accordance with generally accepted government auditing standards.

Comments From the Department of Defense

PRODUCTION AND LOGISTICS

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301-8000

March 22, 1991

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and International
Affairs Division
US General Accounting Office
Washington DC 20548

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report entitled "ARMY FAMILY HOUSING: Additional Dwelling Units Not Justified," dated December 15, 1990 (GAO Code 393362, OSD Case 8575). The Department concurs or partially concurs with many of the GAO findings and suggestions regarding the family housing survey process that was originally used in conjunction with the Army's proposed housing project at Fort Campbell, Kentucky. The Department does not concur, however, with the GAO conclusion that there is not a deficit in adequate, affordable housing at Fort Campbell.

See comment 1.

The Army re-surveyed the housing situation at Fort Campbell based on the initial GAO findings, including a thorough area search for suitable vacant rental housing in the communities surrounding the installation. An updated forecast of the projected housing needs for Fort Campbell was provided to the GAO audit team by letter dated November 15, 1990, but those findings are not considered in the draft report. The Department notes that even when all of the numerical changes recommended by the GAO are incorporated in the housing survey computations, a net deficit of more than 1,000 dwelling units is still indicated for Fort Campbell.

See comment 2.

See comment 3.

Detailed comments regarding the draft report are provided in the enclosure. The Department appreciates the opportunity to comment on the draft report.

Sincerely,

David J. Berteau
Principal Deputy

Enclosure

GAO DRAFT REPORT - DATED DECEMBER 20, 1990
(GAO CODE 393362) OSD CASE 8575

"ARMY FAMILY HOUSING: ADDITIONAL DWELLING UNITS NOT JUSTIFIED"

DEPARTMENT OF DEFENSE COMMENTS

* * * * *

FINDINGS

FINDING A: Request for 300 Unit Build-to-Lease Housing Project at Fort Campbell, Kentucky. The GAO observed that, in August 1989, the Secretary of the Army requested authority from the Congress to proceed with a contract solicitation under section 801 of the Military Construction Authorization Act of 1984 for a build-to-lease housing project at Fort Campbell for 300 units. According to the GAO, a Section 801 build-to-lease project is new housing constructed to Military specifications and leased by a private developer to the Military for up to 20 years. The GAO further observed that, at the end of 20 years, the Army has an option to purchase the project.

The GAO found that the Army justified the 300 additional family housing units by projecting a 2,000 housing-unit deficit at Fort Campbell by FY 1994. The GAO explained that, to make the projection, the Army used a model for determining the need for housing--which is defined as the difference between how many housing units are required and how many housing units are available. The GAO pointed out that, in the Army model, the projected number of private rental units is multiplied by the Army share in private rental units and subtracted from projected housing requirements (net of Army-owned and controlled housing) by bedrooms and price-matching affordability level. (pp. 1-2, GAO Draft Report)

Now on p. 1.

DOD RESPONSE: Concur. The Department points out that, at the end of the 20 year lease, the Army does not have the option to purchase the project. Instead, the Army has only the right of first refusal.

See comment 4.

Additionally, it should be noted that the Army justified the project in accordance with the then current Army Housing Justification Process. The model used was developed as a result of a July 1987 GAO report entitled, "DOD Procedures

See comment 5.

to Determine Housing Needs Can Be Improved" (OSD Case 6773-B). In that report, the GAO had recommended using a 60 minute commuting time, consideration of the future housing growth in the community, and calculation of a military "fair share" access to projected community housing assets based on a ratio of military renters to total renters in the community. Those recommendations were incorporated in the Army housing survey process employed at Fort Campbell.

FINDING B: Housing Requirements. The GAO concluded that the Army projection of the number of families requiring housing was questionable. The GAO found that the Army starting point for its estimate is the projected total number of soldiers to be assigned to Fort Campbell--which was taken from a master Army plan for stationing soldiers at installations. The GAO noted, however, that the plan does not provide data on soldiers by rank or marital status, which is necessary for determining requirements for family housing by rank, according to Army regulations.

The GAO pointed out that, to project the number of married soldiers by rank, the Army used two different databases. The GAO learned that, from one database (covering the entire population of soldiers at Fort Campbell), the Army obtained the relative number of soldiers at each rank and applied it to the total projected number of soldiers; from the other database, limited to soldiers authorized and receiving housing allowances and hence excluding those living on post, the Army obtained the relative number of married soldiers and applied it to the projected number of soldiers at each rank. The GAO observed, however, that the databases were not consistent, and the Army did not reconcile them. The GAO calculated that, for 8 of 21 grades, the number of married soldiers shown in the second database (which covers fewer soldiers than does the first database) exceeded the number of married and unmarried soldiers assigned to Fort Campbell shown in the first database. The GAO used the database for the entire population of soldiers at Fort Campbell to obtain both rank and marriage distribution data to project the number of married soldiers by rank.

The GAO also reported that, from the projected number of married soldiers, the Army subtracted the projected number of voluntary separations (i.e., the number of married soldiers, who will voluntarily choose not to bring their families to Fort Campbell). The GAO found that, in projecting that number, the Army diverged from its guidance by altering the current number of voluntary separations judgmentally. The GAO re-estimated the projected number of voluntary separations by applying the current ratio of

voluntary separations to married soldiers to the projected number of married soldiers, in conformance with Army guidance.

The GAO explained that, in general, it is Army policy to assess housing needs by taking 90 percent of projected requirements to minimize the possibility of overbuilding. The GAO calculated that application of that policy reduces the Army requirements estimate to 12,029 and that of the GAO estimate to 11,371. (pp. 2-3, pp. 8-11/GAO Draft Report)

Now on pp. 2 and 8-10.

DOD RESPONSE: Partially concur. The starting point for determining future housing requirements is the Army Stationing and Installation Plan. The Plan provides the distribution of total personnel by officer, warrant officer, and enlisted designation. In addition, the Plan is based on a Table of Organizations and Equipment, the Table of Distribution and Allowances for Army personnel, and input from other services and agencies for tenant personnel assigned to the installation.

To determine the number of married soldiers, the historical practice has been to calculate marriage factors for both officer and enlisted personnel by reviewing the finance and accounting data base to determine the proportion of the total military population either living in on-post family housing or drawing Basic Allowance for Quarters at the "With Dependents" rate. That data from the three most recent years is then averaged and applied to the projected Army Stationing and Installation Plan data to estimate the number of families expected in the future.

The Army has now further refined the process to derive marriage statistics by individual pay-grades. In order to do this, data are derived from both the Standard Installation Division Personnel System and the Army Finance and Accounting data base. Each of the data bases are used for other purposes in managing separate programs and are updated at different times. Therefore, differences in population distribution statistics between the two are to be expected. The GAO highlighted some differences between the two source documents, but failed to mention that those differences were reconciled as part of the basic survey process; no paygrade in the completed survey is represented as having a married population greater than the total population. As noted by the GAO, some judgmental errors were made in the forecasts of voluntarily separated personnel. This has since been corrected by projecting the future level of voluntarily separated personnel to be in the same proportion of the total married population as the current ratio.

See comment 6.

See comment 7.

The GAO statement that it is Army policy to limit new housing construction projects such that the resulting composite inventory of on post and off post housing is sufficient to house no more than 90 percent of the installation's projected married population is no longer true. It is DOD and Army policy that all military families have access to decent and affordable housing, not just 90 percent of them. Consistent with this policy, the scope of new housing construction projects generally will be restricted to satisfy no more than 90 percent of an installation's calculated net deficit (i.e., 90 percent of the difference between projected housing needs and projected housing inventory), rather than 90 percent of its total housing needs.

FINDING C: Existing Private Rental Units. While agreeing with the Army estimate of the existing (for the year 1989) and projected number of on-post housing units (4,153), the GAO found that there were indications the Army under-estimated the number of existing private rental units. The GAO explained that the Army methodology was to begin with the population in the 18 communities within 30 miles or 1 hour driving time from Fort Campbell. The GAO learned, however, that, in fact, the Army used only the population in four communities (which totaled 108,490) because it assumed that rental housing was restricted to those four communities. (The GAO was unable to find any documentation for that restriction.) On the other hand, the GAO calculations took 15 communities into account--which included a total population of 126,422.

According to the GAO, the Army next estimated the number of households (or housing units) by dividing the population by persons per household--i.e., by 2.58. The GAO concluded, however, that the Army could not support the person-per-household figure it used. The GAO obtained its person-per-household figure of 2.67 from the 1980 census report for the Clarksville-Hopkinsville, Tennessee-Kentucky standard metropolitan statistical area, which encompasses the Fort Campbell housing market area.

The GAO learned that the Army then reduced the number of households by 10 percent to allow for inadequate housing. The GAO observed that the 10 percent figure was based on discussions with local housing officials. According to the GAO, the Army obtained the number of rental units by applying the percentage of rental units to the total number of household units--40 percent--as defined in the 1980 census report. The GAO concluded that the adjustments appeared to be reasonable, and their sources were documented adequately--therefore, the GAO used the same figures in its calculations. The GAO then calculated the existing

Now on pp. 3 and 10-11.

inventory of adequate rental housing to be 17,045 rather than 15,174 as estimated by Army. (pp. 3-4, pp. 11-14/GAO Draft Report)

See comment 8.

See comment 9.

See comment 10.

DOD RESPONSE: Partially concur. The GAO is correct in its statement that the Army, in its original housing survey, did not canvas all communities within its designated market area to determine the total inventory of rental housing. However, the GAO does not explain that the primary objective of such a canvas is to locate suitable rental units that are vacant, not units occupied by others. The larger the size of the total market, the smaller the Army's calculated share of it will be. This means that if the Army found all of the existing adequate rental units that are currently vacant, but underestimated the total number of rental units in the market area, then the resultant market share calculation would underestimate the severity of the housing shortage, not overestimate it. Within the one hour driving time of Fort Campbell, several communities provide a preponderance of the available rental housing. The Army therefore focused its market survey on these communities.

See comment 11.

See comment 12.

See comment 13.

Further, the GAO incorrectly analyzed the data obtained from the Census Bureau. The Census Bureau statistics on "persons per household" are computed by dividing the total number of households (as physically counted by the Census Bureau) into the total number of persons the Bureau has counted as "living in households," not into the total population. For the Clarksville - Hopkinsville Metropolitan Statistical Area, the 1980 census showed 9.5 percent of the population living in "group housing" (e.g., prisons, hospitals, dormitories) rather than "households." Assuming the GAO correctly cited both the total population (126,422) and the ratio of persons per household (2.67) -- the 1980 census listed the ratio as 2.90 for the Clarksville - Hopkinsville Metropolitan Statistical Area) -- the calculation would yield 42,850 households. Continuing the analysis, since 40 percent of the households were identified as being rental units, then 17,140 total rental units would be indicated. Reducing this number by 10 percent to account for inadequate housing, as the GAO agreed was reasonable, results in a calculated adequate housing inventory of 15,426 units. This result is much closer to the Fort Campbell estimate than to the GAO estimate.

FINDING D: Projected Number of Private Rental Units. The GAO also found that the Army underestimated the number of future private rental units. The GAO observed that the Army used a 1-percent growth rate to project the number of rental units to be available in 1994. According to the GAO, that rate was based on discussions with local housing market experts, but those discussions were not documented.

Using building permit data for 1981 to 1988 for its calculations, the GAO estimated, a growth rate of 2.1 percent per year. The GAO did reduce the growth rate for its projection to allow for the failure to construct after permits are issued. (p. 3-4, p. 13/GAO Draft Report)

Now on pp. 3, 11, and 12.

DOD RESPONSE: Partially concur. The GAO correctly indicated that the historical growth rate in the Clarksville - Hopkinsville Metropolitan Statistical Area has been about 2 percent, and that the historical growth rate should be used to forecast growth in the absence of market indicators to the contrary. To gain insight as to the forecast of business activity in the area, the Army followed normal procedure by consulting with local government officials, bankers, and other professionals, who indicated a slowdown in construction. The Army did not, however, document the findings adequately. Projections of this type are obviously inexact, particularly during a time of national economic uncertainty. Consequently, only the future will disclose which growth estimate (1 percent or 2 percent) was the more accurate.

FINDING E: **Projected Private Rental Units For Army Families**. The GAO explained that the Army projected the number of private rental units available for Army families in accordance with its housing model. The GAO concluded, however, that the Army underestimated the projected number of private rental units available for Army families.

The GAO estimates differ from those of Army for the following reasons:

-- The Army estimated its share of private rental units as 49 percent, while the GAO estimated it as 44 percent. The GAO estimates differ because (1) the GAO used different estimates of existing private rental units and (2) the GAO rejected the Army reason for projecting a decline in the share. In accordance with its model, the Army projected a decline in the share because it projected that the rental vacancy rate would decline. However, the GAO found no evidence to support such a decline--hence projected an unchanged share.

-- The GAO began with a different base for total existing private rental units.

-- The GAO used a different growth factor to project the number of private rental units. (pp. 3-4, pp. 14-15/GAO Draft Report)

Now on pp. 11 and 12.

DOD RESPONSE: Partially concur. The GAO brought attention

to improvements that can be made in the way the Army forecasts the share of the private sector rental market it can expect, and those improvements are being adopted. As already explained in the response to Finding C, the Department does not concur with the GAO on its findings about the current inventory of community rental housing.

FINDING F: Improper Supply and Demand Analysis. The GAO found that the Army model for determining the need for additional Military housing at Fort Campbell and other Army posts has a basic shortcoming--resulting in the model indicating a need for housing where there is none. The GAO pointed out that the basic flaw in the model is that it generally results in housing surpluses or deficits where prices should be operating to eliminate them. The GAO noted that a surplus or deficit tends to be eliminated because price, in the absence of restrictions on its movements, serves to equate the quantity of housing demanded and the quantity of housing supplied.

The GAO observed that, although prices do not change to eliminate imbalances, the Army model considers the distribution of different sized rental units by price ranges (corresponding to affordability levels of Army grades). They concluded that the model could indicate housing deficits even where prices match affordability levels. Moreover, the GAO found that the model does not estimate prices and quantities of rental units; those must be independently estimated and then incorporated into the model.

The GAO identified other conceptual problems with the model formulation of the Army share in private rental units. The GAO indicated that, in the model, a decline in a housing market area's rental vacancy rate decreases the Army share. According to the GAO, there is no reason that soldiers should have a more difficult time finding rental units than civilians, as is implied by such a formulation. The GAO further found that, in the model, a reduction in the size of a post's housing referral office decreases the Army share. The GAO pointed out, however, that the Army has not shown why soldiers could not resort to community sources of information about housing--such as newspaper advertisements and local realtors.

The GAO also reported that the model uses an elaborate set of quantitative coefficients purporting to show the relationship between changes in the Army's share and each of its determinants. The GAO learned, however, that the model's coefficients were not estimated on the basis of any data. According to the GAO, the coefficients were made up by the authors of the model and approved by panels of Army

Now on pp. 2-3 and 12-14.

housing experts. (pp. 3-4, pp. 15-17/GAO Draft Report)

See comment 14.

DOD RESPONSE: Partially concur. The Army Segmented Housing Market Analysis model employs supply and demand techniques commonly used in private industry. In response to the GAO audit, the Army has been trying to develop an econometric model, using market clearing price theory, but tests so far indicate that the model will yield only marginally different results than those presently being achieved with the Segmented Housing Market Analysis model. Also, even if the econometric model can be developed into a more accurate and efficient means of forecasting military family housing needs, its application would be limited to areas where completely free market conditions exist. Research is continuing on this subject.

See comment 15.

See comment 16.

The notion that prices should be operating to eliminate deficits is not directly relevant to the Segmented Housing Market Analysis process. Most of the calculated deficit reflects the housing needs of lower income military families whose housing affordability level is too low to attract private investment in new construction. Therefore, the standard assumption of market clearing rents and automatic economic adjustments by the investment community is not appropriate in this application.

See comment 17.

The impact factors (coefficients) used in the Army Segmented Housing Market Analysis process were established by a panel of Army housing experts over a 5 year development period, and not just "made up" by the authors of the model as stated by GAO. The original estimates were refined through a series of four iterations, resulting in a Delphi process (a recognized and effective method of quantifying in the absence of specific data), which was the most efficient and least cost method of defining and refining the model. However, the Army acknowledges that the use of these coefficients makes little difference in the outcome of the analysis, and therefore has decided to discontinue their use.

See comment 18.

See comment 19.

See comment 20.

FINDING G: Other Problems With the Army's Housing Model. The GAO learned that the model assumes maximum amounts that Army families will be willing to spend for housing -- regardless of potential savings from economizing on expenditures on other activities. The GAO concluded that the model ignores factors such as commuting distance and access to shopping that influence the choice of housing--in addition to the number of bedrooms, price, and affordability.

The GAO found that the model also does not integrate the owner-occupied housing and rental markets. For instance,

although the numerator of the Army share of housing includes houses owned and occupied by military families, as well as rental units, the denominator includes only rental units. The GAO further found the model does not recognize that, under some conditions, houses that are for sale might become rental units. (pp. 3-4, p. 18/GAO Draft Report)

Now on p. 14.

DOD RESPONSE: Nonconcur. The Department criteria for private sector housing adequacy and affordability are based on absolute minimum habitability standards and absolute maximum cost and commuting distance standards. The Department agrees with the GAO that there is an interdependency among those factors, and that Service members living closer to their work should be able to afford higher rents in exchange for lower commuting expenses. The Department recognizes that relationship by establishing an upper threshold of "affordability" 30 percent above the Service member's allowances for housing, the most a Service member can be expected to afford for higher quality housing located close to community amenities and to work location. The Department realizes that members living on the fringes of the maximum commuting distance will have less money available for rent, and therefore should have a lower affordability ceiling.

See comment 21.

The Army recognized that some of its soldiers prefer to purchase homes and the model does incorporate that fact. As pointed out by the GAO, however, the Army erred by adding military homeowners to only the numerator of the ratio used to calculate its market share. This error caused the Army calculation to overestimate its share of the private housing market, and hence underestimate the size of its housing deficit. This has been corrected by adding the military homeowners to both sides of the ratio.

See comment 22.

FINDING H: Corps of Engineers' Survey of Rental Housing in the Fort Campbell Area. The GAO observed that the Corps of Engineers survey of rental housing in the Fort Campbell area appeared to have understated available rental housing to a significant degree. The GAO pointed out that the Army justification for more housing Units at Fort Campbell, Kentucky, estimated that there were 15,174 private rental units in 1989.

The GAO found, however, that the Army erroneously estimated several key factors. The GAO corrected the errors and re-estimated that there were actually 17,045 private rental units. Based on the GAO findings, the Army asked the Corps of Engineers to conduct a survey of rental housing in the Fort Campbell area. The GAO reported that the Corps identified 12,497 rental units; however, the GAO found that the 1980 U.S. Census of Housing identified 19,129 units in

the same area. The GAO concluded, therefore, that the Census showed a 53 percent greater amount in 1980, than the Corps showed in 1990.

The GAO then examined indicators of change in rental housing in the area to determine if it is likely that such a drastic reduction occurred. The GAO found that 3,079 multi-unit building permits (excluding those for destruction) were issued in Christian County, Kentucky and Montgomery County, Tennessee, which account for the bulk of the rental housing in the Fort Campbell area, in the FY 1981-FY 1988 period. The GAO speculated that would indicate an expansion rather than a contraction of rental housing. The GAO pointed out that, if rental housing did expand (as indicated by the building permit data), rental units in 1990 would be 84 percent higher than what the Corps found.

The GAO concluded that the reason for the Corps grossly underestimating rental housing was due to the fact it dealt solely with real estate professionals in identifying rental property. The GAO further concluded that it is very unlikely such an approach would identify those rental units made available or managed by other than real estate professionals. The GAO reported that the Corps did not consider the Census data because it wanted the survey to be an independent one. (pp. 3-4, pp. 19-21/GAO Draft Report)

Now on pp. 2-3 and 15-16.

DOD RESPONSE: Nonconcur. The market area survey conducted by the Army in response to the GAO audit covered a total of 34 communities surrounding Fort Campbell. The Army canvassed all known sources of finding rental housing, which included real estate agencies, newspaper advertisements, apartment guides, local government agencies, and physical visits to the communities. The inventory of rental units included apartment buildings, trailer parks, and single residences. All rental units that were available for rent at the time of this survey were counted. The Department acknowledges that the survey's methodology would overlook one potentially significant segment of the total rental housing inventory - non-commercially managed rental housing that is currently occupied and hence not available for rent.

See comment 23.

Although the Department agrees that the total size of the rental housing market in the vicinity of Fort Campbell is larger than that identified by the Army in its last canvas of the area, the Department does not agree with the assessment GAO provides with its analysis of 1980 census data. For example, the GAO included in their count of private rental housing in Clarksville, TN, 1,185 Army family housing units located within the boundary of Fort Campbell (census tract 1014). The GAO also included subsidized housing units, which are generally not available to military

See comment 24.

See comment 25.

See comment 26.

See comment 27.

people, as well as a significant number of "dwellings" that do not meet basic adequacy criteria (i.e., individual sleeping rooms, units lacking indoor plumbing, etc.). Further, the GAO assumption that the number of rental housing units in the area has grown by the number of units covered by new building permits in the last decade overlooks the fact that not all permits result in completed construction, and that growth in housing stock partially is offset by inventory reductions which result from demolition or casualty loss.

More significantly, the GAO failed to explain that the total amount of rental housing that might exist in the surrounding community has no significance with respect to whether the Army has a housing problem. Only units that are adequate, affordable, and vacant contribute to the solution; not units occupied by someone else. The following analysis is offered:

-- The Army's absolute share of the private rental market essentially is unaffected by the size of the total market. That is, the number of military families who are adequately housed in the private community today is a known number, and constitutes some percentage of the total market. The calculated percentage (i.e., "market share") is then applied to the inventory of existing adequate vacant rental units in the area to determine what housing assets, in addition to those currently occupied by military families, might be available to satisfy part of the military's housing needs. Therefore, expanding the size of the total housing market, without finding a corresponding increase in vacant adequate rental units, would actually reduce the military market share of vacant housing, and have no effect on the allocation of currently occupied housing.

-- The same situation is true for forecasts of future housing availability. If it is assumed that the military share of the total housing market will be a constant percentage, as the GAO stated (see Finding E), then the number of rental units available to military families will grow at the same rate as the community grows as a whole. That means if the current number of adequate rental units available to the military (i.e., the sum of military occupied units and "market share" of vacant units) is known, and the expected growth rate in the community is known, then the number of additional housing units the military can expect from that growth will be the same result, regardless of how large the total community is today.

* * * * *

RECOMMENDATIONS

- **None**

The following are GAO's comments on the Department of Defense's letter dated March 22, 1991.

GAO Comments

1. DOD's comments are addressed under the heading "Agency Comments and Our Evaluation."

2. We evaluated the Corps of Engineers' rental housing survey (which DOD refers to as Army's resurvey) but did not evaluate the Army's updated forecast of housing needs for Fort Campbell. As indicated in the report, the reason we did not evaluate this forecast is because it was not submitted as a justification for a resubmitted, revised housing proposal. Housing forecasts are periodically made for Army installations, without necessarily being accompanied by housing proposals, as was the case here. On the basis of our preliminary findings, the Chairman had earlier returned the Fort Campbell housing proposal to the Army for further review and consideration.

3. We are unsure about the precise meaning of "...numerical changes recommended by the GAO..." since we do not recommend any set of numbers. However, if the reference is to our alternative projection to the Army's numbers, then, as shown in Table I.1, we do not project deficits of "more than 1,000 units." We concluded that our estimated deficits were significantly below those of the Army and significantly fewer than 300 units in three of the four variants of the results.

4. We have revised the report as suggested.

5. Our recommendations cited by DOD were made in a 1977 report and summarized in our 1987 report. DOD omitted one important recommendation—inclusion of vacant housing for sale, in addition to rental housing, as a source of housing for military families. This source of housing is not part of Army's model.

We did not recommend the 60-minute commuting criterion; it was already DOD and Army policy. In both the 1977 and 1987 reports we recommended that it be properly applied.

We did recommend in our 1977 report that the future growth of the community be taken into account. Army's housing model does allow for growth of local housing.

However, the essence of Army's model could not have been developed as a result of the 1977 and 1987 reports. We did not recommend the "fair share" approach to assessing military housing requirements, the essence of Army's model. This was already DOD and Army policy at the time of our 1977 report.

In the 1977 and 1987 reports we focused on how this approach might be improved by suggesting changes in the way the military share should be calculated, rather than on DOD's basic policy. Thus, we recommended that military homeowners in the case of housing units for sale, and military renters in the case of rental units, be used in the share calculation instead of military households.

6. Despite repeated requests, the Army never provided us with a reconciliation of the data from the two data bases.

7. The Army made this change in March 1991, about 1-1/2 years after the submission of its Fort Campbell housing proposal. However, we have revised the report to reflect this change.

8. In its estimation of existing private rental units for justifying the Fort Campbell housing proposal (which DOD refers to as Army's original housing survey), the Army not only did not have as its primary goal vacant rental units but it ignored vacant units entirely. The Army estimated rental units by multiplying estimated households (after allowing for inadequate housing) by the ratio of renter-occupied units to total occupied housing units; because this ratio excludes vacant units, the resulting estimate of existing rental units will also exclude vacant units. We changed our report to indicate "occupied" housing units to clarify that this was what the Army specifically did.

9. As partially indicated in the preceding comment, DOD incorrectly described Army's estimation methodology. As described in appendix I of our report, the Army's methodology was to: (1) identify the population within 30 miles or 1-hour's driving time from Fort Campbell; (2) estimate households (housing units) by dividing the population obtained in (1) by an estimate of persons per household; (3) estimate adequate housing units by reducing by 10 percent the households estimated in (2); and (4) estimate existing private rental units, by multiplying the adequate housing units estimated in (3) by the ratio of renter-occupied to total owner- and renter-occupied housing units.

Inclusion of renter-occupied units is justifiable in our view, because the timeframe for the analysis is a projection of a potential housing shortage five years into the future. Within a 5-year timeframe renter-occupied housing units should be potentially available to military families.

10. We agree that several communities around Fort Campbell provide the major part of the area's housing. However, there is no reason to exclude other communities as long as they do not fall outside the criteria of 30 miles or 1-hour's driving time, which define the housing area established by the Army.

11. In preparing our estimates we followed Army methodology. The Army did not correct population for those people living in group housing, and neither did we.

12. For the Clarksville-Hopkinsville SMSA, the 1980 Census of Housing reported the median number of persons-per-household for owner-occupied housing units as 2.67, and for renter-occupied housing units as 2.62. To be conservative, i.e., to avoid overstating the number of rental units, we used the figure of 2.67.

13. We agree that adjustment for group living would result in an estimate of 15,426 housing units. However, this figure still excludes vacant rental units and rental units in the three communities for which we were unable to get population information. Estimating vacant rental units by the ratio of vacant rental units to renter-occupied units for the Clarksville-Hopkinsville SMSA, as derived from the 1980 Census, raises the estimate from 15,426 to 17,015 units. The latter figure is fairly close to our estimate of 17,045 and much closer than the Army's estimate of 15,174, as shown in appendix I of the report. It should be noted that this 17,015 estimate fails to take into account any rental housing available in the three communities for which we had no information and thus understates available rental units. Substitution of 17,015 for our present estimate would of course leave our conclusion on the lack of justification for the Fort Campbell housing proposal unaffected.

Moreover, our estimate of 17,045 is conservative when compared with an alternative based upon the 1980 Census of Housing. The 1980 Census of Housing shows that rental housing (renter-occupied and vacant-for-rent) in the Fort Campbell housing market area was at least 17,189 units in 1980. (See appendix II.) Subtracting 10 percent as an inadequacy allowance and allowing for 2-percent-per-year growth (the annual growth rate of multi-unit building permits between 1981 and 1988, net

of permits for destruction and an allowance for incomplete construction) results in an estimate of 18,487 rental units in 1989. This alternative is significantly higher than our estimate in appendix I and reinforces our conclusion about the Army's failure to justify this housing project.

14. The present Army model does not employ conventional supply and demand analysis. In his letter of July 12, 1990 to Chairman Sasser, Secretary of the Army Stone stated the Army will be using our recommendations to improve its model. Earlier, other Army officials had told us the same thing.

15. We cannot fully comment on the lack of any substantively different results from the Army's "experimental" model and those from the one we reviewed in our report because we have seen neither the experimental model nor the comparative results. However, even assuming that the experimental model is acceptable and the comparative results thus far fit DOD's characterization, it would still be worthwhile to use the new model because it would establish a creditable base for projecting housing needs. Moreover, the results might be different at non-tested installations or at tested installations in the future.

16. The U.S. housing market is considered to be generally a highly competitive market with underlying responsive supply and demand conditions. Under such circumstances, a model that has housing prices equating the quantities of housing supplied and demanded would be appropriate.

17. That prices should be operating to eliminate housing deficits or surpluses in the sense of equating the quantities of housing supplied and demanded is directly relevant to the determination of military housing needs. To establish that soldiers may not be able to afford community housing 5 years from now, it is necessary to project prices as a reference point against which projected affordability levels associated with Army grades may be compared. As stated in the report, the projection of prices should be done on the basis of a supply and demand framework in which prices equate the quantities of housing supplied and demanded.

18. We state that a panel of Army experts approved the impact coefficients. In addition, we revised the text to substitute the word "developed" for the words "made up."

19. Data on the military's share of housing at various military installations as well as data on determinants of this share, such as the community's vacancy rate and the size of an installation's housing referral office, should exist, enabling quantitative estimation or confirmation of such coefficients.

20. DOD's defense of the methodology for estimating the coefficients is in sharp contrast to Army's acknowledgment that the coefficients established by the model's authors and Army housing experts have little effect and are therefore to be discontinued.

21. We do not say that there is an interdependency between commuting distance and affordability. What we say is that the Army model assumes maximum affordability levels without taking into account that Army families might be willing to spend more for housing than the affordability limits established by DOD (up to 30 percent above housing allowances) if they can economize on other expenditures such as commuting and traveling to shopping. Any interdependency between commuting distance and Army families' willingness to spend implies an inverse variability between these two factors that does not have to be limited to a DOD ceiling of 30 percent above housing allowances. Soldiers might want to spend more than the DOD ceiling because of savings on such items as commuting costs, easier access to installation schools, and social activities.

22. Recognition that some soldiers prefer to own homes, by incorporating military homeownership into the numerator of the Army's share of housing, does not constitute integration of the homeowner and rental housing markets. Thus the Army's model does not consider such factors as the community's stock of available owned homes and their prices. Our citation of the omission of homeownership in the denominator of the Army's share is just another example of the model's lack of integration of the two markets.

We do not say that the Army erred by only adding military homeowners to the numerator of the Army share without adding them to the denominator of the share. What we say is that while homeownership is taken into account in the numerator, as military owned homes, only rental units are included in the denominator. Since the denominator of the Army share is the community's housing, it should be clear that the omission relates to all available owned homes, not just those owned by the military. If the denominator of the share were corrected to include all

owned homes, then the available community stock of housing would also have to include all owned homes.

Inclusion of owned homes in the denominator would likely decrease the surpluses and increase the deficits obtainable by using the Army's present model. On the other hand, expansion of the community's stock of available housing to include owned homes would increase the surpluses and decrease the deficits obtainable from the Army's model.

23. DOD has incorrectly identified what the Corps and the Army mean by available rental units. In its survey the Corps defines available rental units that military personnel can rent as including renter-occupied as well as vacant units. Moreover, Secretary of the Army Stone in his July 12, 1990, letter to Chairman Sasser refers to the Corps figure, which includes both renter-occupied and vacant units, as "rentals available." Presumably, the Army and Corps of Engineers counted renter-occupied units as available because in the future, certainly within the 5-year projection span of the housing needs determination, these units are potentially available to military families.

24. The Census Bureau supplied us with data that it said excluded all on-post Fort Campbell housing. Subsequently, the Census Bureau revised the data and said that some on-post housing may have been included in the data supplied to us. We corrected the figure in our report to exclude on-post Fort Campbell housing. The discrepancy between the corrected Census figure and the Corps' survey figure is still very wide.

25. The Corps identified 966 public housing units that it deleted from its total number of available rental units. We included such units in our discussion of the Corps' findings. As the Corps itself noted there are military families who are eligible for public housing. DOD elsewhere in its comments has pointed out that most of the military housing shortage reflects the housing needs of lower-income families. Presumably, many of the lower-income military families would be eligible for public housing.

Public housing is in principle not different from, for example, ordinary one bedroom apartments, which are suitable for some military families but not for larger families; yet the latter type of apartments are included in available rental units. Moreover, adjustment of the available rental units by an inadequacy factor of 10 percent in subsequent analysis to determine the existence of a housing shortage, as the Army did in its methodology for justifying the Fort Campbell housing proposal, could

cover this type of situation as well as situations such as an insufficient number of bedrooms and lack of suitable plumbing.

26. We do not state that rental units expanded by the number of building permits. What we say is that the data on building permits would indicate an expansion rather than a contraction of rental housing, contrary to what is implied by the Corps survey. We used the rate of growth in building permit data, after certain adjustments, as an indicator of the rate of growth of rental units to come up with an illustrative comparison with the Corps' data. The rate of growth we used was 2 percent, the same as used for analyzing the Army's justification in appendix I of the report, which is net of permits for destruction and net of an allowance for failure to complete construction. We also note that the Army used a 2-percent rate of growth for its most recent update of Fort Campbell's projected private rental units.

27. Our objective was to evaluate the Corps' rental housing survey, not to explain what is irrelevant or relevant with respect to whether the Army has a housing problem. The objective of the Corps survey was to establish the number of existing rental units, occupied as well as vacant, in the Fort Campbell housing area. In appendix I of the report we evaluate whether Army has justified the need for additional housing at Fort Campbell, and we give our view on what the key methodology should be for determining whether the Army has a housing problem. It is interesting to note that in our suggested methodology the determination of a housing shortage is unaffected by the size of the housing stock.

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Postage & Fees Paid
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