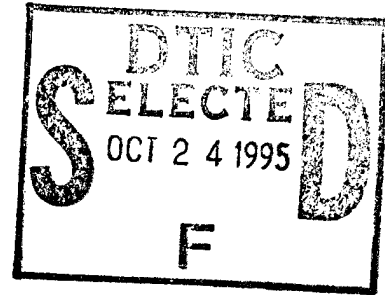


NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



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THESIS

**A COMPARATIVE ANALYSIS OF
MAINTENANCE COSTS FOR NAVY AND
PRIVATELY OWNED HOUSING**

by

Timothy J. Prince

June, 1995

Thesis Co-Advisors: James Fremgen
 William Gates

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PRIVATELY OWNED HOUSING

Timothy J. Prince
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1981


Submitted in partial fulfillment
of the requirements for the degree of

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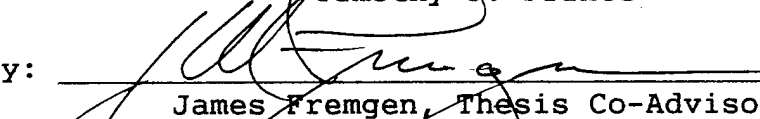
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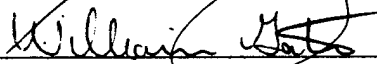


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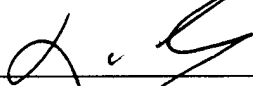
Approved by:



James Fremgen, Thesis Co-Advisor



William Gates, Thesis Co-Advisor



David R. Whipple, Chairman
Department of Systems Management

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ABSTRACT

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The study concludes that Navy housing costs more to maintain than does comparable private sector housing on the Monterey Peninsula. These higher costs are attributed to various Navy policies, as well as to efficiency differences between the Navy and the private sector.

Recommendations to reduce the maintenance costs of Navy family housing are provided. These recommendations include modifying some Navy policies (such as painting and pest control) and privatizing the entire housing maintenance function.

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I. INTRODUCTION

A. BACKGROUND

Quality of Life (QOL) is being emphasized more than ever within the Department of Defense (DoD). In recent testimony before the Senate Armed Services Committee, Secretary of Defense William J. Perry stated he would trade off other things to maintain various QOL proposals in the Fiscal Year (FY) 1996 budget [Ref 1]. Secretary Perry also stated that QOL concerns, of which housing ranks highest, are the key to persuading the best military people to re-enlist [Ref 2]. The Department of the Navy (DoN) emphasizes housing as one of its top QOL issues. OPNAVINST 11101.13J (Assignment and utilization of Navy managed military family housing) states:

The Navy considers housing a premier Quality of Life (QOL) issue. It is the policy of the Navy to provide housing which enhances the Quality of Life of its members and their families. Recognizing the importance of members' and their families QOL, the Navy will take action to provide quality military housing and secure housing in the civilian community meeting this standard. [Ref 3]

Admiral Frank B. Kelso, former Chief of Naval Operations, made his housing stance clear when starting up the "Navy Neighborhoods of Excellence" program:

Recently the Secretary of the Navy, the Commanders in Chief, and I have agreed to establish housing as the Navy's premier Quality of Life issue. We concluded that new quality standards and quality emphasis in all aspects of family housing are needed along with a strategy that accords priority to first, maintenance, repair, and revitalization of existing assets; second, enhanced customer services; and third, limited new acquisition in keeping with our future force size. [Ref 4]

As may well be imagined, this commitment to improved housing has not come without costs. The magnitude of the Navy

housing program is by no means insignificant. There are currently about 92,000 housing units in the Navy inventory. Of this total, the Navy is responsible for approximately 70,000; the Marine Corps assumes responsibility for the remaining 22,000 [Ref 5]. To determine the cost of improving this vast inventory of housing units, one can compare the funds the Navy is presently committing to this issue to the housing funds available in prior years. The FY-94 Family Housing, Navy and Marine Corps (FH,N&MC) Appropriation (which covers both Navy and Marine Corps family housing) [Ref 6] is 32% higher than the corresponding FH,N&MC Appropriation for FY-85 (adjusted to 1994 dollars) [Ref 7].

Concurrently with this increased emphasis on housing quality, the DoD budget has been steadily reduced. The total FY-94 DoD budget [Ref 6] is 34% lower than the FY-85 budget (adjusted to 1994 dollars) [Ref 7]. As a percentage of the total DoD budget, the FH,N&MC Appropriation has doubled to .5% in 1994 from .25% in 1985.

This shifting of resources away from the operational forces to QOL issues, such as family housing, underscores Secretary Perry's view that QOL concerns are directly linked to readiness. With an increasing percentage of the Navy's budget being spent on family housing, it is imperative to ensure the money is being utilized efficiently, especially in these times of heightened cost consciousness.

B. OBJECTIVES

The objective of this thesis is to determine if maintenance being performed on family housing is being accomplished at the lowest reasonable cost. The cost of maintaining the family housing units at the Naval Postgraduate School in Monterey, California will be examined and compared to the cost of maintaining similar housing units in the private sector.

C. RESEARCH QUESTIONS

The primary research question is: Is there a significant difference in maintenance costs between Department of the Navy owned family housing and comparable private sector housing in the Monterey Peninsula area?

Secondary research questions are:

- If the difference is significant, what are the possible causes for the disparity?

- If DoN maintenance costs are in fact higher, what realistic alternatives, if any, exist to reduce the costs of maintaining family housing?

D. SCOPE, LIMITATIONS, AND ASSUMPTIONS

1. Scope

This study will be divided into two major parts. First, a valid and supportable comparison will be developed between the maintenance costs for Navy housing and those of comparable private sector housing. If a significant difference exists, possible causes for the disparity will be presented. Second, if the study shows the Navy maintenance costs to be higher, reasonable alternatives for reducing costs will be analyzed.

2. Limitations

The study will be limited to the Navy housing units at the Naval Postgraduate School in Monterey, California consisting of the La Mesa Village housing complex located off campus as well as the 14 senior officer quarters located on campus grounds. The private sector sample will be limited to housing units in the geographic area around the Naval Postgraduate School, on the Monterey Peninsula. Additionally, due to the difficulty in obtaining extensive private sector maintenance cost data, the study is limited to a single year (i.e., a snapshot of housing costs).

It is not the intent of this thesis to determine if military housing maintenance costs differ appreciably from the private sector in every locale where the DoN manages housing units. However, lessons learned and insights gained from the study may well be extrapolated to fit other housing complexes in different parts of the country.

3. Assumptions

It is assumed that external factors (such as weather, acts of God, etc.) which may affect the quantity of maintenance performed are identical for both target areas (Navy and private sector housing). For instance, severe thunderstorm activity and the associated high wind on the Monterey Peninsula have an equal chance of damaging Navy or private sector housing.

The one year period used for collecting and comparing costs for the Navy is FY-94. The period used in the private sector is calendar year 1994. It is assumed that any cost fluctuations caused by price differences due to this three month offset are insignificant.

E. ORGANIZATION OF THE STUDY

The thesis is divided into five chapters, beginning with this introduction. Chapter II provides a summary of the methods used in executing this study. Chapter III presents the data acquired in the study and compares and analyzes the maintenance costs. Chapter IV will develop some possible cost reduction solutions for Navy family housing. Chapter V summarizes the findings and draws conclusions and recommendations based on the findings.

II. METHODOLOGY

A. NAVY FAMILY HOUSING DATA

1. Collection Method

Maintenance cost data for Navy family housing was obtained from the Naval Postgraduate School Housing Office. Interviews and historical record review sessions conducted with the housing office budget analyst were the primary source of data. Interview sessions were also conducted with the housing manager as well as with other assigned personnel who were involved in maintaining housing units.

Literature review consisted primarily of archival research at the Dudley Knox Library at the Naval Postgraduate School. Various Government Accounting Office reports, student theses, Naval Instructions, and Congressional Budget Office studies were examined. Some family housing specific publications were made available by the La Mesa Village housing manager.

2. Sample Characteristics

The housing areas at the Naval Postgraduate School can be split into two groups, separated by distinct geographical locations. Both housing areas are centrally managed from a single housing office. A third housing area, located at the Presidio of Monterey Annex (formerly Fort Ord), is also available for use by Naval Postgraduate School personnel but obtains its funding from a different source. Because of this funding difference, this area was specifically excluded from the study.

a. La Mesa Village

The first of the two Naval Postgraduate School housing areas is La Mesa Village. This area comprises the bulk of Navy housing at the Naval Postgraduate School. It is located approximately one and a half miles away from the main campus. The village consists of 877 separate family housing

units. The units within La Mesa Village can be further subdivided into four groups: Wherry housing, Capehart housing, 1965 Townhomes, and 1969 Townhomes. These subdivisions are separable by housing style and age. The Wherry units are the oldest of the village units, constructed in the 1950's. This group includes 449 units ranging in size from 811 to 1,622 square feet. The remaining three groups were all constructed in the 1960's. Capehart consists of 150 homes ranging in size from 932 to 1,393 square feet; 1965 Townhomes consist of 142 townhouse type units in the range 1,171 to 1,228 square feet; and 1969 Townhomes are 136 townhouse type units ranging from 1,031 to 1,406 square feet. All units have from two to four bedrooms and have various styles from single family homes to multiplex units. The largest number of connected units under a single roof is eight, in both the 1965 and 1969 Townhome layouts, as well as in one of the Wherry apartment type buildings.

There are no garages in the housing area, although some of the units do possess a carport which is enclosed on three sides. Fireplaces are another feature in some but not all of the homes. Additionally, carpet is laid as a sound dampening tool in second story units where a different family lives on the first floor. La Mesa Village housing units account for over 98% of the Navy housing examined in this study.

b. On-Campus Housing

The second of the two housing areas for this study is the on-campus housing area. This area is located directly on the campus grounds and consists of 14 units built in the 1920's as part of the old Del Monte Hotel. This housing is used as Senior Officer Quarters for personnel assigned to the Naval Postgraduate School, including the Flag Quarters for the school's Superintendent. The Flag Quarters is the largest of the housing units at the Naval Postgraduate School, almost

twice the size of the next largest unit. Because of this size difference and due to the ease with which the operating and maintenance costs for this particular unit can be separated from the rest of the units, it was excluded from the study. The remaining 13 units range in size from 1,825 to 2,082 square feet. These units have detached garages as well as fireplaces. The on-campus housing area accounts for less than 2% of the Navy housing examined in this study.

3. Summary

The following list summarizes the characteristics of the Navy housing units used in this study:

- Number of units ----- 890
- Age ----- 26 to 67 years
- Age (La Mesa Village only) --- 26 to 43 years
- Floor area ----- 811 to 2,082 square feet
- Floor area (La Mesa Village only) - 811 to 1,622 square feet

B. PRIVATE SECTOR HOUSING DATA

1. Collection Method

Maintenance cost data for private sector housing was obtained exclusively through interviews with property management firms on the Monterey Peninsula. A total of seven firms provided maintenance cost data. The method used to provide data was largely a function of the record keeping used by the individual firms. Some firms were capable of totalling all accounts for all managed properties, with the assistance of a management software program. Others could total the accounts for individual properties but could not total identical accounts between different properties. At five of these firms, data for all types of maintenance and repair work was obtained by reviewing annual expense records for

individual properties. The remaining two firms provided end-of-year totals in the various maintenance and repair categories for all the properties managed.

2. Sample Characteristics

Private sector cost data was obtained for 335 separate single family housing units. In order to ensure comparability with the Navy housing units and provide a reasonable sample size, various bounds were set on housing characteristics. Floor area was bounded between a minimum of 500 square feet and a maximum of 2000 square feet. This compares favorably with the Navy housing floor area range of 811 to 2,082 square feet. The age of the private sector units ranged from 15 to 50 years. Additionally, the 335 units include a mixture of detached single family homes and multiplex structures, with the maximum number of housing units in one building under a single roof (townhouse or apartment type arrangement) being six units.

Large apartment complexes (with ten or more units per building) were specifically excluded from the study, as they are fundamentally different from the Navy housing on the Monterey Peninsula. All properties included in the study were used as the primary residence by the occupant. Vacation homes, beach rentals, etc., were specifically excluded due to the excessively high turnover rates in these properties. With a high turnover rate, occupants do not acquire the feeling of property rights. This lack of property rights may lead to neglect for the property by the occupants and may result in significantly higher maintenance costs.

III. COMPARISON AND ANALYSIS OF MAINTENANCE COSTS

A. MAINTENANCE COST DATA

1. Navy Family Housing

Funding for Navy Family Housing at the Naval Postgraduate School is provided by the Naval Facilities Engineering Command, Southwest Division, located in San Diego, California. Funding is passed to the housing office via various budget programs (BP's). These BP's cover broad areas such as management, services, maintenance, etc. Funds can be shifted between BP's only with permission from Southwest Division. The BP's are then further subdivided into numerous budget line codes (BLC's), which more specifically define the use of the funds. Examples of some BLC's are police protection, street cleaning, painting, etc.

BLC's for FY-94 were examined to determine which cost items could be directly traced to maintaining the housing units. Some of the BLC's chosen actually come out of the BP funds which are designated for operations, but realistically contribute to maintaining the units. A total of 11 cost items were chosen. These cost items, along with a brief description of the costs applied to each, are as follows [Ref 8]:

- **Pest Management (BLC A2D):** Pest control at the Naval Postgraduate School is accomplished via a service contract. Costs in this category include preventing pest infestation in the housing units as well as preventing structural pests and those which require area wide control or are a hazard to control. Termites typically fall into this category.
- **Maintenance/Repair - Equipment (BLC A3E):** This is the appliance repair category. It includes costs for repairing, inspecting, and maintaining Government owned household equipment which is not considered a part of the housing unit itself. Examples of such equipment include cooking stoves, refrigerators, etc. Essentially, free standing type appliances which

require minimal hookup to the housing unit are included in this category.

- **Replacement - Equipment (BLC A3F):** This is the appliance replacement category. It includes the acquisition of the household equipment mentioned in the previous category.
- **Service Calls (BLC D1A):** This includes costs of minor service calls from the housing occupants, as well as emergency and temporary repairs (not to exceed 16 man hours per job). This category includes a variety of minor maintenance accomplished inside and outside (within five feet of) the housing unit, such as plumbing, electrical work and installation of permanent equipment such as water heaters, garbage disposals, etc.
- **Routine Maintenance (BLC D1B):** Maintenance scheduled annually or more frequently (defined as seasonally for the Naval Postgraduate School) is included in this cost item. Examples of work included in this category would be changing furnace filters, cleaning gutters and downspouts, and preventive maintenance on furnaces, water heaters, and air conditioners. The cost of carpet cleaning or replacement which is not performed during a change of occupancy would also be included here.
- **Change of Occupancy (BLC D1C):** All costs associated with a change of occupancy are included here. Again, as with the service calls, a variety of maintenance could be included such as plumbing, electrical, cabinet repair, etc. Carpet cleaning or replacement during a change of occupancy period would also be included. Interior and exterior painting is specifically excluded.
- **Self-Help (BLC D1D):** This category includes costs of all repair material items issued through the self-help store. Also included are the costs associated with the purchase, maintenance, and repair of self-help equipment used for grounds care such as lawn mowers and weed eaters and costs of consumable yard care products (grass seed, fertilizer, etc.). Labor costs of the personnel assigned to operate the self-help store are also included in this category.
- **Minor Repairs and Replacements (BLC D1E):** This category includes repair, rehabilitation (exclusive of

any improvements, alterations, or additions), and replacement of structural components and installed equipment, not identified as routine maintenance and not requiring more than 80 man hours per unit for accomplishment.

- **Exterior Painting (BLC D1F):** Costs of exterior painting and the necessary preparation prior to painting housing units, carports, and garages would be included in this cost item. Costs of exterior painting accomplished as part of routine maintenance or minor repairs and replacements would also be included in this category.
- **Interior Painting (BLC D1H):** Costs of interior painting and the necessary preparation prior to painting housing units, including common spaces in multiple unit buildings, would be included in this cost item. As with external painting, costs of interior painting accomplished as part of routine maintenance or minor repairs and replacements would also be included in this category.
- **Grounds (BLC D3A):** This category includes the costs of maintenance, care, and repair of grounds, both improved and unimproved, storm sewers, and drainage structures associated with family housing and on the family housing plant account. Costs associated with the purchase, maintenance, and repair of self-help equipment used for grounds care, such as lawn mowers and weed eaters, are specifically excluded from this category.

The total cost for each of these cost items for FY-94 is presented in Table 1. These totals also include funds which were used to maintain the Flag Quarters, as these funds are not easily separable at this point in the study.

Cost Item		Total
Pest Control		\$64,168
Appliance Repair		\$48,264
Appliance Replacement		\$328,627
Service Calls		\$30,819
Routine Maintenance		\$516,706
Change of Occupancy		\$367,084
Self Help		\$97,463
Repairs/Replace		\$378,230
Painting (Ext)		\$18,128
Painting (Int)		\$148,817
Grounds		\$232,747
Total		\$2,231,053

Table 1. FY-94 Navy Family Housing
Maintenance Cost Data (Totals in Dollars)

2. Private Sector Housing

The seven property management firms supplying data for the study each tracked maintenance expenses in a slightly different manner. Methods used were largely a function of the preferred management style of the individual firms; however, property owner desires played a role as well. Some owners preferred more detail on the breakdown of their expenses than did others. Generally, two methods were used by the firms to conduct maintenance on the properties as well as to track expenses for the property owners.

The first method provided the fewest details. Firms utilizing this method used a single maintenance firm (or handyman) for essentially all types of maintenance on all properties under their management. If a certain job was

beyond the expertise of the handyman, a specialist repairman (plumber, electrician, etc.) would be called. Three of the firms utilized this method of maintenance.

The second method of tracking maintenance costs provided more detail than the first. These firms used specialty repairmen for all types of maintenance. As a consequence, these firms had many different expense accounts covering many different categories of maintenance. The remaining four firms fell into this category.

After examining the calendar year 1994 expenses for all seven firms, the expense accounts were consolidated into ten cost item categories. These cost items, along with a brief description of the type of costs applied to each, are as follows:

- **Pest Control:** This category includes costs associated with termite prevention/inspections as well as the cost of a regular preventive pest spraying which only one of the 335 properties had accomplished on a regular basis. In general, pest control was considered an occupant vice an owner responsibility, with the exception of pests which could cause some structural damage to the housing unit, such as termites.
- **Appliance Repair:** Costs of maintaining and repairing household appliances which are included with the housing unit, such as refrigerators and dishwashers. A portion of these costs may be included in the general repairs category due to handyman repair.
- **Appliance Replacement:** All appliance replacement costs are included as part of this cost item. As with the appliance repair category, the costs of all installed appliances which are included with the housing unit are included in this category.
- **General Repairs:** This category includes the expenses paid to the various handymen for the management firms which utilized them. All different types of repairs could be included in this category (plumbing, electrical, touch-up painting, etc.). Specifically excluded from this cost item would be any costs for grounds care, appliance replacements, and pest control.

- **Plumbing:** Maintenance costs associated with the repair and replacement of internal piping and connections, fixtures and faucets, toilets, etc. are included in this category. Some plumbing costs are covered under the general repair category.
- **Electrical:** This category includes costs associated with the repair and replacement of the housing unit's electrical items such as internal wiring, lighting fixtures, circuit breakers, etc.
- **Carpets/Floors:** Included in this category would be costs associated with cleaning, repairing, and replacing carpets, floor coverings, tiles, etc.
- **Miscellaneous Repairs:** This cost item would include minor maintenance and repair costs to the housing units not classified as any other cost item, including locksmith services, window and screen repairs, chimney repairs, carpentry, etc.
- **Painting:** This category includes the costs associated with both internal and external painting and preservation of the housing units, including all preparation, materials, etc. specifically paid to painters. Some minor painting costs (for example touch-up painting accomplished in a vacant unit between tenants) may be included under the general repairs category and would be excluded from this category.
- **Grounds:** Expenses paid to gardeners or lawn service firms for landscape work, lawn care, tree services, grounds keeping, etc. would be included in this category.

The total cost in calendar year 1994, by firm, for each of these ten cost items is presented in Table 2.

Cost Item	Firm #1 26 Units	Firm #2 115 Units	Firm #3 96 Units	Firm #4 10 Units	Firm #5 5 Units	Firm #6 5 Units	Firm #7 78 Units	Totals 335 Units
Pest Control		\$2,069	\$2,593	\$1,685	\$147	\$125		\$2,194
Appliance Repair		\$948			\$612	\$310	\$1,447	\$7,130
Appliance Replacement	\$4,538	\$8,887	\$31,701					\$14,037
General Repairs		\$48,796	\$20,256	\$4,042	\$806	\$2,306	\$58,152	\$138,649
Plumbing	\$3,824	\$2,877	\$9,914	\$273	\$893	\$166	\$1,602	\$35,713
Electrical			\$6,717	\$970	\$1,273	\$245	\$2,570	\$11,246
Carpets/Floors		\$2,650		\$2,286	\$2,159	\$1,781	\$3,179	\$14,425
Misc Repairs	\$18,435	\$12,177	\$35,875	\$580	\$885		\$1,080	\$40,017
Painting	\$2,910	\$2,715	\$27,900	\$988	\$936	\$385		\$44,045
Grounds	\$6,815	\$5,034					\$12,378	\$54,436
Totals	\$36,522	\$86,153	\$134,956	\$10,824	\$7,711	\$5,318	\$80,408	\$361,892

Table 2. CY-94 Private Sector Cost Data (Totals in Dollars)

A significant private sector maintenance cost was specifically excluded from the study. In general, the property management firms paid for a cleaning service to clean the units after they were vacated by the tenants. This is a cost that the Navy specifically avoids by having the occupants clean the house to certain standards prior to vacating. The private sector is willing to incur this particular cost as the professionally cleaned units tend to present a better appearance to prospective tenants.

3. Cost Item Consolidation

Obvious dissimilarities exist between the cost items for Navy housing and the private sector. Some cost items are relatively comparable while others are not. In an effort to provide comparability between the two areas, it was necessary to combine certain cost items. This combination attempted to group similar costs together to provide a basis for comparison, yet keep enough individual cost items so as to ensure the comparison was a meaningful one.

The cost consolidation resulted in six cost items to use as a basis for comparing costs. These cost items, along with a brief description are as follows:

- **Appliance Repair:** The appliance repair cost items from each data set.
- **Appliance Replacement:** The appliance replacement cost items from each data set.
- **Painting:** The painting cost item from the private sector data and the internal and external painting items from the Navy housing data.
- **Grounds:** The grounds cost item from each data set.
- **Pest Control:** The Pest control cost item from each data set.
- **All Other Maintenance:** The general repairs, plumbing, electrical, miscellaneous repairs, and carpets/floors cost items from the private sector data. The service

calls, routine maintenance, change of occupancy, self help, and repairs and replacements cost items from the Navy housing data.

Totals for the consolidated cost items for both data sets are presented in Table 3.

Cost Item	Navy 891 Units	Private 335 Units
Appliance Repair	\$48,264	\$7,130
Appliance Replacement	\$328,627	\$14,037
Painting	\$166,945	\$44,045
Grounds	\$228,681	\$54,436
Pest Control	\$64,168	\$2,194
All Other Maintenance	\$1,373,687	\$240,050
Grand Totals	\$2,210,372	\$361,892

Table 3. Cost Item Comparison (Dollars)

4. Adjustments to Navy Housing Costs

A portion of the costs presented in Table 3 must be deducted prior to proceeding further with the study. These costs include the cost of maintaining the Flag Quarters, as well as certain costs reimbursed to the Government by the housing occupants.

a. Flag Quarters

OPNAVINST 11101.19D (Management of Flag and General Officer Quarters (F&GOQs)) states:

Because of their age, size, and in many cases status on the National Register of Historic Places, flag quarters have been the highest-cost family housing units in the Navy inventory. These costs, together with the visibility of the residents, have caused them to be highly scrutinized by all levels of review. The restrictive criteria for replacing the units with new construction make it imperative the Navy operate and maintain the units in a manner that allows long-term retention. [Ref 9]

This instruction requires preparing a quarterly summary cost report, which separates the operating and maintenance costs for these quarters from the rest of the housing account. For FY-94, maintenance funds spent on the Flag Quarters at the Naval Postgraduate School totalled \$19,423. Of this total, \$15,357 comes from the All Other Maintenance category, with the remaining \$4,066 coming from the Grounds category.

b. Tenant Reimbursables

Money paid by the housing tenants to the Government for maintenance items must also be subtracted from the Navy totals in Table 3. As in the private sector, Navy housing tenants have certain responsibilities in maintaining the housing units. The tenant is responsible for returning the housing unit to the Navy in the condition that existed upon check-in (except for normal wear and tear). This comparison is accomplished by an inspection upon check-in and check-out. The tenants are held responsible for correcting, repairing, or

replacing any item damaged by negligence or misuse. In many cases, this is done by reimbursing the government for the cost of repairs to the housing units necessitated by negligence. In FY-94, tenants reimbursed the government a total of \$1,258 for such things as broken windows, torn screens, wall damage, etc. These tenant reimbursables were subtracted from the all-other-maintenance category. No adjustment was required to the private sector data since damage caused by tenants was either paid for directly by the tenant or deducted from the tenant security deposit. Either way, the transaction did not appear on the landlord's expense accounts.

Table 4 presents the total maintenance costs for the Navy (less the cost of the Flag Quarters and tenant reimbursables) and private sector which were used in the study.

Cost Item	Navy 890 Units	Private 335 Units
Appliance Repair	\$48,264	\$7,130
Appliance Replacement	\$328,627	\$14,037
Painting	\$166,945	\$44,045
Grounds	\$224,615	\$54,436
Pest Control	\$64,168	\$2,194
All Other Maintenance	\$1,357,072	\$240,050
Total	\$2,189,691	\$361,892

Table 4. Cost Item Comparison (Dollars)

B. COMPARISON OF COSTS

The total costs from Table 4 were divided by the number of housing units from each area to obtain a cost per housing unit for each of the six cost items. These unit costs are displayed in Table 5.

Cost Item	Navy 890 Units	Private 335 Units
Appliance Repair	\$54	\$21
Appliance Replacement	\$369	\$42
Painting	\$188	\$131
Grounds	\$252	\$162
Pest Control	\$72	\$7
All Other Maintenance	\$1,525	\$717
Total	\$2,460	\$1,080

Table 5. Unit Cost Comparison (Dollars/Unit)

This table shows that the per unit cost for the Navy is higher than the private sector in each category.

1. Appliance Repair

The appliance repair category shows the Navy costs higher than the private sector costs by a factor of 2.6 and an actual amount of 33 dollars per unit (54 dollars compared to 21 dollars). Labor rates for the Navy compare reasonably well with those in the private sector. This item had an average labor rate in the Navy of approximately 26 dollars per hour. The property management firms were typically offered a business labor rate (as compared to a residence labor rate)

from appliance repair firms. This rate ranged from 20 to 30 dollars per hour. This rate was significantly less than the residential labor rates offered by most appliance repair firms on the Monterey Peninsula, which ranged from about 20 dollars per hour up to as much as 75 dollars per hour.

The disparity in this category is probably best explained by one of two reasons. First, the Navy typically supplies more appliances than the private sector. A typical rental home in the private sector comes equipped with a cooking range and oven as well as a dishwasher. Refrigerators are occasionally supplied, but they are the exception rather than the norm. The Navy typically supplies the same appliances as listed for the private sector but will also supply refrigerators on demand. At the Naval Postgraduate School, approximately 790 units (or 89 percent of the total) are equipped with Navy supplied refrigerators. Since a typical Navy housing unit possesses more landlord-supplied appliances than the typical private sector unit, the cost per unit to repair those appliances should be larger for the Navy.

The second possible reason for the disparity lies in the documentation of costs for the private sector. Some of the appliances in the private sector were repaired by handymen. These appliance repair costs are hidden in the general repairs category. This would cause the appliance repair category for the private sector to be understated and the general repairs category to be overstated.

2. Appliance Replacement

The appliance replacement category shows the Navy costs higher than the private sector costs by a factor of 8.8 and an actual amount of 327 dollars per unit (369 dollars compared to 42 dollars). Although the labor costs make up a very small percentage of this total, the labor rates between the two areas compare reasonably well. The average labor rate for the Navy in this category was approximately 23 dollars per hour.

The private sector labor rates in this category were identical to those listed in the appliance repair category (ranging from 20 to 30 dollars per hour), as the management firms typically used the same appliance services for repairs and replacements.

This category had one of the largest disparities of the six categories chosen. Some of the difference can be explained by applying the same logic as used for the appliance repair category. Since the Navy supplies more appliances per unit, the replacement cost per unit would be expected to be higher. However this reason probably does not explain the entire difference.

The most reasonable explanation for the difference probably lies in the Navy's Neighborhoods of Excellence (NOE) program. FY-94 marked the first year funding was available to implement various NOE reforms. Appliances were a very visible item which could provide a quick impact for the program. The housing management branch head of the Naval Facilities Engineering Command, Southwest Division discussed this in a memo to his various housing directors:

In general, our inventory of appliances is old and not energy efficient. You should have on your desk now the specifications for what new appliances you will need and by 1 October you should have the supply chits cut to submit as soon as FY-94 money comes in. If you have not done this you are behind the power curve. You are authorized to buy refrigerators which are big enough for our modern families i.e. 20 cubic foot or greater. They can have ice makers. They do not have to be off the GSA schedules. You can now provide microwaves. They can be the installed type or you can put one in each unit or you can establish a pool for check out for those families that need them. Stoves need to be upgraded to include self cleaning ovens. We should not have one single cheap Sunray stove left in the inventory by the end of FY-95 or shame on us. [Ref 10]

This NOE effect can be clearly seen by examining the spending in this category in the years prior to the NOE program. Looking at a five year trend in this category at the Naval Postgraduate School, the first four years (FY-90 thru FY-93) show fairly stable expenditures. The most recent year (FY-94) shows a large spike in spending. Figure 1 provides a graph of the five year annual totals in this category.

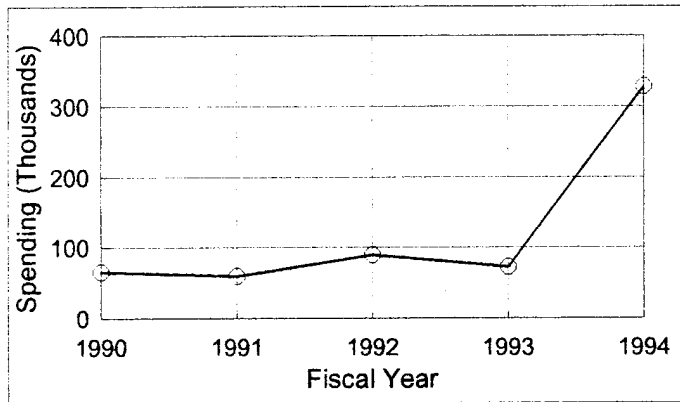


Figure 1. Appliance Replacement Spending

The totals in Figure 1 have all been adjusted to 1994 dollars, using the consumer price index for household furnishings and operation. A straight average of the first four years before the NOE program yields an average annual cost for appliance replacement of 72,062 dollars, which translates to 81 dollars per unit. This compares more favorably with the CY-94 private sector figure of 42 dollars per unit. It is not unreasonable to assume that the additional 288 dollars per unit (369 minus 81) spent by the Navy in FY-94 can be attributed to the NOE "plus up" in this category. Since no equivalent "upgrade" money existed in the

private sector in CY-94, significantly less was spent in this category.

3. Painting

The painting category shows the Navy costs higher than the private sector costs by a factor of 1.4 and an actual amount of 57 dollars per unit (188 dollars compared to 131 dollars). This difference can probably best be explained by examining the Navy's painting policy. The Navy's policy is to paint the interior of a housing unit every four years (or more often if needed) and the exterior on an as-needed basis. This policy results in a fresh coat of interior paint for every other tenant. The private sector has no set policy or time limits for repainting but operates strictly on an as-required basis. The property managers in this study felt that "as required" could be translated to a range of six to eight years, somewhat less often than the Navy program. This painting program is supplemented by minor touch up painting between complete room repaintings. As expected, more frequent painting leads to a higher Navy cost per unit in this category.

4. Grounds

The grounds category shows the Navy costs higher than the private sector by a factor of 1.6 and an actual amount of 90 dollars per unit (252 dollars compared to 162 dollars). In this study, there was limited private sector use of a gardener or lawn service to maintain the rental properties. Some of the owners used a year round lawn service or gardener, but the majority of the owners left the groundskeeping chores to the occupants. Additionally, some of the property owners who maintained their own residences on the Monterey Peninsula also maintained the grounds for their rental property. Although this was a cost to the owners (in terms of the opportunity cost of time), it was not a measurable monetary cost that showed up on the expense sheet for the property. Most of the

grounds expense for the private sector came from the small multiplex units (with the townhouse or apartment type of layouts) whose grounds were the common grounds of the entire complex.

This policy compares favorably with the Navy treatment of groundskeeping. Occupants living in individual single family homes with distinguishable property boundaries are responsible for maintaining their yards to a specific set of grounds maintenance standards published by the housing office. Specific exceptions listed in these standards are common grounds areas and maintenance of trees with a height in excess of 15 feet. Common areas can be defined as areas which can not be readily identified with a specific residence due to location or indistinguishable property boundaries. Examples of common areas would be the area in between and surrounding the multiplex units (with the townhouse and apartment type layout). The tree maintenance restriction applies to all trees in the housing area, both on common grounds areas and within a single unit's yard.

Since the housing area grounds encompass an entire neighborhood and not just the grounds immediately surrounding the housing units, as in the private sector, the argument can be made that the quantity of common grounds area per unit is larger for the Navy than for the private sector. The difference in unit cost for the groundskeeping category can probably be attributed largely to this larger quantity of common grounds per unit.

5. Pest Control

The pest control category shows the Navy's costs higher than the private sector by a factor of 10.3 and an actual amount of 65 dollars per unit (72 dollars compared to 7 dollars).

This difference is probably best explained by the different attitudes toward pest control displayed by the

landlords for the two areas. Both are rightly concerned with pests which can cause structural damage to the housing unit (termites, for example). Both are willing to incur the cost of preventing these types of pests. Here the similarity in attitudes ends. Pest infestations (cockroaches or ants, for example) in the private sector are considered strictly an occupant's responsibility. Unless discovered during a change in occupancy, the property owner would typically not pay for any exterminator services for these types of pests.

The Navy policy, however, is to divide pest control responsibility into three categories. First, certain pest problems are solely the responsibility of the occupant. These would include those types of pests which are normal to maintaining a home and are readily disposed of with commercially available products. The most effective means of controlling these types of pests would be a routine sanitation program by the occupant. Stray ants looking for food or water would fall into this category.

The second category in the Navy policy is that of dual responsibility pests. Occupants should attempt initial control of these pests before requesting intervention from the housing authorities. Prior to intervening, the Navy sends an inspector to verify the pest problem. Following verification, the Navy arranges for a contractor to visit the residence in an attempt to control the pest problem. Pests from the occupant responsibility category which get out of control and result in infestations (such as ant and cockroach infestations) would be the main component of this category. This category marks the largest difference from the private sector and is where the Navy incurs the additional costs.

The third category in the Navy policy is the structural pest category. As expected, the Navy assumes sole responsibility for pests in this category, as do the landlords in the private sector. Since the Navy is willing to incur

more costs in the pest control category to maintain the service members' quality of life, the difference in unit costs from the private sector should come as no surprise.

6. All-Other-Maintenance

The all-other-maintenance category shows the Navy costs higher than the private sector costs by a factor of 2.1 and an actual amount of 808 dollars per unit (1,525 dollars compared to 717 dollars). Of all six categories, this category shows the largest absolute (but not relative) magnitude of difference between the Navy and the private sector. There are four possible explanations for the disparity in this final category.

The first possible explanation is some type of an NOE upgrade component within this category, similar to the phenomenon observed in appliance replacements. The item that stands out with a large increase in funding within this category is the self-help store. The self-help store can be considered part of the NOE program in that it helps to create a sense of ownership in the housing unit as well as the community. A total of 97,463 dollars was spent on the self-help store in FY-94. This total was 23 times larger than the next largest annual total (adjusted to 1994 dollars), which occurred in FY-91 (4,182 dollars). A large portion of this increase was due to a different method of accounting for the labor costs incurred by the self-help store. Prior to FY-94 the labor costs were accounted for under the management budget program instead of the self-help account. Labor costs for this category in FY-94 totalled 56,295 dollars. Subtracting this amount from the total results in a revised total of 41,168 dollars spent in this category, which is still ten times larger than the FY-91 amount.

This increase would account for some but not all of the difference from the comparable private sector unit cost. Additionally, this increase is somewhat mitigated by a

corresponding decrease in the service calls sub-category. From FY-93 to FY-94, the total spent on service calls decreased by approximately 40,000 dollars. If one assumes that the increased emphasis on self-help resulted in occupants conducting more minor maintenance for themselves, then the increase seen in the self-help sub-category is partially offset by the decrease in the service calls sub-category. Either way, this explanation by itself does not sufficiently explain the magnitude of the difference between the Navy and the private sector.

The second possible explanation lies in the quantity of maintenance conducted. Assuming uniform quality of maintenance work between the Navy and private sector, the Navy must be conducting a larger quantity of maintenance. Supporting this explanation would be the higher occupant turnover rate in Navy housing. In FY-94, at the Naval Postgraduate School, an average of 470 units had a change of occupancy [Ref 11]. This equates to an approximate turnover rate of 53% for the pool of 890 units. Although not tracked specifically by the property managers, the turnover rate in the private sector was felt to be significantly less than 50%, somewhere in the range of 20 to 30%. This higher turnover rate would result in a somewhat larger quantity of maintenance conducted per unit in Navy housing, but probably not enough to account for the magnitude of the difference seen.

A third possible explanation, assuming a near constant quantity of maintenance per unit, is that the Navy maintains a higher quality housing unit than does the private sector. Maintaining the housing unit to a higher quality standard would translate into higher costs. Measuring a difference in quality between the two areas (much less trying to quantify that difference) is a difficult task. Since the occupants of the housing units in both areas can move elsewhere if the quality does not meet their expectations (the Navy does not

require its service members to live in Navy housing), it is probably not unreasonable to assume that any differences in quality between the two areas is insignificant. The possible explanation of higher quality housing is invalidated by this assumption.

A final explanation for the disparity, assuming that the quality and quantity of maintenance are approximately the same, is that the Navy conducts its maintenance tasks less efficiently than does the private sector. This explanation is probably the most reasonable of the four, if for no other reason than the profit versus the nonprofit argument. In the private sector, property managers are under no obligation to a particular maintenance firm, but are obligated to their owners to maintain the housing units at the highest quality level for the lowest possible cost, thus maximizing the owner's profit. Likewise, the maintenance firms, which earn their livelihood from the work they conduct, feel an obligation to the property manager to perform high quality work at the lowest possible cost in order to maximize their chance of performing additional work on other managed properties.

Conversely, the Navy uses the same firm of maintenance workers (supplied by the Public Works Department) for all maintenance conducted on the housing units. This firm receives all the work the Navy has to offer, regardless of the quality of work performed. No incentives exist for the maintenance workers to improve the efficiency with which they accomplish their work, since they have a monopoly in the Navy housing area.

IV. COST REDUCTION SOLUTIONS

The previous chapter demonstrated that annual Navy housing maintenance costs are higher than comparable maintenance costs in the private sector. The question remains as to what, if anything, can be done to reduce the costs incurred by the Navy to maintain its family housing? Three possible solutions are presented for consideration. These solutions are presented in order of simplicity, with the easiest solution to implement being presented first. First, the effects of increasing the occupant's use of the self-help facility will be examined. Next, policies adopted by the Navy which contribute to higher costs will be reviewed for potential savings. Finally, privatizing the Navy housing maintenance program will be examined for potential savings.

A. SELF-HELP STORE

The self-help store for Naval Postgraduate School family housing can best be described as a small neighborhood hardware store. Occupants can use the self-help store to obtain all manner of materials for minor household repairs. Examples of available repair items are plumbing materials (washers, fixtures, shower nozzles, etc.), screening material for screen window repair, electric wall switches and cover plates, spackling, fluorescent light bulbs, etc. Since the self-help store is physically located in the building which houses repair materials for the regular public works repair personnel, any item available to the repair personnel is also available for the occupants.

Additionally, the self-help store provides a pool of yard care materials and equipment. Examples range from gasoline powered lawn mowers and weed eaters to hedgers and lawn edgers. Yard care consumable products such as fertilizer, grass seed, and potting soil are also available. Housing occupants use this portion of the store most heavily.

An average of 60 to 80 customers use the self-help store each day. The usage is weather dependent. There is a drop in usage during inclement weather periods and an increase on days of exceptionally good weather (up to as many as 130 customers per day). This observation tends to support the fact that yard care equipment is the self-help store's biggest draw.

The published information regarding the self-help store consists of a single paragraph in the public quarters brochure, a housing handbook which is distributed to each occupant as part of the standard check-in procedure. This brochure states:

A self-help store is located above the tennis courts in building 187. Hours of operation are Monday through Saturday 0800 - 1200 and 1300 - 1600. Items available are gardening tools, lawn mowers, etc. Manual equipment may be checked out for a maximum of 72 hours. Electrical equipment and power mowers for a maximum of 24 hours. Items should be returned in the same condition in which they were checked out. The occupant will be held accountable for the condition of these items. Grass seed and fertilizer furnished to occupants of La Mesa Village is considered a supplement only and occupants are expected to purchase grass seed and/or fertilizer when not available from self-help. [Ref 12]

No mention of the self-help store's maintenance capabilities appears in the brochure. This may be due to the housing management staff's attitude towards maintenance. The occupants (vis-a-vis the self-help store) are not required or relied on to conduct any maintenance whatsoever within the housing unit (with the exception of normal housekeeping and cleaning chores). Any work accomplished by the occupants is considered a savings and is not figured into budget calculations.

Making the occupants more aware of the self-help store's capabilities would probably generate some savings to the Navy,

although an exact amount would be difficult to measure or estimate. Every maintenance job performed by an occupant would transfer the cost of materials from the current budget line code (such as routine maintenance, service calls, etc.) to the self-help budget line code, and simply do away with the labor cost for that particular job. This assumes that the labor cost is variable to some significant degree. For instance, if the cost of those repairmen salaries would still be paid by the public works department, the savings would be seen by the housing accounts but not by the Navy as a whole.

Time savings is the major incentive for the occupants to complete minor repairs themselves. The normal time to complete routine maintenance in Navy family housing (as advertised in the public quarters brochure) is five calendar days following notification. By conducting the work themselves, occupants could respond within one day. Total repair time would be the total of the time that it takes to draw materials from the self-help store plus the time required to accomplish the work. The major incentive for the government to encourage the occupants to conduct minor repairs (other than the savings) is to foster a sense of property ownership.

One facility (NAS Pensacola) attempts to get the most out of its self-help store by offering various do-it-yourself classes to the occupants, via a program called the Self-Help Academy. Service members and spouses are taught basic household repairs, such as how to change air conditioning filters and reset garbage disposals, how to conduct routine maintenance on all supplied appliances, faucets and toilets, and how to care for carpets, tiles and floors. The NAS Pensacola housing director states that the Self-Help Academy is "a double sided benefit. With proper maintenance, the life of household appliances and systems is extended and fewer

service calls are required, providing quite a cost savings in these budget conscious times." [Ref 13]

B. NAVY POLICY

Some portion of the additional maintenance expense incurred by the Navy can be attributed to different maintenance policies between the Navy and the private sector. Each cost category will be examined for policy differences which lead to higher costs.

1. Appliance Repair

As stated in the previous chapter, the Navy typically supplies three major household appliances per unit, as compared to two appliances per unit in the private sector. Making the broad assumption that the annual cost to repair each type of appliance is approximately the same, an average annual repair cost per appliance can be calculated by dividing the unit cost from Table 5 by the number of appliances supplied per unit. This results in a cost of 18 dollars per appliance for the Navy and 10.5 dollars per appliance for the private sector. These numbers imply that the Navy could save approximately 18 dollars per unit each year (for a total of 16,020 dollars) in appliance repair costs by not supplying refrigerators. Having a landlord supplied refrigerator is probably a significant QOL concern for most Navy housing families (as observed by the high rate of refrigerator use in La Mesa Village). So the Navy may be willing to incur this additional cost on the basis of QOL concerns alone.

2. Appliance Replacement

The logic for reducing appliance replacement costs follows that used in the appliance repair category. Since the Table 5 value for the Navy represents an abnormally high appliance acquisition rate (due to the NOE program), the value of 81 dollars per unit (the pre-NOE unit cost) derived in the previous chapter will be used. Data taken from 1994 consumer price guides indicate that the retail price range for

refrigerators is roughly two times the retail price range of the other two appliances (ranges and dishwashers) [Ref 14]. Using this data, an average annual replacement cost per appliance can be calculated. Modifying the calculation from the previous section (due to the price differences between the different types of appliances) results in a replacement cost of 40.5 dollars per refrigerator and 20 dollars per dishwasher/range. The private sector cost per appliance is 21 dollars per dishwasher/range. As above, this would imply that the Navy could save approximately 40 dollars per unit in annual appliance replacement costs by choosing not to supply refrigerators.

Supplying fewer appliances per housing unit is obviously not the direction in which the Navy is currently moving, as shown by the Naval Facilities Engineering Command, Southwest Division memo cited previously. In fact, bigger refrigerators as well as microwave ovens are currently authorized for acquisition. Although savings could be realized by supplying fewer appliances per unit, changing this policy would be incompatible with the high priority the Navy has given to QOL.

3. Painting

The painting category clearly demonstrates higher costs as a result of policy differences. Table 5 shows a Navy painting cost of 188 dollars per unit (based on a policy which calls for repainting every four years) and a private sector painting cost of 131 dollars per unit (with repainting approximately every six to eight years). If the Navy were to reduce the frequency of painting by half (repainting every eight years), the associated cost should decrease to approximately 94 dollars per unit. Likewise, if the frequency were reduced to once every six years, the associated cost should decrease to 125 dollars per unit. A more realistic policy may be to shift to an as-needed basis rather than holding to a rigid time limit. Occupants turn over frequently

enough to ensure repainting would not be required while a housing unit is occupied. Painting is probably less of a QOL issue than appliances, since the Navy states that painting is accomplished for the protection of the finish only, not for beautification. Thus, there may be some potential savings in this category.

4. Grounds

As stated in the previous chapter, the cost differential observed in this category (252 dollars per unit for the Navy compared to 162 dollars per unit for the private sector) can be attributed to the difference in the amount of common grounds per unit. Navy policy in this category does not differ appreciably from that in the private sector, in that landlords in both data sets emphasize the upkeep of common grounds. Reducing funds for groundskeeping would translate into less care for common areas and probably result in an unkempt appearance of the entire housing complex. Since policy can not dictate the quantity of common areas in the neighborhood, there are realistically no policy change savings in this category.

5. Pest Control

The difference in unit costs in the pest control category can also be attributed to Navy policy. As previously stated, the Navy chooses to cover the costs of exterminating out-of-control pests as well as pests hazardous to the housing structure. The Navy could significantly reduce costs in this category simply by limiting the pest control services provided and requiring occupants to contract individually with exterminators. However, as noted in the appliance categories, pest control can probably be considered a significant QOL issue; the Navy may choose to incur these additional costs because of QOL concerns alone.

6. All-Other-Maintenance

The only additional cost incurred by the Navy as a result of policy differences in the all-other-maintenance category is the cost attributable to the self-help store. The private sector has nothing comparable to the self-help store, where occupants can draw household repair materials and then have the cost of those materials charged back to the landlord. Removing the cost of the self-help store from the Navy all-other-maintenance unit cost listed in Table 5 reduces the unit cost by 110 dollars to 1,415 dollars per unit.

The savings to the Navy would be somewhat less than 110 dollars per unit however, since some of the material cost included in the self-help sub-category would be transferred to one of the other sub-categories (service calls, routine maintenance, etc.). Additionally, a labor cost would be created for each maintenance task which would have been accomplished by an occupant but which now would be accomplished by the Navy. The actual savings would be the labor cost currently used to run the self-help store plus the cost of the yard care products provided by the self-help store, less the extra labor cost of the extra maintenance which would now be accomplished by the Navy. This assumes that the Navy would continue to provide the type of minor maintenance which occupants currently can accomplish via the self-help store.

C. PRIVATIZATION

The final cost reduction solution to be presented is privatizing the housing maintenance function. The maintenance costs in each category can be modified to reflect approximately equal quality and quantity of maintenance. Then any differences in cost between the Navy and private sector can be attributed to differences in efficiency. Savings may be possible for the Navy by switching to a more efficient method of conducting maintenance. The six cost categories

will be examined for differences which may be attributed to efficiency differences.

1. Appliance Repair

As derived earlier in this chapter, the appliance repair cost was 18 dollars per appliance for the Navy and 10.5 dollars per appliance for the private sector. These numbers imply that the Navy could save 7.5 dollars per appliance in repair costs by contracting for appliance repair. This may overstate the Navy's savings because some private sector appliance repair costs appear in the all-other-maintenance category, as explained previously. This effect is probably not on the order of magnitude of 7.5 dollars per appliance, so some savings are probable in this category as a result of privatization.

2. Appliance Replacement

As with appliance repair, costs for the appliance replacement category were derived earlier in this chapter. The Navy appliance replacement cost was 40.5 dollars per refrigerator and 20 dollars per dishwasher or range, compared to the private sector cost of 21 dollars per appliance (principally dishwashers and ranges). Since it is logical to assume that the acquisition cost per appliance should be approximately the same for the Navy and the private sector (assuming roughly equivalent appliances are acquired), there are probably no realistic savings from privatizing this task.

3. Painting

The majority of Navy painting services are already contracted out to the private sector. Approximately 93% of the total painting costs are incurred as a result of commercial contracts. As shown earlier in this chapter, the difference in costs can probably be attributed to policy differences. No additional savings as a result of further privatization are likely in this category.

4. Grounds

As with the painting category, a great deal of the Navy housing grounds care is already being contracted out to the private sector. Commercial contracts account for approximately 68% of the total grounds cost. Because of this fact and the logic that the most significant reason for the cost differential between the Navy and the private sector is the greater quantity of common grounds per unit, additional savings can not realistically be expected in this category.

5. Pest Control

The pest control category is already the most heavily privatized of any of the six cost categories. Commercial contracts account for approximately 97% of the total costs in this category. The painting category logic can be applied also to pest control. The unit cost differential from the private sector shown in Table 5 can be reasonably explained by policy differences. No additional savings can be expected in this category.

6. All-Other-Maintenance

The all-other-maintenance category, with the largest unit cost differential, would appear to be subject to the greatest benefit from privatization. Commercial contracts currently account for only 11% of the total cost of this category. The routine maintenance sub-category, which is the largest of all the Navy sub-categories, has no commercial contract costs.

The self-help store largely reflects costs for which there is no private sector counterpart (supplies for maintenance accomplished by the occupant). Removing this cost will provide a more equitable basis for comparing efficiency with the private sector. With the self-help cost removed, the Navy's all-other-maintenance unit cost becomes 1,415 dollars per unit, compared to 717 dollars per unit for the private sector. Assuming equal quantity and quality of maintenance in this category implies the Navy could save approximately 700

dollars per unit by contracting out the repair tasks in this category. However, some of the current costs in this category are indirect (i.e. costs of supervisory, planning, and estimating personnel). Even though the work would be conducted by private maintenance firms, some of these indirect costs would probably still be necessary to administer the maintenance program. Thus, the savings in this category would probably be somewhat smaller.

Some QOL issues should also be addressed in this category. The Navy housing occupants currently enjoy very easy access to maintenance. A repairman is always on call via the Naval Postgraduate School Quarterdeck. If the Navy chooses to continue to provide this level of accessibility to the occupants because of QOL concerns, the cost may offset some of the savings obtained by privatizing.

D. SUMMARY

Table 6 provides a summary of potential savings per unit in each category under each cost reduction solution. No data is presented for the self-help solution due to the difficulty in estimating any figures for this category.

Cost Item	Policy Savings	Privatization Savings
Appliance Repair	\$18	\$7.5
Appliance Replacement	\$40	\$0
Painting	\$63 to \$94	\$0
Grounds	\$0	\$0
Pest Control	\$65	\$0
All-Other-Maintenance	\$110	\$700

Table 6. Summary of Potential Savings (per unit)

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

DoD is the nation's largest landlord, managing approximately 300,000 housing units in the United States. Of this total, the Navy is responsible for approximately one third. When considering such a large number of housing units, any money saved in operation and maintenance will add up rapidly.

This study has shown that the housing at the Naval Postgraduate School costs more to maintain than comparable housing in the private sector. This finding supports a defense-wide study conducted by the Congressional Budget Office which found that government supplied housing was approximately 35% more expensive to operate and maintain over the long run than housing in the private sector. [Ref 15]

Various policies were presented which possibly contribute to these higher costs. Such policies include supplying extra appliances with the housing unit, providing more extensive exterminator services than typically supplied in the private sector, and supplying the self-help store for occupants to conduct minor do-it-yourself repairs. Additionally, the Navy chooses to paint the housing interiors more frequently than in the private sector. These practices all contribute to the higher costs in the Navy when compared to the private sector.

Any cost differences not explained by Navy policy were assumed to be due to an efficiency difference between the Navy and the private sector. This efficiency difference was attributed to the profit motive which drives the private sector; no such motive exists in the Navy. This factor was most visible in the all-other-maintenance cost category, which had a low percentage of its total costs already contracted out to the private sector.

B. RECOMMENDATIONS

The housing management staff at the Naval Postgraduate School should publicize the complete capabilities of the self-help store to housing occupants. Hopefully, increased knowledge would increase the store's usage rate. Various possibilities exist to accomplish this. The public quarters brochure write-up regarding the self-help store should be modified. The new write-up should emphasize the repair capabilities of the self-help store. Additionally, the trouble desk phone watch could refer occupants to the self-help store for minor repair calls. Offering basic repair classes (as done at NAS Pensacola) is another method which could possibly increase the usage rate of the store.

The painting and pest control policies should be reviewed. The Quality of Life benefits of the current policies should be weighed against the potential cost savings. One possible method of conducting a cost-benefit analysis in this area would be to conduct a survey of the housing occupants, asking them to prioritize services that are currently provided by the Navy. This might provide some measure of the QOL benefits as perceived by the people who count most, the occupants.

The Navy should conduct an in depth study regarding the privatization of the housing maintenance function at the Naval Postgraduate School. Again, the Quality of Life benefits of the current methods should be weighed against the potential cost savings. As above, an occupant survey may provide some measure of the QOL benefits.

LIST OF REFERENCES

1. Naval Postgraduate School Public Affairs Office, "Campus News," Monterey, California, 23 February 1995.
2. Graham, Bradley, "The New Military Readiness Worry: Old Housing," The Washington Post, Washington, D.C., 7 March 1995.
3. OPNAVINST 11101.13J, "Assignment and Utilization of Navy-Managed Military Family Housing (MFH)," 16 December 1992.
4. Department of the Navy, "Navy Neighborhoods of Excellence: Commanding Officer's Visual Guide to Quality Navy Family Housing," Naval Facilities Engineering Command, Alexandria, Virginia, 1992.
5. Department of the Navy, "Highlights of the FY-1995 Department of the Navy Budget," Office of the Comptroller of the Navy, Washington, D.C., February 1994.
6. Public Law 103-110, 1993.
7. Public Law 98-473, 1984.
8. Naval Postgraduate School Housing Office, Housing Cost Report Feeder Data, Monterey, California, 30 September 1994.
9. OPNAVINST 11101.19D, "Management of Flag and General Officer Quarters (F&GOQs)," 24 November 1989.
10. Smyth, G.S., Head, Housing Management Branch, Naval Facilities Engineering Command, Southwest Division, Memorandum, Subject: Housing Items of Interest, 2 August 1993.
11. Naval Postgraduate School Family Housing Inventory and Occupancy Report (DD 1410), 30 September 1994.
12. Naval Postgraduate School Public Quarters Housing Brochure, Monterey, California, 1994.
13. Taylor, Sally, "Navy Families Earn Degree of Confidence at Self-Help Academy," Navy Civil Engineer, Alexandria, Virginia, Fall, 1993.
14. Consumer Guide, Publications International, Ltd., Lincolnwood, Illinois, 1994 Edition.

15. Military Family Housing in the United States, A CBO Study, Congress of the United States, Congressional Budget Office, Washington, D.C., September, 1993.

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