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TOTAL CONTRACT MAINTENANCE FOR MANNHEIM FAMILY HOUSING.(U)
JAN 80 J L NAY, D W BROWN
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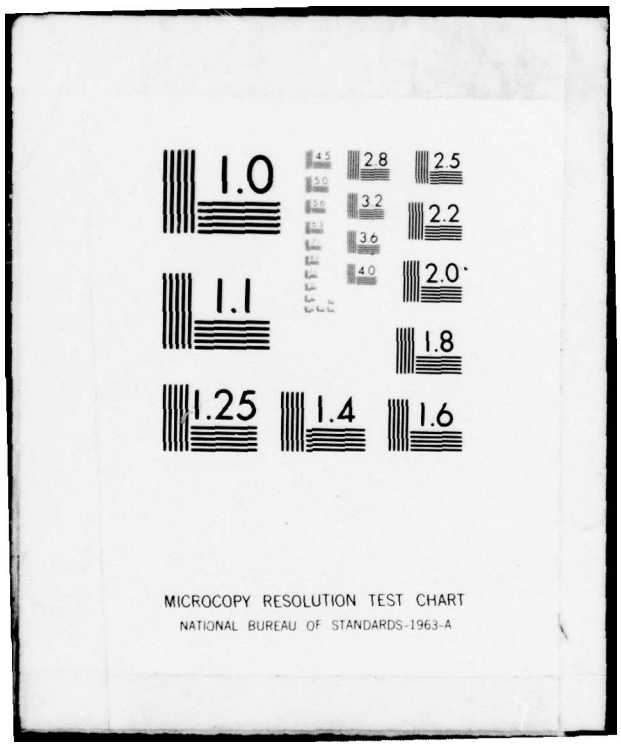
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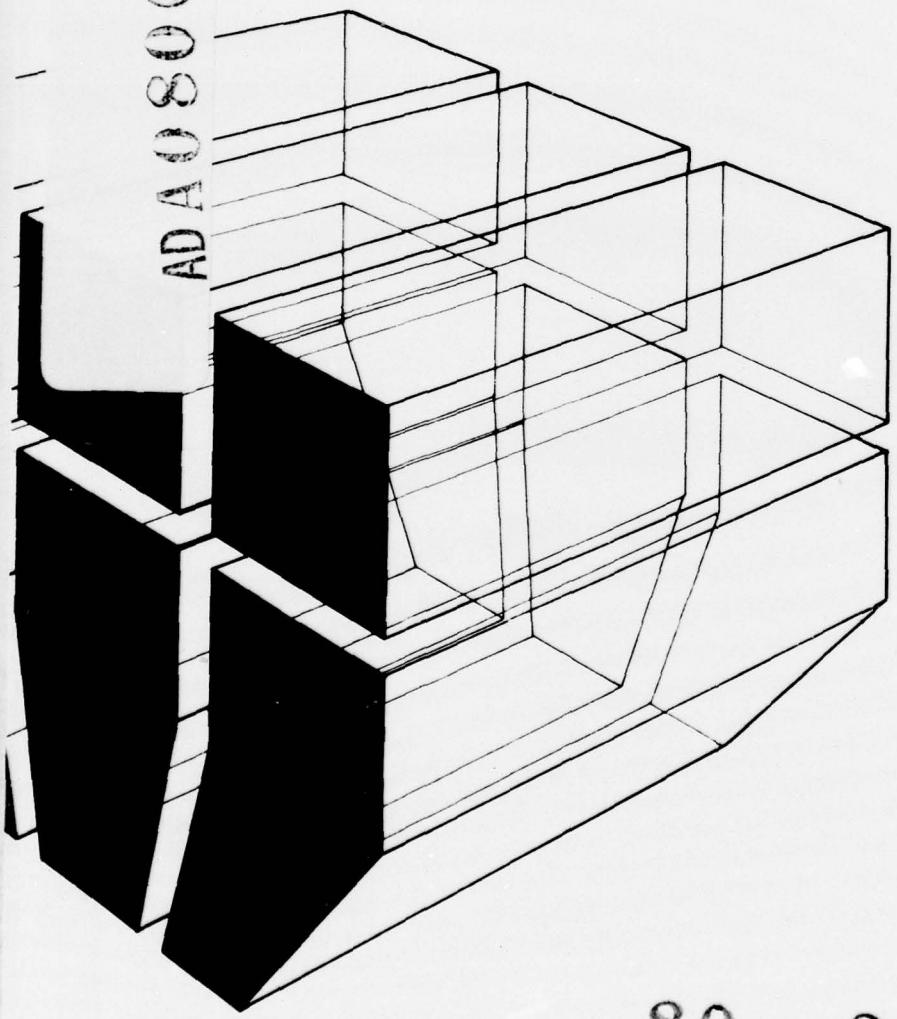

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This report documents a U.S. Army Construction Engineering Research Laboratory (CERL) evaluation of a family housing maintenance contract used as a test case by the U.S. Army Installation Support Activity, Europe (USAISAE).

The total maintenance contract for Benjamin Franklin Village, Mannheim, Germany was compared to Patrick Henry and Mark Twain Villages —> next page

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at Heidelberg, Germany resource costs. The work accomplished by the contractors was used as a common basis for comparison. A direct cross-community comparison of Family Housing Maintenance Account (FHMA) expenditures was not possible because all service costs could not be identified.

The results of the CERL analysis indicate that contracting is feasible and that the FY78 contracting cost savings in the Mannheim/Heidelberg comparisons was 4.2 ~~percent~~ %. It was determined that the Government must have both a good contract document and adequate monitoring of contract performance to realize maintenance cost savings.

FOREWORD

This research was conducted for the U.S. Army Installation Support Activity, Europe (USAISAE) and the 21st Support Command under Intra-Army Project No. 89-3510-7-78. The USAREUR Technical Monitor was Mr. N. Shestople.

The work was performed by the Facility Systems Division (FS) of the U.S. Army Construction Engineering Research Laboratory (CERL). The CERL Principal Investigator was Mr. D. W. Brown. Mr. E. A. Lotz is Chief of FS.

Appreciation is extended to the engineering and housing personnel of the 21st Support Command, Directorate of Engineering and Housing at Mannheim and Heidelberg, Germany and the Procurement Office, Frankfurt, Germany for their support in data collection and analysis. Appreciation is also expressed to Mr. J. G. Kirby, Ms. L. McCarthy, and Ms. M. J. Erickson of CERL-FS for their efforts in compiling information for this report.

COL Louis J. Circeo is Commander and Director of CERL and Dr. L. R. Shaffer is Technical Director.

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CONTENTS

		Page
	DD FORM 1473	
	FOREWORD	
	LIST OF TABLES	
1	INTRODUCTION	7
	Background	
	Objective	
2	GOVERNMENT OPERATIONS	9
	Pre-Award Workload Requirements	
	CY78 Workload Requirements	
3	CONTRACT OPERATIONS	16
	CY78 Workload Requirements	
	FY78 Workload Requirements (Estimated vs Accomplished)	
4	CONTRACT OPERATIONS VS GOVERNMENT OPERATIONS	21
	CY78 Workload and Cost Requirements	
	FY78 Workload and Cost Requirements	
	Comparative Cost Analysis	
	Performance Analysis	
5	CONCLUSION AND RECOMMENDATION	24
	Conclusion	
	Recommendation	
	TABLES	25
	APPENDIX A: CY78 Cost Analysis Procedures	67
	APPENDIX B: FY78 Cost Analysis Procedures	81
	APPENDIX C: Contract Analysis	95
	DISTRIBUTION	

TABLES

		Page
1	Contract Cost Comparison: Estimated vs Accomplished FY78 Workload -- Benjamin Franklin Village	25
2	Real Property Summary Data	26
3	Real Property Data: Patrick Henry Village, Heidelberg	27
4	Real Property Data: Mark Twain Village, Heidelberg	28
5	Real Property Data: Leased Housing, Heidelberg	28
6	Real Property Data: Benjamin Franklin Village, Mannheim	29
7	Real Property Data: Leased Housing, Mannheim	30
8	Boiler Capacities and Volumes (Mannheim vs Heidelberg)	31
9	FE Organizational Structure -- Heidelberg (CY78)	32
10	FE Organizational Structure -- Mannheim (CY78)	33
11	FE Contract Administration Staff (CY78)	34
12	Overview of Typical FE Shop Structure	35
13	In-House CY78 Work Order Activities, Heidelberg	39
14	In-House CY78 Work Order Activities, Mannheim	41
15	Summary of Work Order Activities -- Heidelberg (CY78)	43
16	Summary of Work Order Activities -- Mannheim (CY78)	44
17	FHMA Expenditures for FY78 -- Heidelberg	45
18	FHMA Expenditures for FY78 -- Mannheim	48
19	Contract Operations' Organizational Structure -- Benjamin Franklin Village (CY78)	51
20	CY78 Work Order Activities: Contract Operations -- Benjamin Franklin Village, Mannheim	52
21	CY78 Cyclic Painting Activities: Contract Operations	54
22	CY78 Floor Refinishing Activities: Contract Operations	55

TABLES (Cont'd)

		Page
23	Vacant Quarters Maintenance Distribution Contract Operation FHMA 1920.14113/IJO Activity (CY78)	56
24	Heating Supervision Workload Distribution Contract Operation (CY78)	57
25	FY78 Cyclic Painting Activities: Contract Operations	58
26	Floor Refinishing RPMA -- Contract Operation (FY78)	59
27	Contract Modification Activity and Costs	60
28	Work Order Activity Adjustments: Heidelberg/Government Housing	63
29	Study Assumptions	64
30	Summary of Cost Analyses of Total Contract Maintenance Evaluation, Benjamin Franklin Village, DEH Mannheim	66
A1	CY78 -- Total Cost of the Contract Operation	68
A2	CY78 -- Total Cost of the Government Operation	73
B1	FY78 -- Total Cost of the Contract Operation	82
B2	FY78 -- Total Cost of the Government Operation	88
C1	Financial Accounting Requirements	97
C2	Bid Schedule for One-Time Services	100
C3	Overview of Floor Refinishing Costs During the Second Quarter of FY77 and FY78	105

TOTAL CONTRACT MAINTENANCE FOR MANNHEIM FAMILY HOUSING

1 INTRODUCTION

Background

In June 1978, the Construction Engineering Research Laboratory (CERL), at the request of the U.S. Army Installation Support Activity/Europe (USAISAE), analyzed and evaluated an existing family housing total maintenance contract for Benjamin Franklin Village, Mannheim, Germany. Contract operations were compared to Government in-house operations in the nearby U.S. Army military community of Heidelberg. The study was performed between July 1978 and September 1979.

Methodology

The cost comparison of contract vs in-house family housing maintenance performance was conducted in accordance with AR 235-5.[1]

Basis for Comparison

USAISAE selected the Heidelberg family housing areas for comparison with Benjamin Franklin Village since they are nearly equivalent in terms of number of units, age, and condition. However, the CERL team determined that a side-by-side (direct) cost comparison was not possible since the Heidelberg Directorate of Engineering and Housing (DEH) had not charged its family housing management account (FHMA) for all services provided. Thus, the actual cost for Heidelberg family housing maintenance could not be recovered.

Since a direct cross-community comparison by FHMA expenditure was not possible, CERL used the work completed by the contractor as the basis for comparison. A cost estimate of the in-house resources required to accomplish contractor-completed work was then constructed and compared to contractor payments.

Comparison Period

The workload completed by the contractor in FY78 was selected as the comparison period. Detailed information on the work accomplished by the contract operation and on payments to the contractor was collected. Records of recurring annual work* were not available for the period

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[1] Management of Resources, Commercial and Industrial-Type Functions, Army Regulation (AR) 235-5 (Department of the Army [DA], 30 November 1972).

* Normal DEH work orders are Service Orders (SO), Individual Job Orders (IJO), and Standing Operation Orders (SOO).

before 1 January 1978; however, complete records were available for the entire calendar year. Payment vouchers for nonrecurring annual work (i.e., workload that normally occurs at the time of occupancy turnover such as cyclic painting and floor refinishing) were available for the entire fiscal year. With this information, it was possible to construct the total FY78 workload completed by the contractor. Nonrecurring costs were converted to productive hours of effort by dividing the payment costs by the contractor's paint shop labor rate for painting or by the carpentry shop rate for floor refinishing. The recurring work completed in CY78 was assumed to be a good estimator of the work completed by the contractor during FY78. Cost records from CY78 were used to determine Government operation costs for FY78.

Construction of In-House Cost Estimate

FY78 work completed by the contractor and the Government was categorized in terms of typical DEH shop functional descriptions.[2] An average DEH shop rate for family housing maintenance was calculated from Heidelberg data.* The average shop rate was multiplied by the contractor-completed work order hours to construct the in-house cost estimate.

Objective

The objective of this report is to present the results of an in-depth comparison of the cost of contract vs in-house DEH maintenance of about 2,000 family housing units. Specifically examined was the work accomplished and associated costs for the contract maintenance of 2,091 family housing units at Benjamin Harrison Village, Mannheim, Germany. In-house cost estimates for family housing maintenance were developed from the nearby housing areas in Heidelberg.

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[2] Staffing Guide for U.S. Army Garrisons, Department of the Army Pamphlet (DA PAM) 570-551 (DA, December 1976).

* Since the major portion of family housing maintenance is not currently performed in-house at Mannheim, no precontract award historical records exist. Therefore, it was not feasible to use Mannheim's shop rates.

2 GOVERNMENT OPERATIONS

This chapter discusses Government operations, related workload requirements, pre-award and postaward of the family housing maintenance contract at Benjamin Franklin Village, and the comparability of these workload requirements to Government operations at Patrick Henry and Mark Twain Villages, Heidelberg. The workload requirements for Mannheim and Heidelberg are very similar in terms of real property inventory and organizational structure, but differ slightly in terms of both Facilities Engineering (FE) and family housing operations and maintenance activities. Overall, the vast similarity between Mannheim's and Heidelberg's family housing workload and operations provides an ideal opportunity to compare the efficiencies of contract vs Government-provided operations and maintenance.

Pre-Award Workload Requirements

Workload requirements before the award of the Benjamin Franklin Village maintenance contract were identified in the Government's fair cost estimate (GFCE) as shown in Table 1. Supporting data used to prepare the GFCE were not available for analysis; however, the basis of its preparation was the accomplished work order activity from FY76 plus projected workload requirements specified by the contract. Maintenance requirements identified in the GFCE were compared to the accomplished workload by the contract operations (postaward) to establish a measure of the efficiency level of work performed. An evaluation of the contractor's performance is presented in Chapter 3.

The GFCE defines workload requirements for contract maintenance at Benjamin Franklin Village but, unfortunately, pre-award workload requirements for Government operations at Mannheim and Heidelberg were not available for comparative analysis. Thus, the timeframe for evaluation addresses only the Real Property Management Activities (RPMA) accomplished during the period when data were available for analysis -- i.e., 1 January through 31 December 1978 for recurring work, and 1 October 1977 through 30 September 1978 for nonrecurring work.

CY78 Workload Requirements

The CY78 workload requirements for Government owned and operated family housing facilities at Mannheim and Heidelberg were examined to determine if they were comparable. A brief description of each activity covered in the analysis is presented below.

Real Property

Detailed real property summary data and related family housing statistics are listed in Table 2.

Government Owned/Operated Family Housing Facilities. A comparison of the Government owned and operated family housing facilities in terms of related number of units, age, type, and occupancy (by rank) was performed (Tables 3 through 7 list real property data by housing area).

Findings.

1. Number of buildings: Heidelberg 206 vs Mannheim 187

2. Number of family housing units: Heidelberg 2,005 vs Mannheim 2,091

3. Total square footage: Heidelberg 4,040,190 vs Mannheim 3,812,548

4. Year of construction.

   a. 1945 through 1950: Heidelberg 14 percent vs Mannheim 0

   b. 1951 through 1955: Heidelberg 42 percent vs Mannheim 61 percent

   c. 1956 through 1960: Heidelberg 44 percent vs Mannheim 39 percent

5. Building type.

   a. Heidelberg: Type I -- 18 percent; Type V -- 31 percent; Type Va Mod. -- 16 percent; other types -- less than 10 percent each.

   b. Mannheim: Type Va -- 48 percent; Type VI -- 25 percent; other types -- less than 10 percent each.

6. Occupancy (by military rank).

   a. Generals: Heidelberg 21 vs Mannheim 1

   b. Senior grades: Heidelberg 107 vs Mannheim 10

   c. Field grades: Heidelberg 938 vs Mannheim 152

   d. Other (company grade, senior, and junior enlisted): Heidelberg 939 vs Mannheim 1,928

7. Service order volume per unit.

   a. Heidelberg:

      (1) Patrick Henry Village -- 7.52

      (2) Mark Twain Village -- 7.88

b. Mannheim: Benjamin Franklin Village -- 6.01

8. Individual job order volume per unit.

a. Heidelberg:

(1) Patrick Henry Village -- 0.15

(2) Mark Twain Village -- 0.16

b. Mannheim: Benjamin Franklin Village -- 0.16

Conclusions. In terms of physical measures (numbers, age, and type), these housing areas are very similar. The rank of personnel assigned to family housing quarters at Heidelberg is significantly higher than the rank of personnel assigned at Mannheim. A comparison of workload requirements related to occupant rank shows that Heidelberg's higher ranking personnel at Patrick Henry Village do not appear to create a greater work order demand than occupants at Mark Twain Village (see Items 7 and 8 above). A per unit work order volume for Heidelberg was calculated and compared to the volume at Mannheim. These calculations show Mannheim's SO volume to be less than Heidelberg's; IJO volume was the same (see Work Order Activities, p 13).

Boiler Plants. At the onset of the study, it was thought that boiler plant differences might produce differing work requirements. The real property statistics for boiler capacities and volumes are given in Table 8. Since performance standards were not available, boiler operation requirements could not be analyzed; however, boiler capacities and the number of boilers (by types) were used to determine workload requirements.

Findings.

1. Coal-fired boilers.

a. Heidelberg:

(1) Patrick Henry Village -- 71

(2) Mark Twain Village -- 33

(3) Total -- 104

b. Mannheim: Benjamin Franklin Village -- 103

2. Oil-fired boilers.

a. Heidelberg:

(1) Patrick Henry Village -- 131

(2) Mark Twain Village -- 110

(3) Total -- 241

b. Mannheim: Benjamin Franklin Village -- 207

Conclusions. The capacities and number of coal-fired boilers at Heidelberg and Mannheim are comparable. Heidelberg has 14 percent more oil-fired boilers than Mannheim; however, the additional recurring workload requirement for oil-fired boilers is minimal.

Physical Condition Survey. A random survey of the family housing facilities at Benjamin Franklin Village and Patrick Henry and Mark Twain Villages was conducted in August 1978 to determine the physical condition of the villages' exterior and interior common areas. The intent of this survey was to assess the general appearance of these areas (i.e., stairwells, mechanical spaces, laundry and maids rooms). The condition of the interior living space in family housing was estimated by accomplished work order levels and related cost requirements (see Work Order Activities, p 13). Survey findings revealed that the general condition of family housing's exterior and interior common areas at Heidelberg was comparable to Mannheim.

FE Operations and Maintenance Activities

Organizational Structure. FE organizational structure and related functions at Heidelberg and Mannheim are identified in Tables 9 and 10; only those FE functions in support of the Benjamin Franklin Village maintenance contract organization were evaluated. Data elements identified in Tables 9 and 10 include FE functional titles, related on-board personnel levels during CY78, appointment type (i.e., civilian or military), direct/administration levels, and supervisory/nonsupervisory levels. Contract administration staff requirements for the Benjamin Franklin Village maintenance contract are included in the following calculations, with exception of partial support requirements (Table 11). Partial support (less than one employee) is provided by the FE personnel identified in Table 10.

Findings.

1. Heidelberg:

   a. Direct personnel -- 249

   b. Administration personnel -- 59

   c. Direct/administration staff ratio -- 4.22 (supply included)

2. Mannheim:

   a. Direct personnel -- 247

b. Administration personnel -- 57 (includes contract administration)

c. Direct/administration staff ratio -- 4.33

Conclusions. The FE organizations are comparable since the direct to administration staff requirements difference is 0.1.

Work Order Activities. FE accomplished work order activities at Heidelberg and Mannheim were categorized by shop, using the descriptions of the typical FE shops defined in DA PAM 570-551, change 4.[3] An overview of the FE shops structure is given in Table 12. Family housing management account codes and work order types used by the shops are also given in Table 12.

The accomplished CY78 work order activities from Heidelberg and Mannheim were categorized by related shop functions as defined in Table 12. The accomplished CY78 RPMA by Government in-house workforces is shown in Tables 13 and 14. The RPMA data elements identified in these tables include volume of work order activity, productive hours, labor cost, equipment cost, materials cost, and total costs by housing area (i.e., Government and leased housing). The physical condition of each facility's interior living space in family housing was determined by the level of work order activity accomplished.

Summaries of all work order activities accomplished by contract and in-house workforces for each housing area surveyed are presented in Tables 15 and 16. (Chapter 3 gives detailed data on work orders accomplished by the contract operation.)

Findings. The following values reflect only Government housing statistics (Tables 15 and 16).

1. Service order volume per unit: Heidelberg 7.65 vs Mannheim 6.01.

2. Individual job order per unit: Heidelberg 0.16 vs Mannheim 0.16.

3. Total work order cost per unit:* Heidelberg $956 vs Mannheim $799.

---

[3] Staffing Guide for U.S. Army Garrison, DA PAM 570-551, change 4 (DA, 8 December 1976).

* Contract costs in the amount of $356,951 for boiler operations were added to the total cost reported for CY78 (Tables 15 and 16, Government housing costs only). This cost was calculated as an additional cost for Heidelberg's RPMA requirements; FHMA Code 1910.14226, Element of Expense 2572, verifies coal-fired boiler operating costs during CY78.

Conclusions. The per unit cost of shop activities, including coal-fired boiler operations cost, is $158 more at Heidelberg than at Mannheim -- a cost difference of 16 percent. SO volume per unit is 1.64 work orders greater at Heidelberg -- a volume difference of 21 percent. IJO volume per unit is the same at both installations.*

Housing Cost

FHMA costs incurred during FY78 are listed in Tables 17 and 18. FY78 costs are presented for comparison to the Standard Finance System (STANFINS) recorded cost summaries. Each FHMA cost was categorized by elements of expense (e.g., labor, equipment, supplies, and contracts) from actual Operations/Maintenance Account (OMA) cost input data to the respective FHMA.

OMA vs FHMA Activities. Work order costs were provided by the respective Resource Management Office. The work order summaries and related cost requirements are sent to the Budget and Programs Office for direct cost accounting input to OMA and to FHMA. Unfortunately, in many cases, the budget office input process leads to destruction of the cost trail; the cost data presented in Tables 17 and 18, with their myriad cost adjustments, highlight this cost-tracking dilemma. Thus, it was necessary to adjust the reported OMA and FHMA costs, work order cost summaries, and financial accounting documentation so they were in agreement.

Since the accuracy of the FHMA cost reporting process (input/output data) at Heidelberg is questionable, it was not feasible to compare costs by FHMA. It was feasible, however, to compare the percentage of cost distribution between Heidelberg and Mannheim for labor, equipment, materials, contracts, and other costs, since the overall cost distribution for operations (1910) and maintenance and repair (1920) was assumed to be accurate.

Findings.

1. FHMA/operations (1910).

   a. Labor: Heidelberg 20 percent vs Mannheim 29 percent

   b. Equipment: Heidelberg 0 vs Mannheim 0

   c. Materials: Heidelberg 8 percent vs Mannheim 10 percent

   d. Contracts: Heidelberg 8 percent vs Mannheim 3 percent

   e. Other: Heidelberg 64 percent vs Mannheim 58 percent

* These work order costs for Government housing include S00 work order activity (Tables 15 and 16); the work order volumes shown do not because most FE shops operate with one S00 per year.

2. FHMA/maintenance and repair (1920).

   a. Labor: Heidelberg 20 percent vs Mannheim 1 percent

   b. Equipment: Heidelberg 3 percent vs Mannheim 0

   c. Materials: Heidelberg 10 percent vs Mannheim 5 percent

   d. Contracts: Heidelberg 62 percent vs Mannheim 94 percent

   e. Other: Heidelberg 0 vs Mannheim 0

*Conclusions.** Financial accounting input transactions from FY78 and related cost output data did not lend themselves to comparative analysis. The cost distribution percentages shown above indicate Mannheim spent more for contract services than Heidelberg (to be expected) and less for materials than Heidelberg during FY78. Other differences were not significant.

FE Shops Wage Structure. The DEHs at Heidelberg and Mannheim compute their wage rates according to Army guidelines; both DEHs provided labor costs relevant to CY78. The wage rate mean at Heidelberg and Mannheim was calculated from the work order labor costs (Tables 13 and 14).

Findings. Government and leased housing labor costs incurred by in-house workforces were as follows.

1. Mean wage rate at Heidelberg: $10.29

2. Mean wage rate at Mannheim: $9.48

3. Cost difference per hour: $0.51

Conclusions. The reported costs per hour as calculated for in-house workforce requirements differ by $0.51. This cost difference may be caused by the fact that a higher wage rate average would be derived if the in-house workforce performed the RPMA at Benjamin Franklin Village.**

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* Cost distribution of the total FHMA cost is not shown; however, the backup data from Tables 17 and 18 provide cost elements for computation. FY76 housing costs were not included in this analysis because only STANFINS output cost data were available. Without input documentation, the cost trail from the originating source document to the reimbursable customer is not apparent and calculation of cost adjustments is not possible.

** The shop labor cost as reported by Heidelberg does not include coal-firing boiler operations (contract services). The labor cost requirements for Heidelberg's boiler plants/heating systems and steamfitting shop is included -- the same cost distribution factors would be used to distribute costs for coal-fired boiler operations.

3 CONTRACT OPERATIONS

Contract operations at Benjamin Franklin Village and related workload requirements specified in the family housing maintenance contract are defined and presented in this chapter. Analysis periods were FY78 (for nonrecurring requirements/costs) and CY78 (for recurring requirements/costs).

CY78 Workload Requirements

Workload requirements covering the period of 1 January through 31 December 1978 were evaluated to determine performance and cost efficiencies of the contract operation at Benjamin Franklin Village.

Real Property

Contract operations at Benjamin Franklin Village require maintenance services to those facilities specified in the real property requirements for Government housing at Mannheim (Tables 2 and 7). Also included in the contract is the RPMA for boiler operations; real property data for Mannheim's boiler capacities and volumes are listed in Table 8.

Contract Operations and Maintenance Activities

Organizational Structure. The organizational structure of the contract operation at Benjamin Franklin Village is outlined in Table 19. The structure is defined in terms comparable to the typical shop structure at the direct level of the FE organization, and in terms of project supervision, work management, and supply functions at the administrative level of the FE organization. Data elements presented in this overview include average on-board personnel requirements for CY78 and designation of employees by nonsupervisory/supervisory and direct/administrative categories. Administration personnel and direct supervisory personnel requirements were provided for analysis. However, the direct nonsupervisory manpower requirements for the contract organization were calculated using the reported CY78 work order hours divided by 1600 standard hours per employee.

Findings.

1. Direct personnel:

    a. Nonsupervisory -- 97.2

    b. Supervisory -- 3.5

    c. Total -- 100.7

2. Administrative Personnel:

   a. Nonsupervisory -- 5.6

   b. Supervisory -- 4

   c. Total -- 9.6

3. Direct nonsupervisory/supervisory ratio: 27.8

4. Direct labor/administration staff ratio: 10.5

Conclusions. The contract operation appears to be more efficient than the Government operation in terms of direct nonsupervisory/supervisory and direct labor/administration staff ratios (see Tables 9, 10, and 11).

Work Order Activities. Work order activities were separated into three major categories: (1) work orders (SOs, IJOs, and SOOs), (2) cyclic painting, and (3) floor refinishing (purchase orders).

Since the organizational structure supporting the contract operations is unique, the accomplished workload data were organized using typical FE shop titles and related shop functions. This allowed comparative analysis of contract operations to Government operations. The accomplished workload data from the contract operations are shown in Tables 20 (work orders), 21 (cyclic painting), and 22 (floor refinishing). Workload data adjustments were required since the contractor maintained a vacant quarters maintenance shop and a heating supervision shop; these activities were distributed to related typical shop functions. This workload was distributed by task to the respective typical FE shop based on work distribution factors derived from a 2-month sample of accomplished work (October and November 1978) (Tables 23 and 24).

Findings.

1. Work orders:

   a. Productive hours -- 110,306

   b. Labor costs -- $1,221,353

   c. Equipment costs -- $33,135

   d. Materials cost -- $201,951

   e. Total cost -- $1,456,439

2. Cyclic painting costs: $43,707

Conclusions. The accomplished work order requirements identified above represent the CY78 workload. Documentation of workload performed

before this timeframe was not complete and was not analyzed. However, the CY78 timeframe covered in this analysis represents a 1-year period with typical RPMA (i.e., no reported disasters or atypical workload requirements); thus, CY78 workload can be used as a basis for estimating FY78 workload.

Housing Costs

Work Order Costs vs Contract Payment Costs. Housing cost data were available in two forms: (1) FE reported cost from contract work orders for CY78, and (2) procurement office reported cost from contract payment vouchers for FY78 (reference contract modification documents). The contract work order cost data provide the cost breakout detail necessary for comparison to Government operations at Heidelberg. Cost data provided by the procurement office identified the actual cost of the contract services for Benjamin Franklin Village maintenance during FY78. Work order cost data for FY78 from the contract operation are listed in Table 20 (CY78 work order data), Table 25 (FY78 cyclic painting), and Table 26 (FY78 floor refinishing). Procurement's cost data from contract modification cost documents are summarized in Table 27.

Findings.

1. Work order cost requirements (CY78 vs FY78).

    a. Productive hours: CY78 151,440 vs FY78 156,265

    b. Direct labor costs: CY78 $1,672,683 vs FY78 $1,725,622

    c. Equipment costs: CY78 $43,136 vs FY78 $44,331

    d. Materials cost: CY78 $39,296 vs FY78 $44,858

    e. General and Administrative (G&A) support costs: CY78 $240,451 vs FY78 $248,629

    f. Profit costs: CY78 $79,823 vs FY78 $82,538

    g. Total cost: CY78 $2,075,389 vs FY78 $2,145,978

2. Procurement's reported contract cost for FY78: $2,463,919

Conclusions. Comparison of the cost from the two data sets identified a cost difference of $317,941 (13 percent). Cost determination procedures for CY78 calculations are presented in Appendix A; procedures for FY78 are presented in Appendix B. Because budgetary allocations and expenditures originate and terminate on a fiscal year basis, restructuring of the contract costs to reflect FY78 workload requirements was essential for comparison to fiscal year payments. Reasons attributing to the cost difference calculated from the restructured FY78 costs vs FY78 contract cost payment are believed to be manifold. Some of the probable reasons include:

1. Increased costs caused by payment for an SO claim which was not supported by accomplished work orders

2. Unreported accomplished work orders

3. Unidentified profit for the respective contractor

4. Unidentified overhead cost for the contract operation.

Contract Shop Wage Structure. The contract shop wage determination includes the major cost elements used to develop FE in-house shop rates; however, the FE calculated multiple shop rates by craft, while the contractor calculates a rate for all work order activities.

Findings. The mean wage rate for the contract operation was calculated at $11.07 per productive hour for CY78 workload.

Conclusions. The mean wage rate for the contract operation is 0.78 higher than Heidelberg's wage rate mean ($10.29), which indicates the contract operation has a higher wage rate burden than the Government operation (to be expected).

FY78 Workload Requirements (Estimated vs Accomplished)

The estimated FY78 workload requirements for the contract operation at Benjamin Franklin Village (Table 1) vs the contract operation's accomplished FY78 workload was used to establish a measure of performance.

Workload was categorized by nonrecurring and recurring tasks. Nonrecurring tasks are those tasks which are predominantly related to occupancy turnover, while recurring tasks are day-to-day operations and maintenance activities. All workload specified as work order activity was classified as recurring RPMA, while cyclic painting and floor refinishing activities were classified as nonrecurring RPMA.

Because nonrecurring workload primarily depends on occupancy turnover, this accomplished workload cannot be used to effectively measure contractor performance; it is too variable and therefore not a good basis for comparison. Comparing the estimated recurring workload to the accomplished workload, however, is feasible because of the predictable, constant nature of this RPMA. Thus, the estimated workload requirement as shown in the GFCE for FY78 was compared to the workload accomplished by contract operations during FY78.

Findings

1. Work order activities.

a. Productive hours: estimated 124, 837 vs accomplished 110,306

b. Labor cost: estimated 1,042,490 vs accomplished 1,221,353

c. Equipment cost: estimated 62,240 vs accomplished 33,135

d. Overhead: estimated 165,710 vs accomplished 171,865

e. Profit: estimated 127,044 vs accomplished 57,054

f. Inflation: estimated 240,367 (accomplished not applicable)

g. Total cost: estimated 1,637,851 vs accomplished 1,483,407

2. Cyclic painting activities: estimated $833,617 vs accomplished $490,822 (Table 25).

3. Floor refinishing activities: estimated $246,674 vs accomplished $171,064 (reference Table 26).

4. Total cost: estimated $2,527,397 vs accomplished $2,145,293.

Conclusions

The accomplished workload costs identified above represent CY78 for work order activity and FY78 for cyclic painting and floor refinishing activities. Assuming that the GFCE accurately identified contract workload requirements and that the contractor's performance of this workload was satisfactory (as reported and as inferred by work acceptance authorizations identified on all contract payment documents), the contract operation performed related workload with 12 percent fewer productive hours and 9 percent fewer costs than estimated.

Because of the nonrecurring nature of cyclic painting and floor refinishing activities, it was not feasible to compare estimated vs actual contract costs except to note that: (1) the Government ordered exterior painting for six buildings during FY78 which was not programmed, (2) the Government ordered 491 units to receive interior painting for FY78, and (3) the Government ordered 131 apartments to receive floor refinishing services during FY78.

A 15 percent cost difference was observed between total workload requirements (as estimated by the Government) and the contractor's reported cost requirements. However, the Government actually spent $2,463,919 for FY78 contract services.

A comparative analysis of the contract cost to the GFCE shows the contract operation to be cost effective, and indicates that the level of performance by the contract operation required fewer productive hours than estimated at each functional area identified in Table 1, with few exceptions.

4 CONTRACT OPERATIONS VS GOVERNMENT OPERATIONS

The method used to analyze RPMA cost requirements and work performance for Government and contract operations is described in this chapter. Guidance in AR 235-5 was used to establish the cost factors relevant for comparison of a Government in-house operation to a Government contract operation.[4]

AR 235-5 required that a data baseline be established for cost comparison. RPMA productive hours accomplished during a 1-year period by the contract operation established this baseline. The cost of total productive hours accomplished in the contract operation was compared with the Government's in-house cost for the same number of baseline hours.

CY78 Workload and Cost Requirements

The workload and cost requirements for CY78 were determined using the cost analysis procedures identified in Appendix A. (RPMA workload accomplished during this timeframe by the contract operation is summarized in Chapter 3; this workload is used as the baseline cost comparison data. Cost requirements for the Government operation are given in Chapter 2.)

To compare the same RPMA defined in the contract for maintenance service at Benjamin Franklin Village, certain workload adjustments to the Government operations data were required: (1) travel time was removed from the reported work order activities, and (2) workload requirements related to contract performance were added/deleted from the work order data reported by the Government operations.

More travel time is incurred at Heidelberg than at Mannheim. This additional time was charged against the work order activity and was removed so a comparative productive shop rate could be developed. RPMA workload exclusions from Government operations included ice control and removal, refuse collection and disposal, entomology services, fuel handling, and street sweeping (Table 28). Workload requirements added to the Government operations included coal-fired boiler operations costs (Chapter 2 and Table 29).

In addition to workload adjustments, certain assumptions were made to compare cost requirements of Government operations to contract operations. The assumptions used to determine RPMA workload and cost requirements are given in Table 29. In general, assumption statements include work order activities (CY78 vs FY78), personnel wage rates,

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[4] Management of Resources, Commercial- and Industrial-Type Functions, AR 235-5 (DA, 30 November 1972).

conversion factors for productive hours to employees and for Deutsche marks (DM) to dollars, etc.

FY78 Workload and Cost Requirements

It was essential to develop comparable FY78 workload requirements for contract operations and Government operations so actual contract costs (contractual payment agreements) could be related to the FY78 cost of the Government operations. RPMA workload and cost requirements for FY78 were calculated using the baseline workload determination procedures described in Appendix B. The same data elements for CY78 RPMA requirements also define FY78 requirements, except for nonrecurring workload (Chapter 3). Recurring RPMA and related cost requirements (work order activities) for FY78 were not available for cost analysis. This RPMA was estimated to have the same cost as identified for CY78. Nonrecurring RPMA data and related cost requirements (cyclic painting and floor refinishing activities) were calculated from FY78 data which were available.

Comparative Cost Analysis

The cost requirements of the Government and contract operations are summarized for CY78 and FY78 in Table 30. The contract workload for FY78 established the baseline to be compared with an estimate of the Government's cost to accomplish the same workload. Thus, cost calculations for FY78 Government operations were compared to the actual FY78 contract costs (Tables 1 and 27). This cost analysis procedure realistically established cost benefits realized by the Government during FY78 for contracting family housing RPMA.

Performance Analysis

The levels of work performance demonstrated by contract and Government operations were surveyed and found to be highly comparable.

Physical Condition Survey

A survey was conducted to assess the exterior maintenance level maintained by contract and Government workforces. Although the results of this survey (Chapter 2) are subjective, the level of performance was comparable at both Heidelberg and Mannheim Government housing locations. The level of interior maintenance performed by each activity was based on the volume of accomplished work orders during CY78. The Government operations at Heidelberg required a higher volume of service order activity than the contract and Government operations required at Mannheim. Housing costs, per unit at Heidelberg, were also higher than Mannheim.

Customer Satisfaction Survey

The customer satisfaction surveys conducted by the 21st Support Command over the first 15 months of the contract period did not reveal any significant RPMA performance differences between contract and Government operations. Because the housing areas were not surveyed before contract operations, statistics for comparative analysis of preperformance and postperformance levels could not be evaluated.

Contract Analysis

An analysis of the contract specifications was performed and comments/recommendations were provided for contract revision to enhance contract performance. Specification constraints directly affecting performance include: supply acquisition, one-time services, cyclic painting and floor refinishing activities, specification format, and workload documentation forms. To improve the efficiency of the contract operations, high priority items should be designated as unit price items (i.e., cost benefit incentives) and low priority items should be covered under the umbrella of lump sum pricing (i.e., all recurring work with predictable performance requirements). Detailed information for contract revision, by specification number, is presented in Appendix C.

5 CONCLUSION AND RECOMMENDATION

Conclusion

This analysis has shown that Government family housing contract operations at Mannheim are more cost effective than Government in-house operations at Heidelberg. FY78 cost savings from contracting are estimated to be 4.2 percent. Future savings should approach and possibly exceed 15.1 percent. The FY78 savings are low because the contractor was overpaid for the work accomplished. During the beginning of FY78, the contractor received a higher number of SOs than estimated by the contract. This payment claim was honored. However, since these SOs had not been screened before submission, many were duplicates and/or unnecessary. Thus, the contractor was actually paid for services not rendered and potential savings were reduced. An SO screening procedure was implemented in the middle of CY78; the SO level is now below or equal to initial contract estimates. SO screening and revised contract specifications and administration procedures can save the Government as much as 15.1 percent in family housing maintenance contract costs.

Contracting family housing maintenance is feasible and can provide a viable alternative to Government in-house performance. Contracting is especially useful when manpower restrictions inhibit accomplishing all the work within an acceptable timeframe. However, care must be taken to avoid the tendency to contract all the work that should be done, rather than just the level accomplished in-house because this will likely increase the budget requirements. Any comparison of other sites must be based on the same workload and not just on the in-house dollars spent last year vs the contract dollars spent this year. The key elements in successful contracting are a good contract document (especially important when there is a controversy) and adequate monitoring of contractor's performance. The contractor's work must be inspected on a random basis to insure proper performance; records of performance must be maintained and evaluated. Contracting succeeds when the Government expects to maintain control and cooperation.

Recommendation

It is recommended that the revised contract specification and administration procedures listed in Appendix C be implemented in future contractual agreements to insure an increase in cost savings to the Government.

Table 1

Contract Cost Comparison: Estimated vs Accomplished
FY78 Workload* --
Benjamin Franklin Village

		Units (hours)	Labor Cost ($)	Equipment Cost ($)	Overhead ($) E=15%/A=13.7%	Profit ($) E=10%/A=4%	Inflation ($) E=17.2%/A=0	Total
I. Work Order Activity - LS								
A. Carpenter/Mason (632.21.22)	E	9,200	$96,628	$3,762				
	R	7,308	80,108	2,157				
B. PM/Custodial (632.31.32)	E	23,475	210,588	12,057				
	R	23,093	257,193	6,955				
C. Metalworking (632.4)	E	6,050	55,216	4,389				
	R	1,411	15,399	415				
D. Painting (632.5)	E	2,750	27,608	960				
	R	871	9,524	256				
E. Roadworker/M&S Equip (633.21)	E	4,000	36,361	875				
	R	453	5,079	138				
F. Grounds (634.21.22)	E	9,209	70,769	7,000				
	R	5,562	61,734	1,666				
G. Electrical/Refrigeration/ Washer & Dryer (652.2 & 653.2-3)	E	12,850	124,237	7,674				
	R	12,972	142,167	3,658				
H. Steamfitting/Boiler Fireman (652.3-4 & 654.2-4)	E	43,650	302,181	13,023				
	R	46,857	520,902	14,135				
I. Refuse (Cinder Removal) (654.5)	E	1,153	8,471	0				
	R	1,589	17,566	479				
J. Plumbing (552.5)	E	12,500	110,431	12,500				
	R	10,190	111,681	3,276				
Subtotals	E	124,837	$1,042,490	$62,240	$165,710	$127,044	$240,367	$1,637,851
	P	110,306	$1,221,353	$33,135	$171,865	$57,054	------	$1,483,407
II. Cyclic Painting - LS		(Labor/Equipment/Materials/Overhead/G&A/Profit Costs)						
A. Interior - (Apts)	E	600	$326,545					
	R	491	303,706					
(Stairwells)	E	116	65,553					
	R	111	78,051					
(Play rms/Maid's rms)	E	190	23,186					
	R	141	37,873					
(Laundry rms)	E	55	18,333					
	R	0	0					
B. Exterior - (Bldgs)	E	0	0	------				
	R	6	71,192					
Subtotals	E	-----	$433,617	-----	$65,043	$49,866	$94,346	$642,872
	R	-----	$490,822	-----	------	------	------	$490,822
III. Floor Refinishing - UP (Apts)	E	-----	$246,674					
	R	131	171,064					
Subtotals	E	-----	$246,674	-----	------	------	------	$246,674
	R	131	$171,064	-----	------	------	------	$171,064
Grand Totals	E	-----	$1,722,781	$62,240	$230,753	$176,910	$334,713	$2,527,397
	R	-----	$1,883,239	$33,135	$171,865	$57,054	------	$2,145,293** (E vs R = 15%)
	A							2,463,919 (E vs A = 3%)

Key:
- E = Estimated by Government for (FY78) contract cost determination (GFCE dtd Feb 76)
- R = Reported costs from work order activity for CY78; separate reports for cyclic painting (FY78; and purchase orders for floor refinishing (FY78).
- LS = Lump Sum RPMA
- UP = Unit Price RPMA
- * = GFCE adjustments (additions/deletions during the term of the contract have been included).
- ( ) = Unit of measure and yardstick codes.
- A = Actual contract costs as shown in contract (modifications for FY78): (1) Lump sum DM5,259,809 ($1 = DM2.294) and (2) Unit price DM392,473 ($1 = DM2.294)
- **= Reported costs do not include the cost of paint materials for work order activities (est. at $5RO based on CY7R costs).

Table 2

Real Property Summary Data

Real Property Element	Mannheim				Heidelberg				Difference (Mannheim vs Heidelberg)			
	Family Housing		General Purpose FH		Family Housing		General Purpose FH		Family Housing		General Purpose FH	
	Gov't Owned	Leased	Warehouses	Utility Bldgs	Gov't Owned	Leased	Warehouses	Utility Bldgs	Gov't Owned	Leased	Warehouse	Utility Bldgs
I. Facilities												
A. No. of Buildings	187	10	12	12	206	25	0	16	19	15	7	4
B. No. of Units	2,091	550	-	-	2,005	351	-	-	86	199	-	-
C. Square Footage	3,812,548	478,499	56,051	12,297	4,040,190	575,817	0	21,487	227,642	97,318	56,051	9,190
D. Year of Construction												
1945-50	0	0	0	0	28	1	0	0	28	1	0	0
1951-55	115	0	0	0	87	0	0		28	0	0	0
1956-60	72	0	0	0	0	90	0	0	18	0	0	0
1961-65	0	0	0	0	1	0	0	0	1	0	0	0
1966-70	0	0	0	0	0	4	0	0	0	4	0	0
1971-75	0	7	0	0	0	7	0	0	0	0	0	0
1976-78	0	3	0	0	0	13	0	0	0	10	0	0
E. Building Type and Volume*												
I	1	0	0	0	37	0	0	0	36	0	0	0
Ib	0	0	0	0	3	0	0	0	3	0	0	0
II	13	0	0	0	0	0	0	0	19	0	0	0
III	0	0	0	0	0	0	0	0	0	0	0	0
IIIa	7	0	0	0	0	0	0	0	7	0	0	0
IV B	0	0	0	0	2	0	0	0	2	0	0	0
IV Ba	17	0	0	0	0	0	0	0	17	0	0	0
IV Bc	0	0	0	0	12	0	0	0	12	0	0	0
V	10	0	0	0	63	0	0	0	53	0	0	0
Va	89	0	0	0	18	0	0	0	71	0	0	0
Va Mod	0	0	0	0	32	0	0	0	32	0	0	0
VI	46	0	0	0	4	0	0	0	42	0	0	0
IV & V	0	10	0	0	0	0	0	0	0	10	0	0
II,III,IV & V	0	0	0	0	0	25	0	0	0	25	0	0
A	2	0	0	0	0	0	0	0	2	0	0	0
B	1	0	0	0	0	0	0	0	1	0	0	0
C	1	0	0	0	0	0	0	0	1	0	0	0
OA	0	0	0	0	6	0	0	0	6	0	0	0
OB	0	0	0	0	3	0	0	0	3	0	0	0
Altern I	0	0	0	0	1	0	0	0	1	0	0	0
Altern II	0	0	0	0	12	0	0	0	12	0	0	0
Altern III	0	0	0	0	1	0	0	0	1	0	0	0
Altern A	0	0	0	0	2	0	0	0	2	0	0	0
Altern C	0	0	0	0	1	0	0	0	1	0	0	0
Fl Str	0	0	0	0	9	0	0	0	9	0	0	0
II. Occupancy (by Rank)												
A. General	1	0	0	0	21	1	0	0	20	1	0	0
B. Senior Grade	10	0	0	0	107	3	0	0	97	3	0	0
C. Field Grade	152	0	0	0	938	5	0	0	786	5	0	0
D. Other	1928	550	0	0	939	342	0	0	989	208	0	0

*Does not include warehouses and utility buildings.

Table 3

Real Property Data: Patrick Henry Village, Heidelberg

Rank	No. of Units by Rank	Bldg Type	Bldg No.	No. of Units	No. of Bedrooms	Year Built
General	20	Ib	4757-4759	1 Ea = 3	4 Ea = 12	1957
		I	4760-4769	1 Ea = 10	4 Ea = 40	1956
			4770-4776	1 Ea = 7	4 Ea = 28	1956
Colonel	71	VI	4480-4483	2 Ea = 8	8 Ea = 32	1956
		V	4701-4748, 4751-4756	1 Ea = 54	4 Ea = 216	1956
			4777-4785	1 Ea = 9	4 Ea = 36	1956
LC & Maj	472	Va	4426,4428	19 Ea = 38	56 Ea = 112	1954
		Va	4430,4432	19 Ea = 38	56 Ea = 112	1955
		Va Mod	4464,4466, 4468,4471, 4473,4475, 4477,4478	19 Ea = 152	56 Ea = 448	1955
		Va	4427,4429	20 Ea = 40	59 Ea = 118	1954
		Va	4431	20 Ea = 20	59 Ea = 59	1955
		Va Mod	4463,4465, 4467,4469, 4470,4472, 4474,4476	20 Ea = 160	59 Ea = 472	1955
		Alt A	4490,4491	12 Ea = 24	36 Ea = 72	1956
NCO	723	Alt II	4401-4403, 4406-4414	12 Ea = 144	30 Ea = 360	1954
		Alt I	4405	12 Ea = 12	36 Ea = 36	1954
		Alt C	4462	12 Ea = 12	36 Ea = 36	1956
		Alt III	4404	18 Ea = 18	42 Ea = 42	1955
		Va	4418,4422, 4424	19 Ea = 57	56 Ea = 168	1954
		Va	4415-4417, 4419-4420, 4423,4425	20 Ea = 140	59 Ea = 413	1954
		Va	4421	20 Ea = 20	59 Ea = 59	1955
		Va Mod	4433-4441, 4449-4455	20 Ea = 320	59 Ea = 944	1955
TOTAL	1286		154	1286	3815	

Table 4

Real Property Data: Mark Twain Village, Heidelberg

Rank	No. of Units by Rank	Bldg Type	Bldg No.	No. of Units	No. of Bedrooms	Year
General	1	I	3750	1 Ea = 1	4 Ea = 4	1963
Colonel	36	F1 Str	3739-3743, 3729-3732	4 Ea = 36	14 Ea = 126	1953
LC & Maj	466	IV Bc	3661-3665	24 Ea = 120	56 Ea = 280	1953
		OA	3701,3703, 3704,3706 3606,3709	12 Ea = 72	30 Ea = 180	1950
		I	3712, 3721-3728	12 Ea = 108	30 Ea = 270	1950
		I	3710,3711 3713-3720	13 Ea = 130	32 Ea = 320	1950
		OB	3702,3705, 3708	12 Ea = 36	30 Ea = 90	1950
NCO	216	IV Bc	3650-3653, 3658-3660	24 Ea = 168	56 Ea = 392	1953
		IV B	3737,3738	24 Ea = 48	56 Ea = 112	1953
TOTAL	719		52	719	1774	

Table 5

Real Property Data: Leased Housing, Heidelberg

Rank	No. of Units by Rank	Bldg No.	No. of Units	No. of Bedrooms	Year Built
General	1	3476	1 Ea = 1	--	1945
Colonel	3	3127	1 Ea = 1	2 Ea = 2	1970
		3130	1 Ea = 1	3 Ea = 3	1971
		3131	1 Ea = 1	4 Ea = 4	1971
LC & Maj	5	3110	2 Ea = 2	4 Ea = 4	1968
		3111	3 Ea = 3	6 Ea = 6	1968
LC & Maj, NCO	25	3159-3163	5 Ea = 25	20 Ea = 100	1978
CG & WO	83	3108	6 Ea = 6	18 Ea = 18	1968
		3148	68 Ea = 68	109 Ea = 109	1975
		3158	9 Ea = 9	27 Ea = 27	1977
CG & WO, NCO	32	3145	32 Ea = 32	52 Ea = 52	1974
NCO	202	3142	28 Ea = 28	54 Ea = 54	1974
		3146	22 Ea = 22	44 Ea = 44	1974
		3147	12 Ea = 12	24 Ea = 24	1975
		3151	1 Ea = 1	4 Ea = 4	1976
		3152	39 Ea = 39	108 Ea = 108	1977
		3153	46 Ea = 46	115 Ea = 115	1977
		3154,3156	9 Ea = 18	27 Ea = 54	1977
		3155	6 Ea = 6	18 Ea = 18	1977
		3157	30 Ea = 30	75 Ea = 75	1977
	351	25	351	821	

Table 6

Real Property Data: Benjamin Franklin Village, Mannheim

Rank	No. of Units by Rank	Bldg Type	Bldg No.	No. of Units	No. of Bedrooms	Year Built
General	1	I	2011	1 Ea = 1	7 Ea = 7	1956
Colonel	10	V	2001-2010	1 Ea = 10	4 Ea = 40	1956
Field Grade	152	VI	2012-2029, 2031-2057	2 Ea = 90	8 Ea = 360	1956
		VI	2030	2 Ea = 2	8 Ea = 8	1957
		B	636	12 Ea = 12	30 Ea = 30	1956
		A	437-638	12 Ea = 24	36 Ea = 72	1956
		C	639	12 Ea = 12	36 Ea = 36	1956
		II	640	12 Ea = 12	30 Ea = 30	1954
Company Grade	262	II	641-652	12 Ea = 144	30 Ea = 360	1954
		Va	654-660*	14 Ea = 98**	36 Ea = 252	1954
		Va	653	20 Ea = 20**	54 Ea = 54	1954
Senior Enlisted	360	Va	663-664, 666-670 672-677*	14 Ea = 182**	36 Ea = 468	1954
		Va	192-195,671*	14 Ea = 70**	36 Ea = 180	1955
		Va	196-199	20 Ea = 80**	54 Ea = 216	1955
		Va	190-191*	14 Ea = 28**	36 Ea = 72	1956
Junior Enlisted	1306	Va	657-660, 663-664, 666-670, 672-677*	6 Ea = 102	18 Ea = 306	1954
		Va	192-195,671*	6 Ea = 30	18 Ea = 90	1955
		Va	190,191*	6 Ea = 12	18 Ea = 36	1956
		Va	654-656*	7 Ea = 21+	18 Ea = 54	1954
		IIIa	281 & 291	16 Ea = 32	32 Ea = 64	1952
		IIIa	299-300 302,304	16 Ea = 64	32 Ea = 128	1953
		Va	661,662,665, 678-684, 686-690	20 Ea = 300**	54 Ea = 810	1954
		Va	685,691,692	20 Ea = 60**	54 Ea = 162	1955
		Va	693-695	20 Ea = 60**	54 Ea = 162	1956
		Va	702-703	20 Ea = 40**	54 Ea = 108	1959
		Va	701,704	20 Ea = 40**	54 Ea = 108	1960
		Va	306-310	21 Ea = 105	54 Ea = 270	1954
		IVBa	279,288, 297,301	24 Ea = 96	56 Ea = 224	1953
		IVBa	280,283-285, 287,289-290, 292-296,298	24 Ea = 312	56 Ea = 728	1952
		IIIa	282	32 Ea = 32	64 Ea = 64	1952
TOTAL	2091		187	2091	5499	

* Building houses more than one rank of personnel.
** Includes 2 temporaries each.
\+ Includes 1 temporary each.

Table 7

Real Property Data: Leased Housing, Mannheim

Rank	No. Units by Rank	Bldg Type	Bldg No.	Designation	No. Of Units	No. of Bedrooms	Year Leased
Junior Enlisted	550	IV & V	10	Lampertheim, Bachfeldstrasse	52	104	1973
		IV & V	4,6,8	Lampertheim, Bachfeldstrasse	42	68	1974
		IV & V	2	Lampertheim, Pfaffenwiese	10	15	1974
		IV & V	2	Frankenthal, Lucas-Cranach-Strasse	100	220	1974
		IV & V	3	Frankenthal, Pilgerpfad	80	176	1978
		IV & V	61	Viernheim, Rathausstrasse	15	29	1974
		IV & V	30 & 32	Oggersheim, Moerikestrasse	251++	434	1977
TOTAL	550		10		550	1046	

++ This does not include janitor apartment.

Table 8

Boiler Capacities and Volumes (Mannheim vs Heidelberg)

	Mannheim		Heidelberg					
			Coal Fired # Boilers			Oil Fired # Boilers		
Capacity kBtu-hr	Coal Fired # Boilers	Oil Fired # Boilers	PHV	MTV	Total	PHV	MTV	Totals
						1		1
160						7		7
286	25	11				1		1
288		2				10		10
310		1					3	3
365							1	1
368							1	1
375								
405		11						
428	3	6						
476	5						18	18
484								
512	2					41	46	87
520				16	16			
528								
540		2						
572		4		2	2			
576								
583		37					19	19
584							2	2
588							3	3
588.8						1		1
625						3		3
635						1	1	2
640						35		35
651						9		9
654	60	122				1		1
656		2				1		1
659						3		3
659.2						2		2
695						2		2
698							5	5
725						12	11	23
760		2				1		1
794								
840		3	18		18			
864								
920	4							
940		4	1		1			
1,040			3		3			
1,056			3		3			
1,296			3		3			
1,440				3	3			
1,544				3	3			
1,608				6	6			
1,840			30		30			
1,977.6								
1,984				3	3			
2,048			3		3			
2,058.4			3		3			
2,139.2			3		3			
4,760	4							
25,600			4		4			
Totals	103	207	71	33	104	131	110	241

Table 9

FE Organizational Structure -- Heidelberg (CY78)

DEH Function	Civilian		Temp	Military		Local National		Total Man Years	
	Nonsupv	Supv	Nonsupv	Nonsupv	Supv	Nonsupv	Supv	Direct	Adm
Admin. Office			1			5	1		7
Program & Budget						3	1		4
Office of FE	1	1			2	1			5
Eng. Res. Mgt.		1				18	1		20
Office c/Bldgs. & Struct.					1				1
Bldgs. Prev. Maint.						35	6	41	
Carpentry						16	1	17	
Masonry						10	1	11	
Roofer						5	1	6	
Metal Working						11	1	12	
Painting						14	1	15	
Office c/Bldgs. & Grds.						1	3		4
Grounds Maint.						11	1	12	
Pavement Maint.						12	1	13	
Eng. Org. Maint.					1	14	1	16	
Office c/Utilities						4	1		5
Office c/Mech.						1	1		2
Plumbing						9	1	10	
Steamfitting						13	1	14	
Refrig. & Air Cond.						10	2	12	
Refrig. Repair						9	1	10	
Kitchen Equip. Rep.						5	1	6	
Heating Sys. Op.						16	1	17	
Office c/Electrician							1		1
Electr. Interior						13	1	14	
Electr. Exterior						7	1	8	
Generator Rep.						7	1	8	
Office c/Sanitation							1		1
Ext. Sewer Sys. Maint.						3		3	
Ext. Water Sys. Maint.						3		3	
Water Plant Op.						1		1	
Subtotals	1	2	1		4	257	34	249	50
Total Aver. Man Years	299							299	
Dir. Labor/Admin. Staff Ratio								4.98	
Property Control					1	3			4
Storage						4	1		5
TOTALS	1	2	1		5	264	35	249	59
Total Aver. Man Years	308							308	
Dir. Labor/Admin. Staff Ratio								4.22	

Table 10

FE Organizational Structure -- Mannheim (CY78)

DEH Function	Civilian		Temp	Military		Local National		Total Man Years	
	Nonsupv	Supv	Nonsupv	Nonsupv	Supv	Nonsupv	Supv	Direct	Adm
Admin Office						5	1		6
Program & Budget						6	1		7
Office of FE		2		3		1			6
Eng Res. Mgt.						10	1		11
Office c/Blgs. & Grds						4	1		5
Bldg. Prev. Maint.						28	1	29	
Carpentry						9	1	10	
Masonry						10	1	11	
Roofer									
Metal Working						17	1	18	
Painting						13	1	14	
Grounds Maint.						8	1	9	
Pavement Maint.						8	1	9	
Eng. Org. Maint. (M&S)						21	1	22	
Office c/Utilities						4	1		5
Plumbing						18	1	19	
Steamfitting						17	1	18	
Refrig. & Air Cond.						10	1	11	
Refrig. Repair									
Kitchen Equip. Rep.						8	1	9	
Heating Syst. Op.						29	3	32	
Electric Interior						15	3	18	
Electric Exterior						4	1	5	
Generator Repair									
Ext. Sewer Sys. Maint.						9		9	
Ext. Water Sys. Maint.									
Water Plant Op.						3	1	4	
Subtotals	—	2		3	—	258	26	247	42
Total Aver. Man Years			289					289	
Dir. Labor/Adm. Staff Ratio								5.88	
Supply & Storage Totals	—	2		3	—	11 269	1 27	247	12 54
Total Aver. Man Years			301					301	
Dir. Labor/Adm. Staff Ratio								4.57	

Table 11

FE Contract Administration Staff (CY78)

Organizational Function	Civilian Nonsupv/Supv	Local National Nonsupv/Supv	Temporary Nonsupv	Military Nonsupv/Supv	Total Man-Years Direct/Adm	
Project Admin	1	1.25	.10	.3	1.3	1.35
QA		3			3	
Totals	1	4.25	.10	.3	4.3	1.35

Table 12

Overview of Typical FE Shop Structure

Typical FE Shops DA PAM 570-551-6XX Series		Mannheim		Heidelberg
		Contract Shops	In-House Shops	In-House Shops
632.21.22	Carpentry Masonry and Packing Crating	Carpenter 1920.14111(a) 1920.14113(b)	Carpenter 1920.14111(a) 1920.14210(a) 1920.31111(a) 1920.31210(a)	Carpenter 1920.14111(a) 1920.14113(b) 1920.14210(a+b) 1920.31111(a) 1920.31210(a+b)
		Mason 1920.14111(a) 1920.14113(b)	Mason 1920.14111(a) 1920.14132(a) 1920.14139(a) 1920.14210(a) 1920.31111(a)	Mason 1920.14111(a) 1920.14113(b(1920.31111(a) 1920.31113(b)
		Roofing 1920.14112(c)		Roofer 1920.14111(a) 1920.14113(b) 1920.31111(a)
		Vacant Qtrs Maint. 1920.14113(b)		
632.31.32	Building Preventive Maintenance and Custodial	Preventive Maintenance 1920.14112(c)	Preventive Maintenance 1920.31112(a)	
				Preventive Maintenance 1920.14111(a) 1920.14112(c) 1920.14115(c) 1920.31111(a) 1920.31112(c) 1920.31210(c)
		Custodial 1920.14112(b)		
632.4	Metalworking	Locksmith 1920.14111(a) 1920.14113(b)	Metal 1920.14111(a) 1920.14113(a) 1920.14131(a) 1920.14139(a) 1920.14210(a) 1920.31111(a)	Metal 1920.14111(a) 1920.14113(b) 1920.31111(a) 1920.31113(b) 1920.31210(a)

a = Service Orders
b = Individual Job Orders
c = Standing Operations Orders

Table 12 (Continued)

Typical FE Shops DA PAM 570-551-6XX Series		Mannheim		Heidelberg
		Contract Shops	In-House Shops	In-House Shops
		Vacant Qtrs Maint 1920.14113(b)		
632.5	Painting	Painter 1920.14113(b) 1920.14115(a+b)	Painter 1920.14115(a) 1920.14132(a) 1920.3111(a)	Painter 1920.14114(a+b) 1920.14115(a+b) 1920.14210(b+c) 1920.31115(a+b)
633.21	Pavements Maintenance	Roads 1920.14132(c)	Operator 1910.14216(b+c) 1910.14217(c)	Roads 1920.14132(a+b) 1920.31132(a) Snow and Ice Control 1910.14216(c) Operator 1920.14113(b) Street Sweeping 1910.14217(c)
634.21-22	Grounds Maintenance	Grounds 1920.14131(c)	Grounds 1910.14216(c) 1920.14131(c)	Grounds 1920.14131(a+b+c)
634.5	Pest Control		Entomology 1910.14214(c) 1910.31214(c)	Entomology 1910.14214(c) 1910.31214(c)
652.21-22	Refrigeration and Air Conditioning (Includes Kitchen Equipment Maintenance)	Appliance 1910.16235(a)	Refrigeration 1910.31235(a+b)	Refrigeration 1910.16235(a+b) 1910.31235(a+b)
		Vacant Qtrs Maint 1920.14113(b)	Electrical Distribution 1910.31235(a)	
		Electrical Shop 1910.16235(a)	Electrical Installation 1910.31235(a)	Kitchen Equipment 1910.16235(a+b) 1910.31235(a+b) Mechanical Equipment 1920.14111(a) 1920.14113(b) 1920.31111(a)

a = Service Orders
b = Individual Job Orders
c = Standing Operations Orders

Table 12 (Continued)

Typical FE Shops DA PAM 570-551-6XX Series		Mannheim Contract Shops	Mannheim In-House Shops	Heidelberg In-House Shops
652.3.4	Boiler Plants/ Heating Systems/ Steamfitting	Heating 1910.14223(c) 1910.14226(c) Heating Supv 1920.14113(c) 1910.14223(c) 1910.14226(c)	Coal Handling 1910.14226(c)	Fuel Handling 1910.14223(c)
		Steamfitting 1920.14111(a) 1920.14113(a+b)	Steamfitter 1920.14113(a) 1920.14139(a)	Steamfitter 1920.14111(a) 1920.14112(c) 1920.14113(b) 1920.31111(a)
652.5	Plumbing (Steamfitting included above)	Plumber 1920.14111(a) 1920.14112(b) 1920.14210(b) Vacant Qtrs Maint 1920.14113(b)	Plumber 1920.14111(a) 1920.14131(a) 1920.14139(a) 1920.31111(a)	Plumber 1920.14111(a) 1920.14113(b) 1920.14210(b) 1920.31111(a) 1920.31210(b)
653.2-3	Electrical Systems Maintenance (Interior/Exterior)	Electric (Interior/ Exterior 1920.14111(a) 1920.14120(c)	Electric Distribution 1920.31111(a)	Electric Interior 1920.14111(a) 1920.14112(c) 1920.14113(b) 1920.14210(a+b) 1920.31111(a) 1920.31210(a)
		Vacant Qtrs Maint 1920.14113(a+b)	Electrical Installation 1920.14111(a) 1920.14210(a) 1920.31111(a)	Electric Exterior 1920.14120(a+b+c) Generator 1920.14112(c) CQ (Afterhours Maint) 1920.14111(a) 1920.31111(a)

a = Service Orders
b = Individual Job Orders
c = Standing Operations Orders

Table 12 (Continued)

Typical FE Shops DA PAM 570-551-6XX Series		Mannheim Contract Shops	Mannheim In-House Shops	Heidelberg In-House Shops
654.2.3	Water Plants/ Sewer Systems Maintenance and	Plumber 1920.14120(b)	Water & Chlorination 1920.14120(a+b)	Sanitation 1910.14224(c)
654.41.42	Exterior Water/ Sewer Systems Maintenance	Roads 1920.14120(c)	Sewer Maintenance 1920.14120(a)	Sewer 1910.14225(c) 1920.14112(a) 1920.31210(a)
654.5	Refuse Collection and Disposal	Refuse (Cinder Removal) 1910.14211(c)	1910.14211(c)	Refuse Refuse 1910.14211(c) 1910.31211(c)

a = Service Orders
b = Individual Job Orders
c = Standing Operations Orders

Table 13

In-House CY78 Work Order Activities, Heidelberg

Shop Code	Work Order Activity*	Work Order Type	Work Order Volume	Productive Hours	Labor Cost	Equipment Cost	Material Cost	Total Costs
632.21.22	Carpentry/Masonry							
	1920.14111	SO	2614	12121	$132892	$4255	21645	$158792
	1920.14113	IJO	105	3561	38703	1403	9858	49964
	1920.14210	SO	27	166	1884	51	1268	3203
		IJO	10	175	1971	52	1031	3054
	1920.31111	SO	80	484	5522	174	942	6638
	1920.31113	IJO	3	58	630	31	14	675
	1920.31210	SO	5	24	293	8	158	459
		IJO	2	75	738	19	56	813
	Shop Totals			16664	$182633	$5993	$34972	$223598
632.31.32	Building Preventive Maintenance & Custodial							
	1920.14111	SO	347	567	$5768	$163	$6106	$12037
	1920.14112	SOO	---	18810	197543	6079	23327	226949
	1920.14115	SOO	---	2565	27072	872	2910	30854
	1920.31111	SO	1	3	30	1	32	63
	1920.31112	SOO	---	1246	12260	312	1024	13596
	1920.31210	---	---	---	---	---	---	---
		SOO	---	1120	12474	422	1457	14353
	Shop Totals	---	---	24311	$255147	$7849	$34856	$297852
632.4	Metalworking/Locksmith							
	1920.14111	SO	1162	2978	$32496	$837	$7952	$41285
	1920.14113	IJO	25	1648	16661	421	5594	22676
	1920.31111	SO	55	164	1832	48	74	1954
	1920.31113	IJO	2	10	126	4	25	155
	1920.31210	SO	1	8	79	2	55	136
	Shop Totals	---	---	4808	$51194	$1312	$13700	$66206
632.5	Painting							
	1920.14114	SO	10	29	$338	$7	$18	$363
		IJO	7	60	658	12	58	728
	1920.14115	SO	593	3014	33164	597	3100	36861
		IJO	43	1994	20190	319	2554	23063
	1920.14210	IJO	2	12	134	2	9	145
		SOO	---	36	408	6	24	438
	1920.3115	SO	12	43	485	10	49	544
		IJO	9	343	3024	72	320	3416
	Shop Totals	---	---	5531	$58401	$1025	$6132	$65558
633.21	Pavement Maintenance							
	1910.14216	SOO	---	400	$4599	$909	$744	$6252
	1910.14217	SOO	---	734	7995	1492	---	9487
	1920.14113	IJO	5	42	862	44	---	906
	1920.14132	SO	40	333	3202	44	285	3531
		IJO	15	856	8262	256	964	9482
	1920.31132	SO	3	14	160	1	21	182
	Shop Totals	---	---	2379	$25080	$2746	$2014	$29840
634.21.22	Grounds Maintenance							
	1920.14131	SO	1	64	$600	$6	---	$606
		IJO	1	24	233	2	---	235
		SOO	---	3563	30615	376	8748	39739
	Shop Totals	---	---	3651	$31448	$384	$8748	$40580
634.5	Pest Control							
	1910.14214	SOO	---	2881	$27471	$1303	$1206	$29980
	1910.31214	SOO	---	199	1977	106	129	2212
	Shop Totals	---	---	3080	$29448	$1409	$1335	$32192

*Excluding self-help issue workload.

Table 13 (Continued)

Shop Code	Work Order Activity*	Type	Work Order Volume	Productive Hours	Labor Cost	Equipment Cost	Material Cost	Total Costs
652.21.22	Refrigeration/Air Conditioning (Includes Kitchen Equip. Maint.)							
	1910.16235	SO	3748	5966	$67077	$1302	$20242	$88621
		IJO	3	23	258	5	137	400
	1910.31235	SO	1098	2056	24475	472	4692	29639
		IJO	6	153	1717	30	700	2447
	1920.14111	SO	188	583	6631	68	9374	16073
	1920.14113	IJO	7	120	1315	10	1963	3288
	1920.31111	SO	2	6	66	---	---	66
	Shop Totals	---	---	8907	$101539	$1887	$37108	$140534
652.3.4	Boiler Plants/ Heating Systems/ Steamfitting							
	1910.14223	SOO	---	15989	$129757	$3853	$2731	$136341
	1920.14111	SO	886	2910	32493	504	5301	38298
	1920.14112	SOO	---	419	4796	174	45	5015
	1920.14113	IJO	27	3374	36276	650	52311	89237
	1920.31111	SO	4	13	136	3	4	143
	Shop Totals	---	---	22605	$203458	$5184	$60392	$269034
652.5	Plumbing							
	1920.14111	SO	2116	7744	$84628	$2229	$26487	$113344
	1920.14113	IJO	27	406	4669	132	1303	6104
	1920.14210	IJO	1	4	52	2	25	79
	1920.31111	SO	35	165	1830	43	232	2105
	1920.31210	IJO	1	11	117	4	83	204
	Shop Tables	---	---	8330	$91296	$2410	$28130	$121836
653.2.3	Electrical Systems Maintenance (Interior/ Exterior)							
	1920.14111	SO	3411	4729	$55556	$1464	$18248	$75268
	1920.14112	SOO	---	880	10453	285	92	10830
	1920.14113	IJO	7	138	1738	44	499	2281
	1920.14120	SO	65	122	1601	52	1957	3610
		IJO	17	777	8647	310	41263	50220
		SOO	---	3176	40123	1467	1209	42799
	1920.14210	SO	13	56	666	20	136	822
		IJO	6	24	306	9	49	364
	1920.31111	SO	106	214	2940	73	393	3406
	1920.31210	SO	1	9	99	3	36	138
	Shop Tables	---	---	10125	$122129	$3727	$63882	$189738
654.2.3	Water Plants and Sewer Systems Maintenance/ Exterior Water and Sewer System Maintenance							
	1910.14224	SOO	---	1365	$15669	$529	$5512	$21710
	1910.14225	SOO	---	1144	13703	473	955	15131
	1920.14112	SO	121	812	9160	351	387	9898
		IJO	6	183	2028	66	963	3057
	1920.31210	SO	2	16	174	6	0	180
	Shop Total	---	---	3520	$40734	$1425	$7817	$49976
654.4	Refuse Collection and Disposal							
	1910.14211	SOO	---	11510	$99885	$16431	$0	$116316
	1910.31211	SOO	---	504	4417	726	0	5143
	Shop Totals	---	---	12014	$104302	$17157	$0	$121459
	Grand Totals	SO	16747	45413	$506277	$12794	$129194	$648265
		IJO	337	14071	149315	3899	119779	272993
		SOO	---	66541	641217	35815	50113	727145
	Shop Totals	---	---	126025	$1296809	$52508	$299086	$1648403

*Excluding self-help issue workload.

Table 14

In-House CY78 Work Order Activities, Mannheim

Shop Code	Activity*	Work Order Type	Work Order Volume	Productive Hours	Labor Cost	Equipment Cost	Material Cost	Total Costs
632.21.22	Carpentry/Masonry							
	1920.14111	SO	5	59	$825	$26	$98	$949
	1920.14132	SO	1	3	48	1	1	50
	1920.14139	SO	1	15	238	7	8	253
	1920.14210	SO	10	100	350	37	266	653
	1920.31111	SO	33	296	3,721	113	713	4,547
	1920.31210	SO	1	16	240	6	40	286
	Shop total	---	---	489	5,422	190	1,126	6,738
632.31.32	Building Preventive Maintenance & Custodial							
	1920.31112	SO	40*	321	4,192	86	0	4,278
	Shop Total	---	---	321	4,192	86	0	4,278
632.4	Metalworking							
	1920.14111	SO	1	19	303	10	95	408
	1920.14113	SO	1	5	79	2	25	106
	1920.14131	SO	1	6	96	3	30	129
	1920.14139	SO	1	8	128	4	40	172
	1920.14210	SO	5	70	769	34	211	1,014
	1920.31111	SO	18	156	2,260	77	349	2,686
	Shop Total	---	---	264	3,635	130	750	4,515
632.5	Painting							
	1920.14115	SO	2	8	117	1	7	125
	1920.14132	SO	1	6	88	1	5	94
	1920.31111	SO	11	79	1,078	14	45	1,137
	Shop Total	---	---	93	1,283	16	57	1,356
633.21	Pavements Maintenance							
	1910.14216	IJO	1*	206	2,378	329	0	2,707
		SOO	---	72	719	116	0	835
	1910.14217	SOO	---	320	3,603	511	0	4,114
	Shop Total	---	---	598	6,700	956	0	7,656
634.21.11	Grounds Maintenance							
	1910.14216	SOO	---	67	947	67	887	1,901
	1920.1431	SOO	---	26	361	26	1,966	2,353
	Shop Total	---	---	93	1,308	93	2,853	4,254
634.5	Pest Control							
	1910.14214	SOO	---	5,307	41,872	1,785	320	43,977
	1910.31214	SOO	---	149	1,095	42	58	1,195
	Shop Total	---	---	5,456	42,967	1,827	378	45,172
652.21.22	Refrigeration/Air Conditioning							
	1910.31235**	SO	76	801	9,538	421	1,537	11,496
		IJO	12	999	11,365	223	1,065	12,653
	Shop Total	---	---	1,800	$20,903	644	$2,602	$24,149

* Excluding self-help issue workload.
**SO work order volume for Electrical Distribution and Installation is based on manhours per work order proration.

Table 14 (Continued)

Shop Code	Activity	Work Order Type	Work Order Volume	Productive Hours	Labor Cost	Equipment Cost	Material Cost	Total Costs
652.3.4	Boiler Plants/Heating Systems/Steamfitting							
	1910.14226	S00	---	1,532	14,343	$1,393	---	$15,736
	1920.14113	S0	1	20	283	3	100	386
	1920.14139	S0	13	301	4,105	45	1,322	5,472
	Shop Total	---	---	1,853	18,731	1,441	1,422	21,594
652.5	Plumbing							
	1920.14111	S0	2	22	289	12	53	354
	1920.14131	S0	2	16	216	8	80	304
	1920.14139	S0	3	32	429	17	160	606
	1920.31111	S0	17	175	2,059	87	347	2,493
	Shop Total	---	---	245	2,993	124	640	3,757
653.2.3	Electrical Systems Maintenance							
	1920.14111	S0	3	12	183	4	60	247
	1920.14210	S0	1	2	22	2	8	32
	1920.31111	S0	2	23	257	14	56	327
	Shop Total	---	---	37	462	20	124	606
654.2.3 41.42	Water Plants/Sewer Systems Maintenance and Exterior Water/Sewer Systems Maintenance							
	1920.14120	S0	31*	250	3,068	86	565	3,719
		IJ0	8	1001	11,437	323	2,083	13,843
	Shop Total	---	---	1,251	14,505	409	2,648	17,562
654.5	Refuse Collection/ Disposal							
	1910.14211	S00	---	10,219	99,175	14,372	0	113,547
	Shop Total	---	---	10,219	99,175	14,372	0	113,547
	Grand Totals	S0	283	2,821	34,981	1,121	6,221	42,323
		IJ0	21	2,206	25,180	875	3,148	29,203
		S00	---	17,692	162,115	18,312	3,231	183,658
	Shop Totals	---	---	22,719	222,276	$20,308	$12,600	$255,184

* Excluding self-help issue workload.
**S0 work order volume for Electrical Distribution and Installation is based on manhours per work order proration.

Table 15

Summary of Work Order Activities -- Heidelberg (CY78)

	Volume	Manhours	Labor	Equipment	Materials	Total
Heidelberg						
Patrick Henry Village						
SO	9,673	26,727	$294,603	$7,627	$77,088	$379,318
IJO	197	9,344	99,730	2,672	86,630	189,032
SOO		33,818	328,847	19,150	26,959	374,956
Total Patrick Henry		69,889	$723,180	$29,449	$190,677	$943,306
Mark Twain Village						
SO	5,669	15,467	173,553	4,323	45,418	223,294
IJO	117	4,077	43,233	1,067	31,951	76,251
SOO		29,654	281,242	15,099	20,544	316,885
Total Mark Twain Village		49,198	$498,028	$20,489	$97,913	$616,430
Government Housing						
SO	15,342	42,194	468,156	11,950	122,506	602,612
IJO	314	13,421	142,963	3,739	118,581	265,283
SOO		63,472	610,089	34,249	47,503	691,841
Total Government Housing		119,087	$1,221,208	$49,938	$288,590	$1,559,736
Leased Housing						
SO	1,405	3,219	38,121	844	6,688	45,653
IJO	23	650	6,352	160	1,198	7,710
SOO		3,069	31,128	1,566	2,610	35,304
Total Leased Housing		6,938	$75,601	$2,570	$10,496	$88,667
Total Heidelberg						
SO	16,747	45,413	506,277	12,794	129,194	648,265
IJO	337	14,071	149,315	3,899	119,779	272,993
SOO		66,541	641,217	35,815	50,113	727,145
Grand Total Heidelberg		126,025	$1,296,809	$52,508	$299,086	$1,648,403

Table 16

Summary of Work Order Activities -- Mannehim (CY78)

	Volume	Manhours	Labor	Equipment	Materials	Total
Mannheim						
Contract Operation						
Government Housing						
SO	12,483	28,858	$315,784	$8,620	$111,009	$435,413
IJO	316	6,157	66,665	1,802	39,333	107,800
SOO		75,291	838,904	22,713	51,609	913,226
Total Government Housing		110,306	$1,221,353	$33,135	$201,951	$1,456,439
Government Operations						
Government Housing						
SO	85	954	11,636	303	3,134	15,073
IJO	9	1,207	13,815	652	2,083	16,550
SOO		17,543	161,020	18,270	3,173	182,463
Total Government Housing		19,704	$186,471	$19,225	$8,390	$214,086
Leased Housing						
SO	198	1,867	23,345	818	3,087	27,250
IJO	12	999	11,365	223	1,065	12,653
SOO		149	1,095	42	58	1,195
Total Leased Housing		3,015	$35,805	$1,083	$4,210	$41,098
Total Government Operations						
SO	283	2,821	34,981	1,121	6,221	42,323
IJO	21	2,206	25,180	875	3,148	29,203
SOO		17,692	162,115	183,12	3,231	183,658
Total Government Operations		22,719	$222,276	$20,308	$12,600	$255,184
Total Mannheim						
SO	12,766	31,679	350,765	9,741	117,230	477,736
IJO	337	8,363	91,845	2,677	42,481	137,003
SOO		92,983	1,001,019	41,025	54,840	1,096,884
Grand Total Mannheim		133,025	$1,443,629	$53,443	$214,551	$1,711,623

Table 17

FHMA Expenditures for FY78 - Heidelberg

FHMA Code 1910	FHMA Description	Labor Cost	Equipment Cost	Material Cost	RPMA Contract Cost	Other STANFINS Cost	Cost Adjustments	Total Costs	Additional Cost	Total Adjusted Cost
14211	Refuse Collection & Disposal	$100,562	$8,143	$11	$97,002		($19,781) [2]	$205,718		$205,718
14214	Entomology Services	27,471 [1]	1,303 [1]	1,206 [1]			(29,980) [3]	29,980		29,980
14216	Snow Removal	4,599 [1]	909 [1]	744 [1]			(6,252) [4]	6,252		6,252
14217	Street Cleaning	7,995 [1]	1,492 [1]	193	1,837		(10,304) [5]	11,517		11,517
14219	Other Services	2,728			3,865	6,092		12,685		12,685
14221	Electricity					799,176	(136,453) [6]	799,176		799,176
14223	Fuel Oil	101,485	93	25		928,677	(5,247) [7]	1,030,280		1,030,280
14224	Water	15,669 [1]	529 [1]	5,512 [1]		536,464	(57,285) [8]	558,174		558,174
14225	Sewage	13,703 [1]	473 [1]	955 [1]		500,666	(34,179) [9]	515,797		515,797
14226	Utilities, Other		135	376,364	356,180		(181) [10]	732,679	612 [15]	733,291
16110	Family Housing Office	395,832			69			395,901	2,055 [15]	397,956
16120	Administrative Support	350,839				23,667		374,506		374,506
16231	Control, Mov., Handle, Furnishing					669		669	368,032 [15]	368,701
16235	Maint. & Repair Equipment	41,372	2,812	50,876			(22,742) [11]	95,060	20,533 [15]	115,593
16237	Initial Issue Equipment									
1910	Gov't Hsg. Subtotal	$1,062,255	$15,889	$435,886	$458,953	$2,795,411	($322,404)	$4,768,394	$391,232	$5,159,626
31110	Family Housing Office									
31120	Administrative Support	311				31	(342) [2]	342		342
31211	Refuse Collection & Disp.	3,413				16,026	(19,439) [2]	19,439		19,439
31214	Entomology Services	1,977 [1]	106 [1]	129 [1]			(2,212) [3]	2,212		2,212
31221	Electricity					136,453	(136,453) [6]	136,453		136,453
31222	Gas					93,932		93,932		93,932
31223	Fuel Oil	5,196				64,089	(5,247) [7]	69,285		69,285
31224	Water					35,575	(35,575) [8]	35,575		35,575
31225	Sewage					34,179	(34,179) [9]	34,179		34,179
31226	Other Utilities Fuel					2,043		2,043		2,043

[1] through [15], see p 47.

Table 17 (Continued)

FHMA Code 1910	FHMA Description	Labor Cost	Equipment Cost	Material Cost	RPMA Contract Cost	Other STANFINS Cost	Cost Adjustments	Total Cost	Additional Cost	Total Adjusted Cost
31231	Control, Mov., Handle, Furnish							---	71,264 [15]	71,264
31235	Maint. & Repair Equipment	21,234	1,508				(22,742) [11]	22,742		22,742
1910	Leased Hsg. Subtotal	$32,131	$1,614	$129	0	$382,328	($256,189)	$416,202	$71,264	$487,466
41130	Housing Referral	74,186						74,186		74,186
1910	Total	$1,168,572	$17,503	$436,015	$458,953	$3,177,739	($578,593)	$5,258,782	$462,496	$5,721,278
1920										
14111	Service Calls	$287,703	$33,650	$119,195			($12,401) [12]	$440,548		
14112	Routine Maintenance	289,119	40,648	81,161	21,775		(37,413) [13]	432,703		
14113	Major Repairs/Replace	86,806	3,070	45,019	1,408,150			1,543,045		
14114	Painting, Exterior	2,585		34	111,396			114,015		
14115	Painting, Interior	27,099	1,131	3,916	371,267			403,413		
14120	Exterior Utilities	50,371 [1]	1,829 [1]	44,909 [1 + 10]	24,948		(96,810) [10]	122,057		
14131	Grounds	31,448 [1]	384 [1]	13,063 [1 + 14]	75,700		(40,993) [14]	120,595		
14132	Surface Areas	11,464 [1]	300 [1]	1,249 [1]			(13,013) [1]	13,013		
14139	Other	69		396				465		
14210	Dwelling Alterations	6,071	86	4,988	5,569			16,714		
14220	Other Real Property									
1920	Gov't Hsg. Subtotal	$792,735	$81,098	$313,930	$2,018,805		($200,630)	$3,206,568	0	$3,206,568
31111	Service Calls	$11,655	746				($12,401) [12]	$12,401		
31112	Routine Maintenance	28,723	8,690				(37,413) [13]	37,413		
31113	Major Repairs/Replace	756 [1]	35 [1]	39 [1]	3,602		(830) [1]	4,432		
31115	Painting, Interior	485 [1]	10 [1]	49 [1]	50,303		(544) [1]	50,847		
31131	Grounds									
31132	Surfaced Areas	160 [1]	1 [1]	21 [1]			(182) [1]	182		
31139	Other				538			538		
31210	Dwelling Alterations	13,974 [1]	464 [1]	1,845 [1]			(16,283) [1]	16,283		
31220	Other Real Property									
1920	Leased Hsg. Subtotal	$55,753	$9,946	$1,954	$54,443		($67,653)	$122,096	$0	$122,096
1920	Total	$848,488	$91,044	$315,884	$2,073,248		($268,283)	$3,328,664	$0	$3,328,664
1920	Grand Total	$2,017,060	$108,547	$751,899	$2,532,201	$3,177,739	($846,876)	$8,587,446	$462,496	$9,049,942

[1] through [15], see p 47.

Table 17 (Continued)

1. Estimated costs based on work order data for CY78 provided by Engineering Resources Management Division Office (ERMO). Budget input data provided did not reflect costs. FHMA costs from Mannheim Budget Office for Heidelberg RPMA.

2. Housing Division transferred $19,439 to 1910.31211 and $342 to 1910.31120 for leased housing expenses.

3. Entomology services cost is not billed by FE to FHMA; thus, costs from ERMO for CY78 are shown as annual estimates.

4. Snow Removal Services cost is not billed by FE to FHMA thus costs from ERMO for CY78 are shown as annual estimates.

5. Street Cleaning changes from FE for second quarter, FY78 (EOE 2572) were not recorded by Housing as part of FHMA costs ($817). Labor and equipment costs were reported by ERMO but not FE Budget, thus CY78 estimate of $9,487 is shown.

6. Housing Division transferred $136,453 to 1910.31221 for leased housing expense.

7. Housing Division transferred $5,247 from 1910.31223 to 1910.14223; however, this is assumed to be in error and costs as originally charged by the FE to the respective FHMAs are shown.

8. Housing Division transferred $35,575 to 1910.31224 for leased housing expense. ERMO reported labor equipment and materials expenses in the amount of $21,710 which was not reported in FE Budget.

9. Housing Division transferred $34,179 to 1910.31225 for leased housing expense. OMA changes do not reflect labor, equipment, and material expenditures; thus, ERMO data for CY78 is used as an estimate.

10. Housing Division has $181 excess dollar amount charged to 1910.14226 (EOE 2574) based upon FE charges to FHMA, thus this amount is not included in costs shown. This cost is shown in 1920.14120 ($244, EOE 2572) as an RPMA contract cost. Additional costs of $96,629 have been added to labor, equipment, and materials costs.

11. Housing Division transferred $22,742 to 1910.31235 for leased housing expense.

12. Housing Division transferred $12,401 to 1920.31111 for leased housing expense.

13. Housing Division transferred $37,413 to 1920.31112 for leased housing expense. Housing contract $21,775 (EOE 2572) in addition to FE charges as shown.

14. Housing Division failed to add $413 to EOE 2572 for MA expenditure which was transferred from 1920.14132 to 1920.14131. Also, $40,580 is added to cost for unreported labor, equipment, and materials costs.

15. Transferred from Mannheim.

Table 18

FHMA Expenditures for FY78 -- Mannheim

FHMA Code 1910	FHMA Description	Labor Cost	Equipment Cost	Material Cost	RPMA Contract Cost	Other STANFINS Cost	Cost Adjustments	Total Cost	Backout Cost	Total Adjusted Cost
14211	Refuse Collection & Disposal	$119,088	$13,669		$55,244		($3,847) [1]	$188,001		$188,001
14214	Entomology Services	47,458	1,814	418				49,690	-17,392 [a]	32,298
14216	Snow Removal	4,093	505	2,500				7,098		7,098
14217	Street Cleaning	6,035	871					6,906		6,906
14219	Other Services	18,973		2,130	5,610			26,713		26,713
14221	Electricity					855,986		855,986		855,986
14223	Fuel Oil			251		959,377	(4,313) [2]	959,628		959,628
14224	Water					620,462		620,462		620,462
14225	Sewage					506,900		506,900		506,900
14226	Utilities, Other	19,002	1,508	476,563	12,689			509,762	-2,448 [a,c,d,e]	507,314
16110	Family Housing Office	331,435			86			331,521	-2,055 [e]	329,466
16120	Administrative Support	142,344		4,141		3,413		149,898		149,898
16231	Control, Mov., Handle, Furnish	736,064						736,064	-368,032 [e]	368,032
16232	Maint. & Repair Furnishing							---		---
16235	Maint. & Repair Equipment			45,034	44,238			89,272	-20,533 [e]	68,739
16237	Initial Issue Equipment									
1910	Gov't Hsg. Subtotal	$1,424,492	$18,367	$531,037	$117,867	$2,946,138	($8,160)	$5,037,901	-$410,460	$4,627441
31110	Family Housing Office			$5,426				$5,426		$5,426
31120	Administrative Support	4,690					(4,690) [1]	4,690		4,690
31211	Refuse Collection & Disp.	2,052			33,851		(8,536) [1]	35,903		35,903
31214	Entomology Services	536	17	18				571	-228 [a]	343
31221	Electricity				256,869		256,869			256,869
31222	Gas					111,363		111,363		111,363
31223	Fuel Oil					2,387	(4,313) [2]	2,387		2,387
31224	Water					52,972		52,972		52,972
31225	Sewage					43,401		43,401		43,401
31226	Other Utilities Fuel				305	45,020		45,325		45,325
31231	Control, Mov., Handle, Furnish					142,527		142,527	-71,264 [e]	71,263
31235	Maint. & Repair Equipment	37,837	1,790	16,834			(6,798) [3]	56,461		56,461
1910	Leased Hsg. Subtotal	$45,115	$1,807	$22,278	$34,156	$654,539	($24,337)	$757,895	-$71,492	$686,403
41130	Housing Referral	$60,371			$3,143			$63,514		$63,514
	Subtotal 1910	$1,529,978	$20,174	$553,315	$155,166	$3,600,677	($32,497)	$5,858,310	-$481,952	$5,377,358

[1] through [4], see p 50.
[a] through [e], see p 49.

Table 18 (Continued)

FHMA Code 1910	FHMA Description	Labor Cost	Equipment Cost	Material Cost	RPMA Contract Cost	Other STANFINS Cost	Cost Adjustments	Total Cost	Backout Cost	Total Adjusted Cost
14111	Service Calls	$2,456	$68	$28,879				$31,403		
14112	Routine Maintenance	8,700	184	67,732	2,366,692			2,443,308		
14113	Major Repairs/Replaces	369	6	98,919	1,922,577			2,021,871		
14114	Painting, Exterior			99				99		
14115	Painting, Interior	139	2	77				218		
14120	Exterior Utilities	16,288	428	6,177	189,417			212,310		
14131	Grounds	1,279	86	14,503				15,868		
14132	Surfaced Areas	48	1	157	43,117		(50) [4]	43,323		
14139	Other	5,352	83	1,694	22,260			29,389		
14210	Dwelling Alterations	265	4	4,642	18,361			23,272		
14220	Other Real Property			2,728	56,385			59,113		
1920	Gov't Hsg. Subtotal	$34,896	$862	$225,607	4,618,809		($50)	$4,880,174	0	$4,880,174
31111	Service Calls	6,855	200	1,694				8,749		
31112	Routine Maintenance	18,025	368	6,443				24,836		
31113	Major Repairs/Replaces				45,481			45,481		
31115	Painting, Interior	701	6	46	24,094			24,847		
31131	Grounds			1,103				1,103		
31139	Other							---		
31210	Dwelling Alterations	340	11	1,143	203			1,697		
31220	Other Real Property				3,002			3,002		
1920	Leased Hsg. Subtotal	$25,921	$585	$10,429	$72,780		(0)	$109,715	0	$109,715
	Subtotal 1920	$60,817	$1,447	$236,036	$4,691,589		($50)	$4,989,889	0	$4,989,889
1900	Grand Total	$1,590,795	$21,621	$789,351	$4,846,755	$3,600,677	($32,547)	$10,849,199	-$481,952	$10,367,247

[a] Transferred to Worms
[b] Transferred to Mannheim
[c] Transferred to Karlsruhe
[d] Transferred to Kaiserslautern
[e] Transferred to Heidelberg

Table 18 (Continued)

1. 1910.14211 + 31211 + 31120

   a. OMA

      14211: Labor $113,996 + equipment $14,914 + contract $55,244 = $184,154

      31211: Contract $44,439

   b. FHMA

      14211: Labor $119,088 + equipment $13,669 + contract $55,244 = $188,001

      31211: Labor $2,052 + contract $33,851 = $35,903

      31120: Labor $4,690

2. 1910.14223 and 31223

   a. OMA

      14223: Purchase $955,064 + materials $251 = $955,315

      31223: Purchase $6,699

   b. FHMA

      14223: Purchase $959,628

      31223: Purchase $2,387

3. 1910.31235 and 41235

   a. OMA

      31235: Labor $32,579 + equipment $1,674 + material $15,410 = $49,663

      41235: Labor $5,258 + equipment $116 + material $1,424 = $6,798

   b. FHMA

      31235: Labor $37,837 + equipment $1,790 + material $16,834 = $56,461

      41235: NA

4. 1920.14132

January 1978 RMO data identify labor $48, equipment $1, and materials $1, which were not reported in STANFINS. These costs have been included above.

Table 19

Contract Operations' Organizational Structure
Benjamin Franklin Village (CY78)

	Years		Total Years	
	Nonsupv	Supv	Direct	Admin
Project Supervision		3		3
Work Management	3.6			3.6
Supply	2	1		3
Carpentry & Masonry[1]	10.0	.3	10.3	
Bldg. PM & Custodial	14.4		14.4	
Metalworking	.9		.9	
Painting[2]	20.8		20.8	
Pavement Maint.	.3		.3	
Grounds Maint.	3.5	.1	3.6	
Refrigeration & A/C	6.0		6.0	
Boiler/Heating/Steamfitting	29.0	1.6	30.6	
Plumbing	6.4	.5	6.9	
Electrical Sys. Maint.	2.2	1	3.2	
Water & Sewer Sys. Maint.	2.7		2.7	
Refuse Collection & Disposal	1.0	___	1.0	___
Subtotals MY	102.8	7.5	100.7	9.6
Total Average MY	110.3			110.3
Direct Nonsupervisor to Supervisor Ratio	$\frac{(102.8)-(3.6+2)}{(7.5)-(3+1)} = 27.8$			
Direct Labor to Admin. Ratio	$\frac{100.7}{9.6} = 10.5$			

1. Includes 5.4 MY of floor refinishing.
2. Includes 20.3 MY of cyclic painting.

Table 20

CY78 Work Order Activities: Contract Operation -- Benjamin Franklin Village, Mannheim

Shop Code	Activity**	Work Order Type	Work Order Volume	Productive Hours	Labor Cost	Equipment Cost	Material Cost	Total Costs	
632.21.22	Carpentry/Masonry								
	1920.14111	S0	1408*	4978	$54249	$1465	$9812	$65526	*$97 added from Table
	1920.14112	S00		1140	12796	345	609	13750	S0, carpentry
	1920.14113	IJ0	70*	1190	13063	347	3865	17275	
	Shop Total	---	---	7308	$80108	$2157	$14286	$96551	
6.32.31.32	Building Preventive Maintenance and Custodial								
	1920.14112	IJ0	2	474	$5155	$142	$0	$5297	
		S00	---	22619	252038	6813	36648	295499	
	Shop Total	---	----	23093	$257193	$6955	$36648	$300796	
632.4	Metalworking								
	1920.14111	S0	813*	1344	$14669	$396	$5313	$20378	*$9 added from Table 10,
	1920.14113	IJ0	5	67	730	19	225	974	S0, metalworking
	Shop total	---	---	1411	$15399	$415	$5538	$21352	
632.5	Painting								
	1920.14113	IJ0	---	9	$102	$3	$2	$107	
	1920.14115	S0	289	811	8866	238	562	9666	
		IJ0	2	51	556	15	16	587	
	Shop Total	---	---	871	$9524	$256	$580	$10360	
633.21	Pavement Maintenance								
	1920.14132	S00	---	453	$5079	$138	$332	$5549	
	Shop Total	---	---	453	$5079	$138	$332	$5549	
634.21.22	Grounds Maintenance								
	1920.14131	S00	---	5562	$61734	$1666	$10101	$73501	
	Shop Total	---	---	5562	$61734	$1666	$10101	$73501	
652.21.22	Refrigeration and Air Conditioning								
	1910.16235	S0	4212*	9085	$99600	$2517	$51268	$153385	*69 added from Table 10
	1920.14113	IJ0	36	454	4981	131	1589	6701	
	Shop Total	---	---	9539	$104581	$2648	$52857	$160086	

** Typical FE shop titles using DA PAM 570-54-6XX and FHMA using AR 37-100-79. The above workload does not include floor refinishing and cyclic painting.

† Occupancy turnover maintenance is distributed.

Table 20 (Continued)

Shop Code	Activity	Work Order Type	Work Order Volume	Productive Hours	Labor Cost	Equipment Cost	Material Cost	Total Costs	
652.34	Boiler Plants/Heating Systems/Steamfitting								
	1910.14 223	S00	---	5711	$63250	$1720	2237	$67207	
	1910.14226	S00	---	35448	395590	10718	1245	407553	
	1920.14111	S0	295	1011	11164	300	1585	13049	
	1920.14113	S00	---	2382	26485	716	0	27201	
		S0	97	366	4008	108	2652	6768	
		IJ0	39	1502	15706	443	26163	42312	
	Shop Total		---	46420	$516203	$14005	$33882	$564090	
652.5	Plumbing								
	1920.14111	S0	3214*	8756	$95823	$2857	$28761	$127441	*$181 added from Table 10
	1920.14112	IJ0	1	232	2644	72	115	2831	
	1920.14113	IJ0	102	1202	13214	347	4239	17800	
	Shop Total	---	---	10190	$111681	$3276	$33115	$148072	
653.2.3	Electrical Systems Maintenance								
	1920.14111	S0	2147†	2481	$27148	$732	$10932	$38812	†$107 from Table 10
	1920.14113	S0	8	26	257	7	124	388	
		IJ0	58	719	7870	208	2515	10593	
	1920.14120	S00	---	207	2311	63	437	2811	
	Shop Total	---	---	3433	$37586	$1010	$14008	$52604	
654.2.3.4	Water Plants and Sewer Systems Maintenance/ Exterior Water and Sewer Systems Maintenance								
	1920.14120	IJ0	1	257	$2644	$75	$604	$3323	
		S00	180	2055	55	0	2110		
	Shop Total	---	---	437	$4699	$130	$604	$5433	
654.5	Refuse Collection and Disposal								
	1910.14211	S00	---	1589	$17566	$479	0	18045	
	Shop Total	---	---	1589	$17566	$479	0	18045	
	Grand Total	S0	12483	28858	$315784	$8620	$111009	$435413	
		IJ0	316	6157	66665	1802	39333	107800	
		S00	0	75291	838904	22713	51609	913226	
	Shop Total	---	---	110306	$1221353	$33135	$201951	$1456439	

Table 21

CY78 Cyclic Painting Activities: Contract Operations

	Activity	Apartments	Cost	
I.	Interior Painting			
	Jan 78	(40)	24,716	
	Feb 78	(28)	17,716	
	Mar 78	(20)	12,030	
	Apr 78	(35)	23,107	
	May 78	(35)	22,291	
	Jun 78	(63)	36,238	
	Jul 78	(45)	32,428	
	Aug 78	(60)	41,262	
	Sep 78	(41)	26,302	
	Oct 78	(50)	32,891	
	Nov 78	(32)	21,594	
	Dec 78	(35)	24,338	
	Subtotal	(484)		314,913
II.	Common Areas			
	Mar (111 Stairwells)		78,051	
	Apr (106 Maids' rms; 35 Play rms)		37,873	
	Subtotal	(252)		115,924
III.	Exterior Painting			
	Jul 78	(1)	12,870	
	Subtotal	(1)		12,870
IV.	Cyclic Painting Total			443,707
V.	Cost Distribution			
	Total Cost		$443,707	
	Less Profit		426,642	
	Less Overhead/G&A		375,235	
	Labor/Equip/Mats		375,235	
	*95%/ 2%/ 3%			

*Paint Shop, Contract Operation, IJO cost distribution factors

Table 22

CY78 Floor Refinishing Activities: Contract Operations

I Unit Price Contract Activity

Delivery Order #	Date Ordered	Delivery Order Cost	Number of Dwelling Units
28	1/2/78	$6,491	6
29	1/11/78	6,576	5
30	1/19/78	7,463	4
31	1/23/78	7,951	6
32	1/31/78	7,776	6
33	2/8/78	8,128	5
34	2/10/78	3,668	4
35	2/27/78	2,615	3
36	3/7/78	1,516	2
37	3/17/78	2,697	2
38	4/3/78	4,288	3
39	4/18/78	1,146	1
40	4/25/78	2,468	2
41	5/9/78	2,451	2
42	5/19/78	4,756	3
43	6/1/78	2,198	2
44	6/9/78	5,741	3
45	6/20/78	3,430	2
46	6/26/78	4,794	4
47	6/29/78	3,807	3
48	7/7/78	3,392	2
49	7/19/78	5,347	5
50	7/28/78	2,055	2
51	8/8/78	4,533	3
52	8/18/78	1,125	2
53	8/23/78	5,020	4
54	9/7/78	6,741	4
55	9/19/78	3,824	2
56	9/26/78	151	*
57	10/5/78	3,266	2
58	10/20/78	4,005	2
59	11/6/78	1,408	1
60	11/10/78	4,861	3
61	12/4/78	6,531	3
62	12/8/78	6,531	3
63	12/?/78	3,876	2
II Total Floor Refinishing Cost		$147,588	107

III Cost Distribution

Total Cost: $147,588
Less Profit: $141,912

Less Overhead/G&A: $124,812
Labor/Equip/Mats: $124,812
**76%/2%/22%

*Economic Price Adjustment
**Carpenter/Mason Shop, Contract Operations, IJO cost distribution factors.

Table 23

Vacant Quarters Maintenance Distribution
Contract Operation
FHMA 1920,14113/IJO Activity (CY78)

Activity	Vacant Qtrs Maint. Shop (100%)	Plumber (39%)	Carpentry/ Masonry (21%)	Electrical (23%)	Appliance (15%)	Metalworking/ Locksmith (2%)
Productive Hours	(3,026.0)	(1,180.14)	(635.46)	(695.98)	(453.90)	(60.52)
Labor Cost $	33,208.54	12,951.33	6,973.79	7,637.96	4,981.28	664.17
Equipment Cost $	872.56	340.30	183.24	200.69	130.88	17.45
Materials Cost $	10,591.01	4,130.49	2,224.11	2,435.93	1,588.65	211.82
Total Cost $	44,672.11	17,422.12	9,381.14	10,274.58	6,700.81	893.44
Work Order Volume (SO)*	463	180.57	97.23	106.49	69.45	9.26
Work Order Volume (IJO)	243	94.77	51.03	55.89	36.54	4.86

* SO work order volume is added to respective shops. Productive hours and related costs, however, are added to IJO activity for each shop.

Table 24

Heating Supervision Workload Distribution
Contract Operation (CY78)

Original Costs:	1910.14226/500
Manhours	(2,956)
Labor	$32,673
Equipment	$ 887
Materials	$ 0
Total Cost	$33,560

Adjusted Costs:

Manhours	(396)
Labor	$ 4,378
Equipment	$ 119
Materials	$ 0

Transferred Costs: (1.6 Nonproductive Manyears x 1600)

Manhours	(2,560)
Labor	$28,295
Equipment	$ 768
Materials	$ 0

$\frac{(2,560)}{2,956} = 0.866$

0.866 (32,673) = 28,295
0.866 (887) = 768

Table 25

FY78 Cyclic Painting Activities: Contract Operations

	Activity		Cost	
I.	Interior Painting	(Apts)		
	Oct 77	(54)	$ 29,288	
	Nov 77	(40)	21,255	
	Dec 77	(30)	17,073	
	Jan 78	(40)	24,716	
	Feb 78	(28)	17,716	
	Mar 78	(20)	12,030	
	Apr 78	(35)	23,107	
	May 78	(35)	22,291	
	June 78	(63)	36,238	
	July 78	(45)	32,428	
	Aug 78	(60)	41,262	
	Sep 78	(41)	26,302	
	Subtotal	(491)		303,706
II.	Common Areas			
	Mar	(111 Stairwells)	78,051	
	Apr	(106 Maid's rms; 35 Play rms)	37,873	
	Subtotal	(252)		115,924
III.	Exterior Painting			
	Oct 77	(4)	45,931	
	Dec 77	(1)	12,391	
	July 78	(1)	12,870	
	Subtotal	(6)		71,192
IV.	Cyclic Painting Total			$490,822
V.	Cost Distribution			
	Total Cost		$490,822	
	Less Profit		471,944	
	Less Overhead/G&A		415,078	
	*Labor/Equip/Mats		415,078	
	*95%/ 2%/ 3%			

*Paint Shops Contract Operation, IJO cost distribution factors.

Table 26

Floor Refinishing RPMA -- Contract Operation (FY78)

I. Unit Price Contract Activity

Delivery Order #	Date	$	No. of FH Units
16	10/3/77	6778	4
17	10/7/77	5635	3
18	10/14/77	6783	3
19	10/21/77	2007	3
20	10/28/77	3510	4
21	11/4/77	1561	2
22	11/18/77	1025	1
23	11/23/77	1564	2
24	11/28/77	4772	3
25	12/2/77	3459	4
26	12/6/77	5526	4
27	12/22/77	6296	6
28	1/2/78	6491	6
29	1/11/78	6576	5
30	1/19/78	7463	4
31	1/23/78	7951	6
32	1/31/78	7776	6
33	2/8/78	8128	5
34	2/10/78	3668	4
35	2/27/78	2615	3
36	3/7/78	1516	2
37	3/17/78	2697	2
38	4/3/78	4288	3
39	4/18/78	1146	1
40	4/25/78	2468	2
41	5/9/78	2451	2
42	5/19/78	4756	3
43	6/1/78	2198	2
44	6/9/78	5741	3
45	6/20/78	3430	2
46	6/26/78	4794	4
47	6/29/78	3807	3
48	7/7/78	3392	2
49	7/19/78	5347	5
50	7/28/78	2055	2
51	8/8/78	4533	3
52	8/18/78	1125	2
53	8/23/78	5020	4
54	9/7/78	6741	4
55	9/19/78	3824	2
56	9/26/79	151	*
II. TOTAL Floor Refinishing Cost		171064	131

III. Cost Distribution

Total Cost	$171,064
Less Profit	$164,485
Less Overhead & Admin.	$144,665
Floor/Equip/Mats	$144,665
**76%/2%/22%	

*Economic Price Adjustment

**Carpenter/Mason Shop, Contract Operation, IJO Cost Description Factors

Table 27

Contract Modification Activity and Costs

Mod. No. & Date	Modification Description	Lump Sum FY7T	Lump Sum FY77	Lump Sum FY78	Lump Sum FY79	Lump Sum Cumulative	Estimated Unit Price FY77	Estimated Unit Price FY78	Estimated Unit Price FY79	Estimated Unit Price Cumulative	Total Cumulative
FY7T											
P00001 (1 Sep 76)	Fund citation established for FY7T	348,377.72	4,180,532.64	4,180,532.64	4,180,532.64	12,889,975.64					
P00002 (1 Sep 76)	Substitute "Contracting Officer's Representative" for "Administrative Contracting Officer."										
P00003 (1 Sep 76)	Transfer of contract administration functions to Seckenheim Area Procurement Office; Invoices must be approved by the COR for payment.										
	Total Cost FY7T	348,377.72	4,180,532.64	4,180,532.64	4,180,532.64	12,889,975.64					12,889,975.64
FY77											
P0004 (1 Oct 76)	Fund Citation established for FY77.		76,336.95	226,634.88	226,771.17	13,419,718.64	218,762.14	545,431.77	551,565.40	1,315,759.31	14,735,477.95
P00005 (1 Jul 77)	Specification revisions: Section 3 (change Administration); Section 10 (add Repair, Sanding, Sealing of Floors); Section 12 (add Cinders Removal); Section 13 (delete Pavement Cleaning); Section 14 (add: Trimming of Trees and Maintenance of Two Additional Playground and Picnic Areas/delete Mowing of Grass); and Section 19 (add Exterior Window Cleaning).										
P00006 (1 Jul 77)	Prompt payment discount of 1/10 of 1 percent within 15 days of invoicing effective beginning Jul 77.										
P00007 (5 Jul 77)	Administrative error made. Replace attachments 13 and 14 for Floor Refinishing (Section 10) in Modification P00005 with attachments 1 and 2 respectively; no change in contract cost.										
P00008 (23 Aug 77)	Increase in interior painting workload during FY77 (add 38 apartments to 600 to equal a total of 638 apartments).		80,000.00*			13,499,718.64					14,815,477.95
P00009 (8 Sep 77)	Modification to correct computation error in P00005 lump sum cost from 76,336.95 to 76,366.95, an increase of DM30.00;		30.00			13,499,748.64					14,815,507.95
	Economic price adjustment for labor and materials for FY77 RPMA.		167,920.66	367,075.44	367,075.44	14,401,820.18					15,717,579.49
P00010 (13 Sep 77)	Established unit price for painting workload specified in P00008 which decreases estimated cost.		- 3,099.62			14,398,720.56					15,714,479.97
P00011 (21 Sep 77)	Increase apartment painting workload from 638 to 641.		3,235.35			14,401,955.91					15,717,715.22
P00012 (27 Sep 77)	Economic price adjustment for P00005 (Sections 12, 13 14, and 19), P00007 (Section 10), P00009 (FY78 and FY79) and P00011 (increase in painting work).		5,113.35	14,215.41	14,215.48	14,435,500.15	13,862.79	34,236.72	34,681.40	1,398,540.22	15,834,040.37
	FY 77 Total Cost	348,377.72	4,510,069.33	4,788,458.37	4,788,594.73	14,435,500.15	232,624.93	579,668.49	586,246.80	1,398,540.22	15,834,040.37

Table 27 (Continued)

Mod. No. & Date	Modification Description	Lump Sum FY77	Lump Sum FY78	Lump Sum FY79	Lump Sum Cumulative	Estimated Unit Price FY77	Estimated Unit Price FY78	Estimated Unit Price FY79	Estimated Unit Price Cumulative	Total Cumulative
FY 78										
P00013 (1 Oct 77)	Fund citation established for FY78		53,279.86	-53,279.86	14,435,500.15					15,834,040.37
P00014 (17 Oct 77)	Rescheduling of exterior painting from FY79 to 78; increase funds for P00013 to include exterior painting for two buildings.									
P00015 (13 Dec 77)	One-time task to repair damage at 37G Columbus and 18A Lincoln. (Ex = 2.16)		1,080.00*		14,436,580.15					15,835,120.37
P00016 (17 Jan 78)	Increase in scope of work ordered by P00015 (fire damage).		3,420.00		14,440,000.15					15,838,540.37
P00017 (15 Mar 78)	One-time task to repair apartment door at 9D Jefferson.		250.00		14,440,250.15					158,838,790.37
P00018 (1 Apr 78)	Increased service order level for Apr-Sep 78; funds not authorized for FY79.		182,486.70	364,973.40	14,987,710.25					16,386,250.47
P00019 (1 Apr 78)	One-time task to repair apartment door at 56G Columbus.		300.00		14,988,010.25					16,386,550.47
P00020 (14 June 78)	Specification revisions in exterior/interior painting which do not affect costs.									
P00021 (14 Jun 78)	One-time task to repair water damage which affected nine units.		6,913.19		14,994,923.44					16,393,463.66
P00022 (4 Aug 78)	Finalize costs (est vs act) for P00016, P00017, and P00019 and to add four new one-time services.		73.67		14,994,997.11					16,393,537.33
P00023 (24 Aug 78)	One-time task to replace light pole.		550.00		14,995,547.11					16,394,087.33
P00024 (24 Aug 78)	Scope of work change for 1 Sep 77-31 Mar 78 (service order level increase)?		182,486.70		15,178,033.81					16,576,574.03
P00025 (8 Sep 78)	Scope of work change for 1 Sep 76-30 Sep 76 (service order level increase)?	28,451.26			15,206,485.07					16,605,025.29
P00026 (6 Sep 78)	Change dates of P00024 to 1 Oct 77-31 Mar 78 (service order level increase)?									
P00027 (1 May 78)	Economic price adjustment for P00018 and Section 10, Floor Refinishing. Decrease in estimated quantity ordered/Section 10.		172,779.41		15,379,264.48		-187,195.76	-165,656.13	1,045,688.33	16,424,952.81
P00028 (25 Sep 78)	Painting workload decreased for FY78.		- 114,376.11		15,264,888.37					16,310,576.70
P00029 (28 Sep 78)	Scope of work change for 1 Oct 76-30 Sep 77 (service order level increase)?	352,227.03			15,617,115.40					16,662,803.73
	FY78 Total Cost	376,828.98	4,862,296.36	5,277,701.79	5,100,288.27	15,617,115.40	232,624.93	392,472.73	420,590.67	1,045,688.33	16,662,803.73

Table 27 (Continued)

Mod. No. & Date	Modification Description	Lump Sum FY77	Lump Sum FY78	Lump Sum FY79	Lump Sum Cumulative	Estimated Unit Price FY77	Estimated Unit Price FY78	Estimated Unit Price FY79	Estimated Unit Price Cumulative	Total Cumulative
FY79										
P00030 (1 Oct 78)	*Fund citation established* for FY79 plus economic price adjustment (34,375.82 x 12 = DM412,509.84).			412,509.84	16,029,625.24					17,075,313.57
P00031 (5 Dec 78)	Decrease in cost for P00021, cancel P00023 and add Cinder Hauling during breakdown of GFP.		- 1,126.18		16,028,499.06					17,074,187.39
P00032 (10 Jan 79)	Specification revisions to (Lawns, Landscaped Grass, and Playgrounds) Section 14.									
P00033 (1 Jul 78)	Reduction in service order level for Aug and Sep 78 during FY78 and Oct, Nov & Dec 78 for FY79.		- 16,766.80	- 87,051.02	15,924,681.24					16,970,369.57
P00034 (5 Mar 79)	Local purchase allowance to procure supplies when not available in FSS.			22,400.00	15,947,081.24					16,992,769.57
P00035 (14 Mar 79)	Specification revisions to Sections 8 and 9 (exterior/ interior painting).									
P00036 (7 May 79)	One-time task to replace gutters and downspouts.			84,393.00	16,031,474.24					17,077,162.57
P00037 (1 Jun 79)	One-time task to replace roof flashing related to P00036.			23,118.00	16,054,592.24					17,100,288.57
P00038 (20 Jun 79)	Economic price adjustment (Jan-Apr = DM37809.68 and May-Sep = DM195294.50).			233,104.18	16,287,696.42					17,333,384.75
	Total Costs (as of 20 Jun 79)	376,828.98	4,862,296.36	5,259,808.27	5,788,762.81	16,287,696.42	232,624.93	392,472.73	420,590.67	),045,688.33	17,333,384.75

Table 28

Work Order Activity Adjustments: Heidelberg/Government Housing

CY78	Delete:	Labor Hrs.	Labor	Equip	Materials	Total Cost
1910.14211	Refuse	11,510	$99,885	$16,431	$ 0	$116,316
1910.14214	Entomology	2,881	27,471	1,303	1,206	29,980
1910.14216	Snow & Ice Control	400	4,599	909	744	6,252
1910.14217	Street Sweeping	734	7,995	1,492	---	9,487
1910.14223	Fuel Handling	15,989	129,757	3,853	2,731	136,341
	Total	31,514	$269,707	$23,988	$4,681	$298,376
CY78	Accomplished:	119,087	$1,221,208	$49,938	$288,590	$1,559,736
CY78	Difference:	87,573	$951,501	$25,950	$283,909	$1,261,360

Table 29

Study Assumptions

1. Number of Government owned and operated facilities (Heidelberg vs Mannheim). Heidelberg has 2,005 Government owned and operated family housing units and Mannheim has 2,091. Because a 4 percent difference exists between the two activities, the real property requirements for Government owned and operated family housing are assumed comparable.

2. Boiler operations. It was assumed the boiler plant/heating system/steamfitting shop at Heidelberg provided an hourly cost requirement comparable to coal-fired boiler operations, since this shop's cost distribution factors would be used to prorate the cost of the contract.

3. Baseline data. Baseline data established the RPMA requirements for 1 year, providing a basis for comparison of the contract operation to the Government operation. Accomplished RPMA for CY78 by the contract operation was assumed to be the baseline for comparative analysis to related Heidelberg activities.

4. Appliance maintenance. Appliance maintenance activities at both Heidelberg and Mannheim were assumed comparable during CY78. (The USAEUR-wide appliance contract was phased-in during late November and December; however, full appliance contract operations did not begin until January 1979.)

5. General and administration support (G&A). G&A requirements for both contract and Government operations were assumed to be identical to existing operations; i.e., calculations were based on actual direct/administrative support ratios.

6. Reimbursable labor rates. Reimbursable labor rates were assumed to include shop supervision and related shop expenses (e.g., employees, fringe benefits, and shop meetings) for all updated direct labor costs.

7. Work order activities. Work order activities for CY78 were assumed to be comparable to FY78 because: (a) calendar and fiscal year workloads cover a 1-year period, (b) the workload requirements are recurring in nature and should be constant, and (c) complete FY78 work order data were not available.

8. Currency exchange conversion rate (DM vs dollars). The same rate of exchange for the contract's unit price activity, as specified in the total contract maintenance at Benjamin Franklin Village, was used to calculate the dollar value of the lump sum portion of the contract during FY78. It was assumed that the same level of exchange would have been applicable to the lump sum portion of the contract as was realized for the unit price activity since lump sum costs are prorated over the year in regular monthly increments.

Table 29 (Continued)

9. Calculations for wage/salaries. It was assumed these calculations do not include housing allowance benefits, since personnel performing related RPMA are predominantly incumbents of the local labor market.

10. Government-furnished equipment. Coal dollies for the coal handling requirements at Mannheim and Heidelberg are furnished to the respective contractors by the Government for boiler firing operations. Therefore, equipment for Government-furnished items costs are not applicable for cost comparison.

11. Work order backlog. It is assumed that the work order backlog is minimal in both contract and Government operations. Therefore, backlog was not analyzed as a performance factor. Backlog caused by supply limitations was reported. (Recommendations for possible contract revision are given in Appendix C.)

12. Annual productive hourly standard. The annual productive hourly standard was assumed to be 1600 hours per employee, unless otherwise specified.

Table 30

Summary of Cost Analyses of
Total Contract Maintenance Evaluation, Benjamin Franklin Village
DEH, Mannheim

Cost Elements	CY78 (Derived From Work Orders)	FY78* (Derived From Work Orders)	FY78** (Contract Cost vs Work Orders)
I. Contract Operation			
A. Contract Cost	$2,075,389	$2,145,978	$2,463,919
B. Administration & Related Costs	99,934	99,934	99,934
C. Government Furnished Materials & Other Services	235,896	235,896	235,896
Total Cost of Contract Operation	$2,411,219	$2,481,808	$2,799,749
II. Government Operation†			
A. Personnel Costs	$2,205,724	$2,273,846	$2,273,846
B. Materials/Other Services	570,415	582,265	582,265
C. Other Costs	63,851	65,690	65,690
Total Cost of Government Operation	$2,839,990	$2,921,801	$2,921,801
III. Cost Difference (Totals)	$ 428,771	$ 439,993	$ 122,052
(%)	(15.1)	(15.1)	(4.2)

* Costs were reconstructed for FY78 using reported cyclic painting and floor refinishing activities for FY78 and CY78 work order activity (FY78 work order activity was not available for contract operation).

** Contract costs were used as shown in FY78 contract modification activity and Government Operations were reconstructed as stated above.

† Government housing costs from Patrick Henry and Mark Twain Villages were used in this comparative analysis.

APPENDIX A:

CY78 COST ANALYSIS PROCEDURES

Contract Operations Cost Elements (Table A-1)

I. Contract Cost.

A. Direct Labor.

1. Productive Hours. The accomplished RPMA during CY78 as performed and reported by the contractor was used as the basis for cost determination and comparison to the Government. Productive hours are categorized by three major activities:

a. Work Order Activity. The contract operation performed 28,858 hours in SO activity; 6,157 hours in IJO activity; and 75,291 hours in SOO activity. The productive hours for work order activity were calculated at 110,306.

b. Cyclic Painting. The total cost of cyclic painting for CY78 is $375,235 (without overhead/G&A and profit). Since a cost breakout was not provided, the productive hour requirement for cyclic painting (interior/exterior) was determined by calculating the percentage of labor costs to total costs for the contractor's paint shop IJO activity (95 percent) and calculating an hourly rate for painting skills using actual paint shop labor costs and productive hours ($658/60 = $10.97 per hour):

$375,235	Total cost of cyclic painting
x0.95	Ratio of labor cost to total costs for paint shop
$356,473	Cyclic painting labor cost
$356,473	Cyclic painting labor cost
$10.97	Per hour paint shop rate
32,495	Productive hours for cyclic painting

c. Floor Refinishing. The productive hour requirement for floor refinishing (sanding/sealing/repair) was determined in the same way as cyclic painting. Purchase orders issued during a 1-year period (1978) provided the total cost of floor refinishing activity ($124,812). The IJO requirements for the contractor's carpentry/masonry shop were used to distribute floor refinishing costs (without overhead/G&A and profit) and to calculate productive hours:

Table A-1

CY78 -- Total Cost of the Contract Operation

I.	Contract Cost		
	A. Direct Labor		
	1. Productive Hours	(151,440)	
	2. Direct Labor Cost	$1,672,683	
	B. Equipment	43,136	
	C. Materials	39,296	
	D. General and Administrative Support (13.7%)	240,451	
	E. Profit (4%)	79,823	
	Subtotal		$2,075,389
II.	Administrative and Related Costs		
	A. Administrative Support		
	1. Procurement Personnel	$ 6,892	
	2. EP&S (Contract Inspection)	92,842	
	B. Transportation		
	1. Procurement	200	
	2. EP&S Inspection	0	
	Subtotal		**$99,934**
III.	Government Furnished Materials & Other Services		
	A. Materials	$201,371	
	B. Material Handling	22,956	
	C. Utilities	6,265	
	D. Insurance & Administrative (2.3%) Services Above Installation Level	5,304	
	Subtotal		$235,896
	Cost of Contract Operation to the Government		$2,411,219

$124,812	Total cost of floor refinishing
x0.76	Ratio of labor cost to total costs for carpentry/masonry shop
$ 94,857	Floor refinishing labor cost

$94,857	Floor refinishing labor cost
$10.98	Per hour carpentry/masonry shop rate
8,639	Productive hours for floor refinishing

d. Total Productive Hours:

Work Order Activity	110,306
Cyclic Painting	32,495
Floor Refinishing	8,639
Total Productive Hours	151,440

2. Direct Labor Cost. Labor costs for the contract operation were used as the basis for determining productive hourly labor rates. The rates provided by the project officer (COR) at the DEH, Mannheim include comparable cost elements used by the DEH to calculate Government effective shop rates for reimbursable customers. Shop expense, shop supervision, wage rate increases, and currency exchange fluctuations realized during CY78 represent the major cost factors for determining the following direct labor costs.

a. Work Order Activity Labor Cost: $1,221,353.

b. Cyclic Painting Labor Cost:

$375,235	Total cost of cyclic painting
x0.95	Ratio of labor cost to total costs for paint shop
$356,473	Labor cost for cyclic painting

c. Floor Refinishing Labor Cost Determination:

$124,812	Total cost of floor refinishing
x0.76	Ratio of labor cost to total cost for carpenter shop
$ 94,857	Labor cost for floor refinishing

d. Total Cost for Direct Labor:

Work Order Activity	$1,221,353
Cyclic Painting	356,473
Floor Refinishing	94,857
Total Cost	$1,672,683

B. Equipment. Equipment essential to Housing's RPMA is furnished by the contractor. The total equipment costs incurred by this requirement are used by the contractor to calculate the average equipment cost per productive hour. The sum of the three categories makes up the total equipment cost requirement for the contract workload. Calculations for distribution of the average equipment cost per productive hour to each of the major work categories are shown below.

1. Work Order Activity Equipment Cost: $33,135.

2. Cyclic Painting Equipment Cost Determination:

$375,235	Total cost of cyclic painting
x0.02	Ratio of equipment cost to total cost for paint shop
$ 7,505	Equipment cost for cyclic painting

3. Floor Refinishing Equipment Cost Determination:

$124,812	Total cost of floor refinishing
x0.02	Ratio of equipment cost to total cost for carpenter shop
$ 2,496	Equipment cost for floor refinishing

4. Total Cost for Equipment:

Work Order Activity	$33,135
Cyclic Painting	7,505
Floor Refinishing	2,496
Total Cost	$43,136

C. Materials. The contractor furnishes paint and floor refinishing materials for the RPMA workload. Cost requirements for materials used during this 1-year period were estimated using the cost determination factors for each of the major work categories defined below.

1. Work Order Activity: Paint shops reported $580 for materials expense during CY78.

2. Cyclic Painting:

$375,235	Total cost of cyclic painting
x0.03	Ratio of materials cost to total cost for paint shop
$ 11,257	Materials cost for cyclic painting

3. Floor Refinishing:

$124,812	Total cost of floor refinishing
x0.22	Ratio of materials cost to total cost of carpenter shop
$ 28,459	Materials cost for floor refinishing

4. Total Cost for Materials:

Work Order Activity	$ 580
Cyclic Painting	11,257
Floor Refinishing	27,459
Total Cost	$39,296

D. G&A Support. The G&A expense is calculated at 13.7 percent of the costs for labor, equipment, and materials ($1,755,115 x 0.137 = $240,451). This cost factor is identified in the Army Audit Agency's evaluation of the service order claim as being a realistic G&A cost (Report No. 2191-09-8-0051).

E. Profit. The contractor estimates profit at 4 percent of the costs for labor, equipment, materials, and G&A ($1,995,566 x 0.04 = $79,823).

II. Administrative and Related Costs.

A. Administrative Support.

1. Procurement Support.

a. Contracting Officer. The Contracting Officer is estimated to require 0.1 manyears of support for contract administration of the Housing Maintenance Contract at Benjamin Franklin Village, Mannheim. (GS-12/2 with salary per annum of $23,857 plus 20 percent benefits for 0.1 manyears or $2,863.)

b. Procurement Specialist. The Procurement Specialist estimate is 0.1 manyears (LNC7-7 with estimated salary of $20,000 plus 30 percent benefits for 0.1 manyears or $2,600) dedicated to administration of this contract. (Note: The Procurement Specialist, Contracting Officer, and Clerk-Typist support requirements are based on current requirements as identified by the Procurement Specialist.)

c. Clerk-Typist. The typing workload for procurement's contract administration is estimated to require 0.1 manyears of effort. This estimated manpower requirement was identified by the Contracting Officer at the grade level of a GS-5/5 with an annual salary of $11,907 plus 20 percent benefits or $1,429.

d. Total Cost for Procurement Support:

Contracting Officer	$2,863
Procurement Specialist	2,600
Clerk-Typist	1,429
Total Cost	$6,892

2. Engineering, Plans and Services Division. Contract inspection requirements for CY78 averaged 5.7 manyears of support and $92,842. The cost requirement for monitoring the contract operation has been calculated using the Mannheim effective shop rate for administration, dated 1 October 1978 ($10.18 x 1600 hours x 5.7 manyears).

B. Transportation.

1. Procurement. The Contracting Officer estimated $200 for travel expense involving contract administration per year.

2. Engineering, Plans and Services Division. The FE does not provide transportation expense to inspectors for monitoring the contractor's work performance; therefore, a cost for this category is not applicable.

III. Government Furnished Materials and Other Services.

A. Materials. Actual materials cost ($201,371) obtained from accomplished work order activity was the basis of this cost determination. This cost does not include paint materials ($580).

B. Materials Handling. The Government's handling and storage cost for material furnished the contractor is estimated at 11.4 percent of the Government furnished materials cost. Table A-1 lists the cost elements for determination of materials handling requirements ($201,371 x 11.4 percent = $22,956).

C. Utilities. The DEH, Mannheim provided a design estimate of $6,265 for utility services furnished to the contract operation during CY78.

D. Insurance and Administration Services Above the Installation Level. An additional cost of 2.3 percent for Item 3 total cost ($230,592 x 2.3 percent = $5,304) was added to the cost of the contract operation for noninsured claims and administration of the contract workload beyond the installation level (per AR 235-5).

E. Other Costs. As Mannheim's reduction-in-force (RIF) action did not result in separation or early retirement of any employees affected by contracting Benjamin Franklin Village RPMA, a cost was not identified for this category.

Government Operations Cost Elements (Table A-2)

I. Personnel Costs.

A. Direct Labor.

Table A-2

CY78 -- Total Cost of the Government Operation

I.	Personnel Costs		
	A. Direct Labor		
	1. Productive Hours	(151,440)	
	2. Direct Labor Cost	$1,802,794	
	B. General and Administrative		
	1. Support Personnel	(22.5)	
	2. Support Cost	402,930	
	Subtotal		$2,205,724
II.	Materials/Other Services		
	A. Materials		
	1. Materials Cost	$470,902	
	2. Materials Handling		
	a. Handling Personnel	(4.1)	
	b. Handling Cost	53,554	
	B. Other Services (Equipment)	45,959	
	Subtotal		$570,415
III.	Other Costs		
	A. Insurance	$ 8,328	
	B. Additional Indirect Costs Above Installation Level	55,523	
	Subtotal		$63,851
	Total Cost of the Government Operation		$2,839,990

1. Productive Hours. The total productive hour requirement for the contract operation (151,440 hours) establishes the baseline data to be compared to Government cost requirements for accomplishment of this RPMA. Thus, the same total productive hours accomplished during CY78 in the contract operation (Table A-1) is identified for the Government operation.

2. Direct Labor Cost. An average cost per productive hour was calculated using actual labor costs and adjusted manhours at Patrick Henry Village (PHV) and Mark Twain Village (MTV) for the accomplished RPMA during CY78. The baseline productive hours were then multiplied by the rates developed for each of the three major work categories using the cost factors provided by the DEH at Heidelberg. Two major adjustments were made:

a. The FE at Heidelberg estimated 10 percent of the reported productive hours for travel time which is not calculated into reimbursable shop rate.

b. Work excluded from the total contract maintenance at Benjamin Franklin Village was deleted from the work order activity in Government housing, Heidelberg:

1910.14216	Snow & Ice Control
1910.14211	Refuse
1910.14214	Entomology
1910.14223	Fuel Handling
1910.14217	Street Sweeping

(1) Work Order Activity (Government Housing).

(a) Hours:

87,573	Productive hours
-8,757	Travel time adjustment (10 percent)
78,816	Adjusted productive hours

(b) Labor Rate:

$951,501	Labor cost
78,816	Adjusted productive hours
$12.07	Average hourly labor rate

(c) Labor Cost:

110,306	Baseline productive hours
x12.07	Average hourly labor rate
$1,331,393	Baseline labor cost

(2) Cyclic Painting (Government Housing/Paint Shop).

(a) Hours:

2,066	IJO productive hours
-207	Travel time adjustment
1,859	IJO adjusted productive hours

(b) Labor Rate:

$20,982	IJO labor cost
1,859	IJO adjusted productive hours
$11.29	Average hourly labor rate

(c) Labor Cost:

32,495	Baseline productive hours
x$11.29	Average hourly labor rate
$366,869	Baseline labor cost

(3) Floor Refinishing (Government Housing/Carpentry-Masonry Shop).

(a) Hours:

3,736	IJO productive hours
-374	Travel time adjustment
3,362	IJO adjusted productive hours

(b) Labor Rate:

$40,674	IJO labor cost
3,362	IJO adjusted productive hours
$12.10	Average hourly labor rate

(c) Labor Cost:

8,639	Baseline productive hours
x$12.10	Average hourly labor rate
$104,532	Baseline labor cost

(4) Total Labor Cost:

Work Order Activity	$1,331,393
Cyclic Painting	366,869
Floor Refinishing	104,532
Total Cost	$1,802,794

B. G&A Support.

1. Support Personnel. A direct labor to administrative support ratio for the DEH at Heidelberg was calculated to determine the support requirement for the direct manyear effort in the contract operation. Manyear totals were determined for both direct labor (based on productive hours accomplished and DEH Heidelberg shop support requirements) and administrative support manyears (based on DEH Heidelberg's direct/administrative ratio). The factors used in this analysis include:

a. Direct Labor (Plumber Shop, DEH Heidelberg).

35,360	Available hours (2080 x 17 years)
22,982	Productive hours (35,360 - 12,378 shop burden) 1.539 available/productive hours ratio
151,440	Baseline productive hours
x1.539	Available to productive hours ratio
233,066	Total direct (supervision and nonsupervision) available hours
233,066	Direct available hours
2,080	Standard hours per year
112.1	Direct personnel

b. Administrative Support.

(1) DEH Heidelberg:

274	Total direct personnel
5	Pest control shop
2	Fuel storage and issue shop
17	Refuse collection and disposal shop
- 1	Railroads shop
249	Adjusted direct personnel requirement comparable to contract workload
122	Total administrative support manyear
5	Office of DEH
5	Master planning
6	Real property
25	Engineering, plans and services
22	Contract inspection
- 9	Supply and storage
50	Adjusted administrative manyear requirement comparable to contract workload

249	Adjusted direct manyear
50	Adjusted administrative support manyear
4.98	Direct/administrative ratio
112.1	Direct contract manyears
4.98	Direct/administrative ratio
22.5	Administrative support manyear for contract workload

(2) Support Costs:

$17,908	Average administrative support salary with benefits
x22.5	Administrative manyears
$402,930	Total support cost

II. Materials/Other Services.

A. Materials.

1. Materials Cost. The materials cost was developed by determining a related cost per labor hour from the total actual material costs and the adjusted productive labor hours for PHV and MTV. This ratio was multiplied by the baseline hours to determine the materials cost. Cost determination procedures are shown below.

a. Work Order Activity (Government Housing).

(1) Hourly Rate:

$283,909	Materials cost
78,816	Adjusted productive hours
$3.60	Average materials cost per labor hour

(2) Material Cost:

110,306	Baseline productive hours
x3.60	Hourly rate
$397,102	Materials cost

b. Cyclic Painting (Government Housing/Paint Shop).

(1) Hourly Rate:

$2,621	IJO materials cost
1,859	IJO adjusted productive hours
$1.410	Average materials cost per labor hour

(2) Material Cost:

$32,495	Baseline productive hours
x1.410	Hourly rate
$45,818	Materials cost

c. Floor Refinishing (Government Housing/Carpentry-Masonry Shop).

(1) Hourly Rate:

$10,889	IJO materials cost
3,362	IJO adjusted productive hours
$3.239	Average materials cost per labor hour

(2) Material Cost:

8,639	Baseline productive hours
x3.239	Hourly rate
$27,982	Materials cost

d. Total Materials Cost:

Work Order Activity	$397,102
Cyclic Painting	45,818
Floor Refinishing	27,982
Total Cost	$470,902

2. Materials Handling.

a. Materials Handling Personnel. Personnel requirements for handling were calculated by subtracting the actual Heidelberg direct labor/administrative staff ratio with supply from the same ratio without supply:

249	Direct personnel
59	Administrative personnel with supply/storage
4.22	Direct/administrative ratio with supply/storage
112.1	Direct productive personnel (reconstructed)
4.22	Direct/administrative with supply/storage ratio
26.6	Administrative support with supply/storage
-22.5	Administrative support without supply/storage
4.1	Supply/storage personnel

b. Materials Handling Personnel Cost. Cost requirements for handling personnel were developed by multiplying the Heidelberg average salary with benefits by the number of personnel:

$13,062	Average supply/storage personnel salary with benefits
x4.1	Supply/storage personnel
$53,554	Materials handling cost

B. Other Services (Equipment). An equipment cost per labor hour was calculated for each major work activity. This ratio was multiplied by the baseline labor hours to determine equipment costs.

1. Work Order Activity (Government Housing).

a. Hourly Rate:

$25,950	Equipment cost
78,816	Adjusted productive hours
$0.33	Average equipment cost per labor hour

b. Equipment Cost:

110,306	Baseline productive hours
x0.33	Hourly rate
$36,401	Equipment cost

2. Cyclic Painting (Government Housing/Paint Shop).

a. Hourly Rate:

$333	IJO equipment cost
1,859	IJO adjusted productive hours
$0.179	Average equipment cost per hour

b. Equipment Cost:

32,495	Baseline productive hours
$0.179	Hourly rate
$5,817	Equipment cost

3. Floor Refinishing (Government Housing/Carpentry-Masonry Shop).

a. Hourly Rate:

$1,455	IJO equipment cost
3,362	IJO adjusted productive hours
$0.433	Average equipment cost per hour

b. Equipment Cost:

8,639	Baseline productive hours
x$0.433	Hourly rate
$3,741	Equipment cost

4. Total Equipment Cost:

Work Order Activity	$36,401
Cyclic Painting	5,817
Floor Refinishing	3,741
Total Cost	$45,959

III. Other Costs.

A. Insurance. This item includes the costs incurred by the activity as a result of uninsured losses caused by fire or other hazards, insurance premiums and settlements of loss and damage claims and the cost of claims paid through the employee's compensation. Since actual costs are not identified by the Government, a 0.3 percent cost factor from AR 235-5 was calculated using the Government's total labor, supplies and equipment cost requirement for estimating the value ($2,776,139 x 0.003 = 8,328).

B. Additional Indirect Costs Above Installation Level. A 2 percent cost factor was added to the Government's cost base to cover indirect costs for central administrative services above the installation level, i.e., centralized accounting, personnel, legal assistance ($2,776,139 x 0.02 = $55,523).

APPENDIX B:

FY78 COST ANALYSIS PROCEDURES

Contract Operations Cost Elements (Table B-1)

I. Contract Cost.

A. Direct Labor.

1. Productive Hours. The accomplished RPMA during FY78 as performed and reported by the contractor (except for work order activity) was used as the basis for cost determination and comparison to the Government. Productive hours are categorized by three major activities:

a. Work Order Activity. The contract operation performed 28,858 hours in SO activity; 6,157 hours in IJO activity, and 75,291 hours in SOO activity. The productive hours for work order activity were calculated at 110,306.

b. Cyclic Painting. The total cost of cyclic painting was $415,078 (without overhead/G&A and profit). Since a cost breakout was not provided, the productive hour requirement for cyclic painting (interior/exterior) was determined by calculating the percentage of labor costs to total costs for the contractor's paint shop IJO activity (95 percent) and calculating an hourly rate for painting skills using actual paint shop labor costs and productive hours ($658/60 = $10.97 per hour):

$415,078	Total cost of cyclic painting
x0.95	Ratio of labor cost to total costs for paint shop
$394,324	Cyclic painting labor cost
$394,324	Cyclic painting labor cost
$10.97	Per hour paint shop rate
35,946	Productive hours for cyclic painting

c. Floor Refinishing. The productive hour requirement for floor refinishing (sanding/sealing/repair) was determined in the same way as cyclic painting. Purchase orders issued during a 1-year period (1978) provided the total cost of floor refinishing activity ($144,665). The IJO requirements for the contractor's carpentry/masonry shop were used to distribute floor refinishing costs (without overhead/G&A and profit) and to calculate productive hours:

Table B-1

FY78 -- Total Cost of the Contract Operation

I.	Contract Cost		
	A. Direct Labor		
	1. Productive Hours	(156,265)	
	2. Direct Labor Cost	$1,725,622	
	B. Equipment	44,331	
	C. Materials	44,858	
	D. General and Administrative Support (13.7%)	248,629	
	E. Profit (4%)	82,538	
	Subtotal		$2,145,978
II.	Administrative and Related Costs		
	A. Administrative Support		
	1. Procurement Personnel	$ 6,892	
	2. EP&S	92,842	
	B. Transportation		
	1. Procurement	200	
	2. EP&S Inspection	0	
	Subtotal		$99,934
III.	Government Furnished Materials & Other Services		
	A. Materials	$201,371	
	B. Material Handling	22,956	
	C. Utilities	6,265	
	D. Insurance & Administrative (2.3%) Services Above Installation Level	5,304	
	Subtotal		$235,896
	Cost of Contract Operation to the Government		$2,481,808

$144,665	Total cost of floor refinishing
	Ratio of labor cost to total costs for
x0.76	carpentry/masonry shop
$109,945	Floor refinishing labor cost

$109,945	Floor refinishing labor cost
$10.98	Per hour carpentry/masonry shop rate

10,013	Productive hours for floor refinishing

d. Total Productive Hours:

Work Order Activity	110,306
Cyclic Painting	35,946
Floor Refinishing	10,013
Total Productive Hours	156,265

2. Direct Labor Cost. Labor costs for the contract operation were used as the basis for determining productive hourly labor rates. The rates provided by the COR at the DEH, Mannheim include comparable cost elements used by the DEH to calculate Government effective shop rates for reimbursable customers. Shop expense, shop supervision, wage rate increases, and currency exchange fluctuations realized during CY78 represent the major cost factors for determining the following direct labor costs.

a. Work Order Activity Labor Cost: $1,221,353.

b. Cyclic Painting Labor Cost:

$415,078	Total cost of cyclic painting
x0.95	Ratio of labor cost to total costs for paint shop
$394,324	Labor cost for cyclic painting

c. Floor Refinishing Labor Cost Determination:

$144,665	Total cost of floor refinishing
x0.76	Ratio of labor cost to total cost for carpenter shop
$109,945	Labor cost for floor refinishing

d. Total Cost for Direct Labor:

Work Order Activity	$1,221,353
Cyclic Painting	394,324
Floor Refinishing	109,945
Total Cost	$1,725,622

B. Equipment. Equipment essential to Housing's RPMA is furnished by the contractor. The total equipment costs incurred by this requirement are used by the contractor to calculate the average equipment cost per productive hour. The sum of the three categories makes up the total equipment cost requirement for the contract workload. Calculations for distribution of the average equipment cost per productive hour to each of the major work categories are shown below.

1. Work Order Activity Equipment Cost: ($33,135)(CY78).

2. Cyclic Painting Equipment Cost Determination (FY78):

$415,078	Total cost of cyclic painting
x0.02	Ratio of equipment cost to total cost for paint shop
$ 8,302	Equipment cost for cyclic painting

3. Floor Refinishing Equipment Cost Determination (FY78):

$144,665	Total cost of floor refinishing
x0.02	Ratio of equipment cost to total cost for carpenter shop
$ 2,894	Equipment cost for floor refinishing

4. Total Cost for Equipment:

Work Order Activity	$33,135
Cyclic Painting	8,302
Floor Refinishing	2,894
Total Cost	$44,331

C. Materials. The contractor furnishes paint and floor refinishing materials for the RPMA workload. Cost requirements for materials used during this 1-year period were estimated using the cost determination factors for each of the major work categories defined below.

1. Work Order Activity: Paint shops reported $580 for materials expense during CY78.

2. Cyclic Painting:

$415,078	Total cost of cyclic painting
x0.03	Ratio of materials cost to total cost for paint shop
$ 12,452	Materials cost for cyclic painting

3. Floor Refinishing:

$144,665	Total cost of floor refinishing
x0.22	Ratio of materials cost to total cost of carpenter shop
$31,826	Materials cost for floor refinishing

4. Total Cost for Materials:

Work Order Activity	$ 580
Cyclic Painting	12,452
Floor Refinishing	31,826
Total Cost	$44,858

D. G&A Support. The G&A expense is calculated at 13.7 percent of the costs for labor, equipment, and materials ($1,814,811 x 0.137 = $248,629). This cost factor is identified in the Army Audit Agency's evaluation of the service order claim as being a realistic G&A cost (Report No. 2191-09-8-0051).

E. Profit. The contractor estimates profit at 4 percent of the costs for labor, equipment, materials, and G&A ($2,063,440 x 0.04 = $82,538).

II. Administrative and Related Costs.

A. Administrative Support.

1. Procurement Support.

a. Contracting Officer. The Contracting Officer is estimated to require 0.1 manyears of support for contract administration of the Housing Maintenance Contract at Benjamin Franklin Village, Mannheim. (GS-12/2 with salary per annum of $23,857 plus 20 percent benefits for 0.1 manyears or $2,863.)

b. Procurement Specialist. The Procurement Specialist estimate is 0.1 manyears (LNC7-7 with estimated salary of $20,000 plus 30 percent benefits for 0.1 manyears or $2,600) dedicated to administration of this contract. (Note: the Procurement Specialist, Contracting Officer, and Clerk-Typist support requirements are based on current requirements as identified by the Procurement Specialist.)

c. Clerk-Typist. The typing workload for procurement's contract administration is estimated to require 0.1 manyears of effort. This estimated manpower requirement was identified by the Contracting Officer at the grade level of a GS-5/5 with an annual salary of $11,907 plus 20 percent benefits or $1,429.

d. Total Cost for Procurement Support:

Contracting Officer	$2,863
Procurement Specialist	2,600
Clerk-Typist	1,429
Total Cost	$6,892

2. Engineering, Plans and Services Division. Contract inspection requirements for CY78 averaged 5.7 manyears of support and $92,842. The cost requirement for monitoring the contract operation has been calculated using the Mannheim effective shop rate for administration, dated 1 October 1978 ($10.18 x 1600 hours x 5.7 manyears).

B. Transportation.

1. Procurement. The Contracting Officer estimated $200 for travel expense involving contract administration per year.

2. Engineering, Plans and Services Division. The FE does not provide transportation expense to inspectors for monitoring the contractor's work performance; therefore, a cost for this category is not applicable.

III. Government Furnished Materials and Other Services.

A. Materials. Actual materials cost ($201,371) obtained from accomplished work order activity was the basis of this cost determination. This cost does not include paint materials ($580).

B. Materials Handling. The Government's handling and storage cost for material furnished the contractor is estimated at 11.4 percent of the Government furnished materials cost. Table B-1 lists the cost elements for determination of materials handling requirements ($201,371 x 11.4 percent = $22,956). Note: Work order material costs are based on CY78 activities.

C. Utilities. The DEH, Mannheim provided a design estimate of $6,265 for utility services furnished to the contract operation during CY78. Actual utility costs are unknown because of existing metering constraints. Thus, the estimated cost for CY78 was used for FY78 since seasonal climatic influences are considered in the CY78 utility cost and rate fluctuation between calendar and fiscal year timeframes is minimal.

D. Insurance and Administration Services Above the Installation Level. An additional cost of 2.3 percent for Item 3 total cost ($230,592 x 2.3 percent = $5,304) was added to the cost of the contract operation for noninsured claims and administration of the contract workload beyond the installation level (per AR 235-5).

E. Other Costs. As Mannheim's RIF action did not result in separation or early retirement of any employees affected by contracting Benjamin Franklin Village RPMA, a cost was not identified for this category.

Government Operations Cost Elements (Table B-2)

I. Personnel Costs.

A. Direct Labor.

1. Productive Hours. The total productive hour requirement for the contract operation (156,265 hours) establishes the baseline data to be compared to Government cost requirements for accomplishment of this RPMA. Thus, the same total productive hours accomplished during FY78 in the contract operation (Table B-1) except for work order activity (CY78), is identified for the Government operation.

2. Direct Labor Cost. An average cost per productive hour was calculated using actual labor costs and adjusted manhours at PHV and MTV for the accomplished RPMA during CY78. The baseline productive hours were then multiplied by the rates developed for each of the three major work categories using the cost factors provided by the DEH at Heidelberg. Two major adjustments were made:

a. The FE at Heidelberg estimated 10 percent of the reported productive hours for travel time which is not calculated into reimbursable shop rate.

b. Work excluded from the total contract maintenance at Benjamin Franklin Village was deleted from Government housing, Heidelberg, work order activity:

1910.14216	Snow & Ice Control
1910.14211	Refuse
1910.14214	Entomology
1910.14223	Fuel Handling
1910.14217	Street Sweeping

(1) Work Order Activity (Government Housing).

(a) Hours:

87,573	Productive hours
-8,757	Travel time adjustment (10 percent)
78,816	Adjusted productive hours

(b) Labor Rate:

$951,501	Labor cost
78,816	Adjusted productive hours
$12.07	Average hourly labor rate

Table B-2

FY78 -- Total Cost of the Government Operation

I.	Personnel Costs		
	A. Direct Labor		
	1. Productive Hours	(156,265)	
	2. Direct Labor Cost	$1,858,380	
	B. General and Administrative		
	1. Support Personnel	(23.2)	
	2. Support Cost	415,466	
	Subtotal		$2,273,846
II.	Materials/Other Services		
	A. Materials		
	1. Materials Cost	$480,228	
	2. Materials Handling		
	a. Handling Personnel	(4.2)	
	b. Handling Cost	54,860	
	B. Other Services (Equipment)	47,177	
	Subtotal		$582,265
III.	Other Costs		
	A. Insurance	$ 8,568	
	B. Additional Indirect Costs Above Installation Level	57,122	
	Subtotal		$65,690
	Total Cost of the Government Operation		$2,921,801

(c) Labor Cost:

110,306	Baseline productive hours
x12.07	Average hourly labor rate
1,331,393	Baseline labor cost

(2) Cyclic Painting (Government Housing/Paint Shop).

(a) Hours:

2,066	IJO productive hours
-207	Travel time adjustment
1,859	IJO adjusted productive hours

(b) Labor Rate:

$20,982	IJO labor cost
1,859	IJO adjusted productive hours
$11.29	Average hourly labor rate

(c) Labor Cost:

35,946	Baseline productive hours
x$11.29	Average hourly labor rate
$405,830	Baseline labor cost

(3) Floor Refinishing (Government Housing/Carpentry-Masonry Shop).

(a) Hours:

3,736	IJO productive hours
-374	Travel time adjustment
3,362	IJO adjusted productive hours

(b) Labor Rate:

$40,674	IJO labor cost
3,362	IJO adjusted productive hours
$12.10	Average hourly labor rate

(c) Labor Cost:

10,013	Baseline productive hours
x$12.10	Average hourly labor rate
$121,157	Baseline labor cost

(4) Total Labor Cost:

Work Order Activity	$1,331,393
Cyclic Painting	405,830
Floor Refinishing	121,157
Total Cost	$1,858,380

B. G&A.

1. Support Personnel. A direct labor to administrative support ratio for the DEH at Heidelberg was calculated to determine the support requirement for the direct manyear effort in the contract operation. Manyear totals were determined for both direct labor (based on productive hours accomplished and DEH Heidelberg shop support requirements) and administrative support manyears (based on DEH Heidelberg's direct/administrative ratio). The factors used in this analysis include:

a. Direct Labor (Plumber Shop, DEH Heidelberg).

35,360	Available hours (2080 x 17 years)
22,982	Productive hours (35,360 - 12,378 shop burden)
	1.539 available/productive hours ratio
156,265	Baseline productive hours
x1.539	Available to productive hours ratio
240,492	Total direct (supervision and nonsupervision) available hours
240,492	Direct available hours
2,080	Standard hours per year
115.6	Direct personnel

b. Administrative Support.

(1) DEH Heidelberg:

274	Total direct personnel
5	Pest control shop
2	Fuel storage and issue shop
17	Refuse collection and disposal shop
- 1	Railroads shop
249	Adjusted direct personnel requirement comparable to contract workload
122	Total administrative support manyear
5	Office of DEH
5	Master planning

6	Real property
25	Engineering, plans and services
22	Contract inspection
- 9	Supply and storage
50	Adjusted administrative manyear requirement comparable to contract workload
249	Adjusted direct manyear
50	Adjusted administrative support manyear
4.98	Direct/administrative ratio
115.6	Direct contract manyear
4.98	Direct/administrative ratio
23.2	Administrative support manyear for contract workload

(2) Support Costs:

$17,908	Average administrative support salary with benefits
x23.2	Administrative manyears
$415,466	Total support cost

II. Materials/Other Services.

A. Materials.

1. Materials Cost. The materials cost was developed by determining a related cost per labor hour from the total actual material costs and the adjusted productive labor hours for PHV and MTV. This ratio was multiplied by the baseline labor hours to determine the materials cost. Cost determination procedures are shown below.

a. Work Order Activity (Government Housing)(CY78).

(1) Hourly Rate:

$283,909	Materials cost
78,816	Adjusted productive hours
$3.60	Average materials cost per labor hour

(2) Material Cost:

110,306	Baseline productive hours
x3.60	Hourly rate
$397,102	Materials cost

b. Cyclic Painting (Government Housing/Paint Shop).

(1) Hourly Rate:

$2,621	IJO materials cost
1,859	IJO adjusted productive hours
$1.410	Average materials cost per labor hour

(2) Material Cost:

35,946	Baseline productive hours
x1.410	Hourly rate
$50,684	Materials cost

c. Floor Refinishing (Government Housing/Carpentry-Masonry Shop).

(1) Hourly Rate:

$10,889	IJO materials cost
3,362	IJO adjusted productive hours
$3.24	Average materials cost per labor hour

(2) Material cost:

10,013	Baseline productive hours
x3.24	Hourly rate
$32,442	Materials cost

d. Total Materials Cost:

Work Order Activity	$397,102
Cyclic Painting	50,684
Floor Refinishing	32,442
Total Cost	$480,228

2. Materials Handling.

a. Materials Handling Personnel. Personnel requirements for handling were calculated by subtracting the actual Heidelberg's direct labor/administrative staff ratio with supply from the same ratio without supply:

249	Direct personnel
59	Administrative personnel with supply/storage
4.22	Direct/administrative ratio with supply/storage

115.6	Direct productive personnel (reconstructed)
4.22	Direct/administrative with supply/storage ratio
27.4	Administrative support with supply/storage
-23.2	Administrative support without supply/storage
4.2	Supply/storage personnel

b. Materials Handling Personnel Cost. Cost requirements for handling personnel were developed by multiplying the Heidelberg average salary with benefits by the number of personnel:

$13,062	Average storage/supply personnel salary with benefits
x4.2	Supply/storage personnel
$54,860	Materials handling cost

B. Other Services (Equipment). An equipment cost per labor hour was calculated for each major work activity as outlined below. This ratio was multiplied by the baseline labor hours to determine equipment costs.

1. Work Order Activity (Government Housing)(CY78).

a. Hourly Rate:

$25,950	Equipment cost
78,816	Adjusted productive hours
$0.33	Average equipment cost per labor hour

b. Equipment Cost:

110,306	Baseline productive hours
x$0.33	Hourly rate
$36,401	Equipment cost

2. Cyclic Painting (Government Housing/Paint Shop).

a. Hourly Rate:

$333	IJO equipment cost
1,859	IJO adjusted productive hours
$0.18	Average equipment cost per hour

b. Equipment Cost:

35,946	Baseline productive hours
x$0.18	Hourly rate
$6,470	Equipment cost

3. Floor Refinishing (Government Housing/Carpentry-Masonry Shop).

a. Hourly Rate:

$1,455	IJO equipment cost
3,362	IJO adjusted productive hours
$0.43	Average equipment cost per hour

b. Equipment Cost:

10,013	Baseline productive hours
x$0.43	Hourly rate
$4,306	Equipment cost

4. Total Equipment Cost:

Work Order Activity	$36,401
Cyclic Painting	6,470
Floor Refinishing	4,306
Total Cost	$47,177

III. Other Costs.

A. Insurance. This item includes the costs incurred by the activity as a result of uninsured losses caused by fire or other hazards, insurance premiums and settlements of loss and damage claims and the cost of claims paid through the employee's compensation. Since actual costs are not identified by the Government, a 0.3 percent cost factor from AR 235-5 was calculated using the Government's total labor, supplies and equipment cost requirement for estimating the value ($2,856,111 x 0.003 = 8,568).

B. Additional Indirect Costs Above Installation Level. A 2 percent cost factor was added to the Government's cost base to cover indirect costs for central administrative services above the installation level, i.e., centralized accounting, personnel, legal assistance ($2,856,111 x 0.02 = $57,122).

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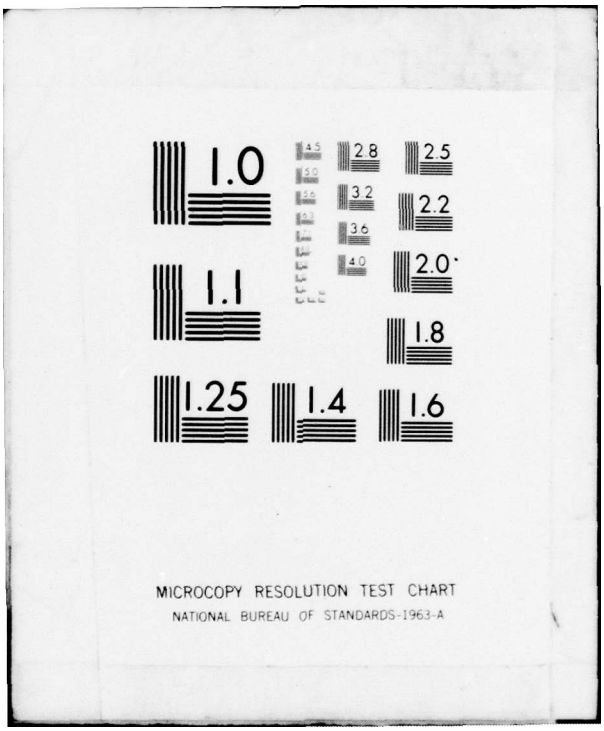
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APPENDIX C:

ANALYSIS OF THE HOUSING
MAINTENANCE CONTRACT -- BENJAMIN
FRANKLIN VILLAGE, MANNHEIM

Contract Modifications

Findings

Modifications to the housing maintenance contract at Benjamin Franklin Village, Mannheim were summarized in Table 1, which listed modification numbers, effective dates, modification descriptions, related costs by fiscal year, and lump sum/unit price categories. Total contract cost after 31 months of contract services is projected to be DM 16,992,769.57. The projected cost, based on actual costs for lump sum and unit price RPMA, is approximately 1.5 million DM -- less than the Government's preaward estimate for these services (DM 18,444,482,00). An analysis of the RPMA workload during the contract period showed a fluctuation in the accomplished vs estimated workload and modification activity (i.e., workload increases for floor refinishing, window cleaning, one-time services; and workload decreases for cyclic painting). The only precontract data available are the Government's cost estimate and workload statistics which can be provided to prospective bidders for contract cost determination compared to actual contract costs for evaluation of workload fluctuation (estimated vs actual). The Government's estimated contract workload and costs for FY78 and projected contract costs for FY78 were also shown in Table 1.

As of the second quarter of FY79 (and 31 months of contract services), a total of 35 modifications had been made to the contract. This level of modification activity for a contract of this magnitude does not appear unrealistic, given that the Government lacked contracting experience for total housing maintenance functions. The Mannheim contract has had the following number of modifications:

- FY7T -- 3 modifications (1 month)
- FY77 -- 9 modifications
- FY78 -- 18 modifications
- FY79 -- 5 modifications (6 months)

Modification activity was primarily caused by:

- Specification revisions for scope of work changes (23 percent)
- One-time services (19 percent)
- SO volume changes (17 percent)

Fund Citation for Each Fiscal Year -- 10 Percent. Because fiscal accounting and fund allocation for Government financing functions are standardized, it is not possible to avoid modifications to multiyear contracts. The contract must cite funds to be allocated and spent during each fiscal year for the term of the contract. It is important to note that housing maintenance activities are funded by FHMA, which involves financial accounting to numerous maintenance-related subaccounts. To comply with existing regulations (AR 37-100-79, AR 420-10, and AR 210-50), modifications for allocation of fiscal year funding should specify all related FHMA activities supporting the respective RPMA covered in the contract. Currently, the contract-performed RPMA is charged to FHMA (1920.14112 -- routine maintenance). The contractor codes work order activity by FE Army Management Structure (AMS) codes (not FHMA); however, this accounting information is not summarized or input into AMS or STANFINS.[5]

It is recommended that funds spent by the respective accounts identified in Table C-1 become part of STANFINS input data.

Specification Revision for Clarification Purposes -- 14 Percent. Specification clarification has occurred five times during a 31-month period. Since the Government has tested the specification and is fully aware of the RPMA conducive to contract performance, this modification activity should decline.

Specification Revision for Scope of Work Changes -- 23 Percent.

Variations in Estimated Quantities of Work Ordered. When frequencies or estimated quantities change and the degree of change exceeds the quantity specified in the contract, an equitable adjustment to both estimated quantities and costs for the related service is necessary. The quantity of work order activity established for bid determination of the contract workload must cover a 1-year period; this unit of measure must represent all activity within that period by each representative craft category or total RPMA (i.e., 2001 Carpentry/Masonry tasks per annum or 20,000 SOs per annum). To reduce this change activity, the contract must specify a percentage of variation allowable in the estimated vs actual quantities of work (15 to 25 percent), and the adjustment process to be followed (i.e., to be negotiated and documented by supplemental agreement). Adoption of this recommendation should significantly reduce the number of modifications to the contract.

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[5] The Army Management Structure Appropriations and Funds Available for Obligation, Expense, and Expenditures, AR 37-100-79 (DA, 1 May 1978); Facilities Engineering: General Provisions, Organizations, Functions, and Personnel, AR 420-10 (DA, 20 December 1977); and Family Housing Management, AR 210-50 (DA, 6 January 1971).

Table C-1

Financial Accounting Requirements
(Benjamin Franklin Village, Mannheim)

FHMA	Description
1910.14211	Refuse collection and disposal
1910.14223	Fuel oil
1910.14226	Other utilities and fuels
1910.16235	Maintenance and repair, household equipment
1920.14111	Service calls
1920.14112	Routine maintenance
1920.14113	Major repair (includes heating systems, water heaters, heat exchangers, installed equipment, etc.)
1920.14114	Painting, exterior
1920.14115	Painting, interior
1920.14120	Exterior utilities
1920.14131	Grounds
1920.14132	Surfaced areas
1920.14139	Other real property (maintenance and repair of recreation facilities, fences, services facilities associated with family housing)

After contract award, the accomplished and unaccomplished work order activity in the contract operation is used to determine the succeeding annual workload to be performed by the ongoing contract operations. These data will provide a basis for modifying the contract and, if feasible, workload changes should be initiated concurrently with an economic price adjustment for labor and materials. In cases where the workload is unknown because of a lack of historical data, unit price performance of related RPMA may be a cost effective performance alternative. Advantages of this alternative are (1) it allows the Government to order work on a requirements basis, and (2) it allows funds to be spent for accomplished work only. Cyclic painting, preventive and seasonal maintenance, window cleaning, and floor refinishing are examples of RPMA that seem most advantageous to be performed as unit price items.

New Work. New work is often added to a contract after award because of existing contract commitments for performance of the related RPMA. When this is not the case, the Government should evaluate the cost effectiveness of work performance before contracting and/or inclusion into the existing service contract. The impact of new work on the contract operation and the overall cost of the service contract must also be evaluated before inclusion in an existing contract. Adding new work to a contract can turn a good contract into an uneconomical contract.

The evaluation should at least address the following questions: Is the contractor performing the existing RPMA as ordered or is there a significant work backlog? Will the cost of the new work encourage the contractor to seek additional payment for the current services performed under the terms of the contract?

One-Time Services -- 19 Percent. One-time services are normally processed on a purchase order basis and awarded to the lowest bidder for a fixed price (lump sum). The one-time services include such RPMA as repair and replacement of doors and repair of fire or water damage. Two modification actions are performed for each one-time service activity. The first modification orders the work at an estimated cost; the second modification reflects the actual cost of the accomplished work. An alternative method of work accomplishment is to award the one-time service requirement on an independent purchase order basis. A second alternative is to consider a unit price performance of all related RPMA which may be bid on a "per hour" basis. A limitation, normally monetary, must be established to distinguish one-time services from the recurring/routine services (i.e., SOs, recurring IJOs, and SOOs).

The one-time services workload may be included in the contract; however, before this workload activity is included, the following questions should be answered:

1. Will the FE have enough workforce resources to perform the maintenance not covered by the contract's scope of work?

2. If this workload is excluded, will the response time be significantly impacted by preparation and solicitation of a new contract?

3. Will the bid competition be adversely affected by the addition of this workload?

4. Will the FE have resources available to handle unknown workload resulting from natural disasters or major mechanical systems failures?

If one-time services are designated for contract performance, the workload (recurring IJO activity) must be determined to provide the bidder with essential information for bid determination and to provide cost factors for the Government's determination/evaluation of the contract cost.

The bid determination may be based on total estimated manhours using a unit price per manhour of expended labor and an estimated Government total materials cost using actual material receipts/costs from the workload determination.

It should be noted that this maintenance activity is immediately limited by the maintenance activities identified in the exclusions to the scope of work; this limitation must be specified in the contract. Table C-2 is an illustration of a bid schedule for one-time services.

All work activity that exceeds the dollar limitation of an SO must be formalized into a specification (accompanied by a cost estimate) by the contractor for the Contracting Officer. This information will help the Contracting Officer determine who is responsible for the work (i.e., contractor or Government), and provide essential purchase order/work authorization documentation. (A contractor who is not responsible for work beyond the dollar limitation of an SO can only be required to perform related maintenance via a separate purchase order agreement.)

Including this maintenance activity in the family housing maintenance contract is optional. However, if it is incorporated into the contract, the maintenance activity cannot be performed by separate contractual agreements or by FE personnel unless the contractor fails to comply with the terms of the contract. When the contractor fails to comply, the Government can impose alternative performance options and payment penalties.

Economic Price Adjustment for Labor and Materials -- 6 Percent. Economic price adjustment for labor and materials is authorized by procurement law when multiyear contracts are used. Therefore, the degree of modification activity resulting from this factor cannot be reduced.

Computation/Administration Errors -- 7 Percent. The amount of administrative workload created by this factor is minimal and primarily caused by the complexity of a service contract.

Table C-2

Bid Schedule for One-Time Services

Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Amount
Part III	All one-time services over $___ in value per task required to maintain ___ family housing units located at _____, _____, __, (excluding items specified in the scope of work) accomplished in accordance with these specifications for a unit price as specified below.				
1.	Maintenance repair over $____ in value per task shall be accomplished for a unit price per hour to include labor and overhead cost.	___	hr	$___	$___
2.	Material cost for each task over $____ shall be reimbursed at the actual cost shown on the invoice, if applicable.	___		$___	$___
				Part III Total	$___

Cost Adjustment from Estimated to Actual -- 4 Percent. Although the percentage of contract modification caused by cost adjustment is low, it is an activity that can be entirely eliminated using one-time service alternatives.

SO Volume Change -- 17 Percent. Modifications caused by SO volume changes can be directly related to the increase in regulated SO activity vs estimated workload indicators specified in the contract. Several alternatives can be used to alleviate the major problems associated with workload indicants:

1. A limitation(s) for the RPMA covered in the scope of work is essential. The limitation(s) should be an easily identifiable unit of measure that requires minimal monitoring, that can be monitored at the desk of the Contracting Officer's representative, and that concurs with existing DEH work order constraints. Each work order category must have an appropriate limitation specified in the contract.

a. It is recommended that a monetary limitation establish the boundaries of the SO activity covered in the scope of work. Since housing maintenance activity is predominantly SO work, a monetary limitation appropriate to this work order activity should be determined. The monetary limitation of a task or SO must be high enough to allow performance of a major portion of the work order activity, but low enough to prevent inflation of the overall cost of the contract. If the monetary limitation is set high, then the bidders must increase their bid quotation to allow for the occurrence of this unknown workload. However, if the monetary limitation is low enough to represent the major portion of the work order activity, then the bid quotation will be competitive and comparable to related ongoing contract costs.

b. It is recommended that appropriate limitations for recurring IJOs and SOOs be determined and specified in the contract.

2. Work order volume should be identified as an annual volume (e.g., 20,000 SOs or 2,001 carpentry/masonry tasks per annum).

a. Estimated task frequencies should be determined from the work order survey of accomplished and unaccomplished maintenance activities during a 1-year period. The scope of work should reference these estimated task frequencies, so that they may be used by the prospective bidders as a basis for workload determination. Since the purpose of this document is to help the bidder determine workload and contract cost, care should be taken when identifying historical or projected workload requirements.

b. The contractor must be responsible for properly estimating the services required to perform the work satisfactorily as specified by the terms and conditions of the contract, and to adequately determine the costs of these services. The specification must state this intent in

order to relieve the Government of responsibility for providing inadequate workload estimates.

3. Accomplished work order activity should be documented and submitted by the contractor in summary form, preferably weekly and at least monthly. If this recommendation is enforced, the Government will be constantly aware of the contractor's accomplished work order activity, and the burden of proof for claims such as the SO claim no longer becomes a drawn-out settlement process because the contractor and the Government are aware of the status of all work order activity on a weekly basis. Of course, the Contracting Officer's representative must make sure that the workload is accurately documented before the respective monthly invoices are accepted/approved. Contract administration data should be referenced for recommended administrative procedures and suggested work documentation formats.

4. Work orders issued by the Government should be thoroughly screened by a designated DFAE staff member (after the work order has been prepared by the DFAE work receptionist) before delivering it to the contractor for work performance. Administration of contract work order issue activities is essential because it:

a. Insures proper designation of contract work order activity.

b. Eliminates duplication of requests for services previously rendered.

c. Allows potential economic benefits to be realized by contracting for housing maintenance services as identified in economic analysis.

Technical Specifications, Benjamin Franklin Village -- Findings

Specification Format

In general, the organization of the total contract maintenance for Benjamin Franklin Village, Mannheim follows the guidelines specified in the Defense Acquisition Regulations (DAR) uniform contract format,[6] but the contract is repetitive. For example, each section of the existing contract contains a scope of work, a requirement for reports, a work exclusion paragraph, etc. analogous to a series of minicontracts, whereas the uniform contract format encourages consolidation of each of these specifications into one respective section of the contract.

Section F of the Benjamin Franklin Village housing maintenance contract merely specifies that "nonpersonal services shall be performed in strict compliance with the terms and conditions of this contract and

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[6] Defense Acquisition Regulation (Armed Services Procurement Regulation), pp 2:4 - 2:12.

applicable specifications attached thereto." The technical specifications for the Benjamin Franklin Village contract should become a part of Section F, as indicated in the uniform contract format. It is recommended that the technical specification be reorganized using the format specified by the Construction Specifications Institute (CSI) guidelines for masterformat, or the technical specification format given in the Housing Maintenance Contract Guide prepared by CERL.[7]

Terms used in the contract should be consistent throughout the specification. For example, urgent, emergency, preventive and seasonal maintenance, and other SOO activity maintenance activities could be specified as the major maintenance categories for each section of the contract. Related reports, inspections, performance times, etc. should also be specified for each of these categories. Terms such as major vs minor maintenance should be avoided unless related RPMA can be specified for these terms. Limitations for each of these maintenance categories must also be specified in the contract. Comments pertaining to work limitation determinations are as indicated on pp 95 to 102 of this appendix.

Bid Schedule

The bid schedule must be organized to complement the type of contract performance payment specified by the respective FE and housing personnel. Payment of maintenance activities may be a lump sum bid item, by unit price bid item, or by a combination of both. The housing contract at Benjamin Franklin Village is primarily lump sum; however, it seems likely that some of these RPMA could be performed more efficiently through use of a unit price performance schedule.

Activities like cyclic painting, one-time services, preventive maintenance/seasonal maintenance visits, roofing inspections, pavements inspections, etc. are conducive to unit pricing. The decision criteria used to specify unit price vs lump sum performance are based on cost efficiencies (i.e., payment of work actually accomplished) and contract administration requirements (i.e., preventive maintenance visits that appear to require additional monitoring under a lump sum performance because the contractor receives payment regardless of work performed unless the Contracting Officer closely monitors this activity and initiates noncompliance action before the first prorated lump sum payment).

The decision to select the most desirable bid schedule performance criteria involves a complex determination process. For example, the floor refinishing activities within this contract have a unit price bid schedule performance requirement with 10 related bid items. Each floor

[7] Masterformat, The Construction Specifications Institute (June 1978); and Joyce L. Nay and David W. Brown, Housing Maintenance Contract Guide, TR P-107 (CERL, March 1980).

refinishing activity is bid as a separate unit price; i.e., damaged flooring, new flooring, damaged molding, new molding, etc. are separate unit prices. Because several unit price items are involved each time an apartment requires floor refinishing activities (i.e., shoe molding, baseboard, stair tread, or new flooring), the cost for these services appears excessive.

It is recommended that the cost effectiveness of the current contract be evaluated by comparing the existing bid schedule and related cost for floor refinishing services to the preceding floor refinishing contract with Kurt Myer Firm, Contract Number DAJA02-76-D-0059, effective 8 January 1976. The initial bid schedule format and unit price categories for the Kurt Myer Firm contract is considered to be the cost effective alternative for contract performance of this activity. A cost benefit is realized by the Government when all related maintenance activities such as floor refinishing are bid as one unit price. An overview of floor refinishing RPMA (second quarter of FY77 and FY78), shown in Table C-3, allows comparative analysis of the number of apartments requiring refinishing maintenance, floor refinishing cost during second quarter of each fiscal year, and the average per unit cost for floor refinishing maintenance.

Work Documentation

An effective work documentation program will enhance the efficiency of contract administration by reducing inspection workload and in-house accounting activities. Procedures for work flow and documents (forms to be used during the maintenance contract performance) must be specified for each maintenance activity. Since each organizational entity has specific reporting requirements, they too must be integrated into the contract. This documentation should be used to provide management with necessary historical data to analyze contract performance and related cost, and to update the frequencies of RPMA in future contracts.

It is recommended that this documentation include completed work orders and weekly work summaries from the contractor. These interim progress reports will be used to facilitate monitoring of the contract operation and to help reduce the inspection workload. The prospective bidders will assess the cost of performing these administrative requirements; therefore, it is recommended that these procedures and documents be reviewed thoroughly to eliminate all needless reporting criteria.[8]

[8] Joyce L. Nay and David W. Brown, Housing Maintenance Contract Guide, TR P-107 (CERL, March 1980).

Table C-3

Overview of Floor Refinishing Costs During the Second Quarter of FY77 and FY78

Item	FY77	FY78	Difference
Number of apartments	25	43	18
Total costs (DM)	37,742.73	111,789.23	74,046.50
Cost per apartment (DM)	1,509.71	2,599.75	1,090.40
Percentage increased			72.2

Personal vs Nonpersonal Contract Services

Contractual provisions concerning the contract employees, if present in a sufficient degree, may alone render the services personal in nature. For example, Government specifications for qualification criteria of individual contract employees may render the contract "personal" when the qualifications are not essential to satisfactory performance of the scope of work. If the RPMA requirement is appropriately specified, the qualifications of contractor personnel and related work techniques, planning, scheduling, etc. are inferred and need not be stated in the contract. Care must be taken to avoid specifying contract employees' skill requirements. The technical specifications should only specify the RPMA requirements to be performed. Care must also be taken to avoid specifying the techniques to be used by the contractor in performance of the RPMA. For example, the contract should specify that a pavement be inspected, but should not require how the inspection is done; e.g., immediately following a rainstorm. Instead, the contract should specify the inspection cycle (e.g., quarterly or semi-annually). Forecasting specifications may also be considered as personal because of the planning nature of the requirement.

Cost Effective Performance Evaluations

The most cost effective approach for obtaining services should be determined and then specified accordingly to the contract. For example, inspections as stated in this contract are numerous and emphasis should be placed on consolidating these requirements. In addition, inspections should be scheduled and a submission of this schedule should be stated in this specification for approval by the Contracting Officer before work is begun. Preventive maintenance activities such as vacant quarters maintenance (other than painting and floor refinishing requirements and seasonal maintenance inspections) should be consolidated, where feasible. Inspection frequency and the performance period specified in the contract must also be evaluated for cost effectiveness. Preventive maintenance is not necessarily cost effective when performed both quarterly and during occupancy turnover.

Additional information pertaining to cost effective considerations is given on pp 102 to 104 of this appendix.

Workload Data

The workload data shown in this contract are insufficient for bid cost determinations and work performance criteria. Many sections of the contract lack workload data for determination of RPMA requirements. In addition, units of measure are combined by major RPMA, such as "2 percent of all surface areas to include interior/exterior wall surfaces shall not be ordered at any one time." A unit of measure such as this is far too ambiguous. If the criteria are too ambiguous, the contractor's

interpretation meets compliance with the terms of the contract. In addition, the workload data should specify annual volumes or frequencies rather than specifying that "work orders shall not be issued in excess of three per day or five per week."

A major benefit of contracting for family housing maintenance services is the unconstrained aspects of performing the workload and the flexibility the contractor has in hiring/firing personnel to meet these workload peaks, an advantage that the FE does not have. It is recommended that task frequencies or real property units of measure be established and specified in the contract. These workload data will then be used to monitor each work authorization document and help enforce the requirements of the contract.

Government- vs Contractor-Furnished Supplies

Some advantages and disadvantages of furnishing Government supplies to the contract operation are identified in the Housing Maintenance Contract Guide.[9]

The following recommendations for modification of technical specifications are organized by their respective sections as they appear within the original contract document.

Section 1 (not used)

Section 2 -- Special Conditions

Paragraph 2.02.3 -- Work Not Included. The exclusions to the contract should contain a brief description of the terms used or the respective sections that reference the work exclusion. For example, an explanation of the term "major repairs" using examples of work items not included in the contract should be provided for classification.

1. Item 1 should also exclude Section 10 of the contract.

2. Item 2, "Furnishing of Utilities and Fuel," should be expanded to read: "...as specified in Annex D."

3. Item 4, "Repair Work," should exclude such items as mentioned in Section 12.11, major repairs for low pressure heating systems, etc.

Items 7 and 8, workload such as fire prevention/firefighting, and architectural/engineering services are not considered as maintenance

[9] Joyce L. Nay and David W. Brown, Housing Maintenance Contract Guide, TR P-107 (CERL, March 1980).

activities and should be eliminated from work not included in the scope of this contract.

Paragraph 2.03 -- Other Contracts. The first sentence of this paragraph is covered in the exclusions to the scope of work and is not required. The last sentence should be revised to read: "The contractor shall insure that his/her work performance is not deterred because of other contracting activity." Contrary circumstances must be immediately called to the attention of the Contracting Officer's representative.

Paragraph 2.09.3 -- Loss of Property. The contractor is responsible for loss of Government property which has been designated for his/her use as specified in Annex D of the contract. The contractor is not liable for loss of privately owned property of U.S. civilian or military personnel as specified in the contract unless the property is damaged by the contractor in performance of his/her work. Therefore, it is recommended that statements of this nature be eliminated from the contract.

Paragraph 2.09.4 -- Protection Measures. This paragraph, along with Paragraph 2.09.3, may be consolidated and replaced with: "The contractor shall be responsible for the security of all facilities, materials, and equipment under his/her control. In cases of break-ins (forced entry, etc.), the contractor shall notify the Provost Marshal's office immediately upon discovery and assist in determining loss. The contractor shall reimburse the Government for all lost or damaged Government materials and equipment under his/her control, regardless of the source of loss or damage."

It is recommended that a new paragraph be added entitled, "Workmanship." The contents of this paragraph is subdivided by two categories, "Intent" and "Cleanup."

"1. Intent. The performance of work shall conform to the applicable performance specifications stated in the TM 5-600 series, TM 5-800 series, and all other standards provided by the contracting officer. During the repair and replacement activities, adjacent services and dwelling contents shall be protected. Work areas left open overnight or unattended shall be temporarily closed to protect the occupants from possible safety hazards and to protect the dwelling unit from weather damage. In the event the contractor discovers a structural deficiency beyond the scope of this contract, he/she shall immediately notify the contracting officer before completion of the work. Work deemed unsatisfactory by the contracting officer will be corrected at the expense of the contractor within the timeframe specified in this contract. Any Government or occupant owned property damaged by the contractor shall be repaired or replaced immediately at no expense to the Government.

"2. Cleanup. Work areas shall be cleaned after the maintenance has been performed. Cleaning shall include the removal of all smudges, grease, stains, dirt, paint drips, and refuse resulting from the

contractor's work. Carpet which is soiled during the repair activities shall be cleaned according to the manufacturer's recommendations. Glazing materials shall be cleaned as part of the replacement activity. Appliances installed to or serviced in the dwelling shall be cleaned to remove all smudges, grease, and other markings resulting from the contractor's work. Special attention shall be given to the cleanup activity in vacant quarters. They must be left in an acceptable condition with no further cleanup being necessary before occupancy."

Paragraph 2.09.6 -- Cleaning of Site. This paragraph should be eliminated since the inserted paragraph entitled, "Workmanship" (above) covers cleanup.

Paragraph 2.11 -- Directives. It is recommended that only Paragraphs 2.11.1 and 2.11.4 be retained. Paragraph 2.11.2 and 2.11.3 are inferred and should be eliminated.

Paragraph 2.13 -- Contingency and Emergency Services. Since the intent of this contract is not to require large-scale emergency work that exceeds the reported historical data in Annex G of the contract, the contractor cannot be liable for extraordinary work without contract modification or individual purchase order agreement. RPMA that may fall within this classification should be treated as unit price items and be specified as one-time services. Comments pertaining to work beyond the scope of this contract are given on pp 98 to 99 and 101 to 102.

Paragraph 2.13.2 -- One Time Services. One-time services should be treated as a unit price maintenance item. They will fall within the category specified in Paragraph 2.13.1.

Paragraph 2.14.2 -- Contractor Representatives. It is recommended that this paragraph be replaced with: "Contract manager. Provide a full-time manager to be responsible for overall work performance. The manager must have full authority to act for the contractor at all times during performance of the work and must be available to discuss the work upon request of the contracting officer. The Government reserves the right to require the contractor to replace any manager upon proper notification."

Paragraph 2.15 -- Records Access. The records to be accessed should be specified by title and identified in Section K of the contract under the subtitle of work documentation forms.[10]

[10]Joyce L. Nay and David W. Brown, Housing Maintenance Contract Guide, TR P-107 (CERL, March 1980).

Section 3 -- Administration

Paragraph 3.01.1 -- Work Authorization. It is recommended that forms and their completion instructions be specified in the contract.

Paragraph 3.01.3 -- Emergencies. The RPMA that warrant emergency handling should be specified in the contract and the method used to identify a condition as an emergency should be specified (e.g., priority 1 designates an emergency action which will be verbally communicated to the contractor before receiving the work authorization document).

Paragraph 3.02 -- Supply. The problem of supply is addressed in the Housing Maintenance Contract Guide.[11]

Paragraph 3.02.2 -- Government-Furnished Supplies. If a decision is made to provide Government-furnished supplies for the contract operation, the first statement of this paragraph must be amended to specify that the contractor is excused from meeting the performance timeframes of the work order activities when certain Government-furnished supplies are not available. By amending this paragraph accordingly, the contractor still retains responsibility for performance of the ordered task.

Paragraph 3.03 -- Work Schedule. Working hours are normally specified in Section J of the contract, Special Provisions. Performance timeframes for the respected maintenance activities (i.e., urgent, emergency, preventive, and seasonal maintenance) are specified in Section H of the contract, Performance.

Section 4 -- Preventive Maintenance

Paragraph 4.01 -- General. A timeframe for submission of the schedule for preventive maintenance visits should be specified in the contract (e.g., 10 days before the end of each month) for approval of the Contracting Officer. Since vehicle identification is specified in Section 2, Paragraph 2.14.5, any statements relevant to vehicle markings should be eliminated. This paragraph also covers personnel manning requirements which are not enforceable or are left to the discretion of the contractor in performance of the scope of work specified. In addition, preventive maintenance visits are ordered on a quarterly basis; before adoption of this procedure for future contracts, it is recommended that the cost effectiveness of quarterly visits vs semi-annual visits be evaluated (AR 210-50 specifies that a minimum of two visits per year shall be made to each set of quarters). It may be desirable to require that the contractor complete all preventive maintenance visits 1 month before contract termination in order that noncompliance action may be taken and payment deferred if the contractor fails to complete all

[11]Joyce L. Nay and David W. Brown, Housing Maintenance Contract Guide, TR P-107 (CERL, March 1980).

preventive maintenance visits. It is further recommended that preventive maintenance visits be treated as a unit price item. The advantages of this are that the contractor is motivated to perform preventive maintenance visits because additional funds can be obtained by performance of this activity, and the Government pays for only that work actually performed.

Paragraph 4.04 -- Reports and Records. The contract should specify work documentation forms;[12] composite summaries of completed annual work should be maintained by the contractor and made accessible to the Contracting Officer on request. A checklist of maintenance activities to be inspected and a column for annotating work performed during the visit should be provided in the contract. This form should also contain a block for the occupant's complete signature and a block for the date of the preventive maintenance visit. Preventive maintenance performed in common areas such as maid's rooms and equipment rooms should be signed and dated by the contractor.

Paragraph 4.04.3 -- Preventive Maintenance. This paragraph requires that the contractor report followup work required by building to include estimates of labor and materials. The contract should specify whether or not the contractor will be responsible for maintenance that has been discovered during the preventive maintenance visit and the work procedure for performance of this maintenance activity. If the contractor does have this responsibility, the possibility of giving the contractor the option of performing this maintenance at the time of his/her visit should be considered. If the related maintenance activity exceeds the limitations of the contract and a provision for performance of maintenance beyond the scope of work is specified, an estimate of maintenance requirements along with submission of a specification for needed repairs should be requested. If work beyond the limitations of the contract is not specified for contractor performance on a unit price basis, then reporting these deficiencies to the Contracting Officer is all that can be reasonably required of the contractor.

Paragraph 4.05 -- Planning Period. The discussion of Annex G on p 121 gives recommendations relevant to preventive maintenance workload indicants.

Section 5 -- Inspection and Repair of Roof Systems and Supporting Structures

Supporting structures have been added to this title for clarification of the maintenance responsibility specified.

Paragraph 5.01 -- General. The contract modification discussion on limitations for the scope of work must be reviewed before the

[12]Joyce L. Nay and David W. Brown, Housing Maintenance Contract Guide, TR P-107 (CERL, March 1980).

limitations specified in this section are adopted, i.e., 2 percent total roof area, 5 percent rain gutters, downspouts, etc. It is recommended that units of measure that are easily monitored be specified; e.g., "150 roof replacement tasks not to exceed 10 square meters per work order."

Paragraph 5.02 -- Requirements and Inspections. This paragraph should be revised to read: "Annually inspect roof covering, roof construction, insulations, openings of all types, all other load-bearing construction parts, as well as roof guttering and downspout systems of each building covered in this scope of work."

Paragraph 5.03 -- Repairs. It is recommended that replacement criteria be specified. For example, to specify that defective guttering and downspouts shall be repaired or replaced leaves the decision with the contractor without a basis for determination. Cleaning of gutters and downspouts as specified in this paragraph should be treated as a separate paragraph, and only the requirement to clean and remove all debris from gutters and downspouts during the fall after leaves have fallen from the trees should be specified; i.e., the procedure and tools to be used in performance of this maintenance activity are left to the discretion of the contractor.

Paragraph 5.04 -- Work Not Included. All work excluded from this contract should be specified in Section 2; this eliminates the requirement to specify work exclusions in each section of this contract. The contractor should be required to request approval of the roofing inspection schedule 10 days before the end of each month (during the months of ___ through ___) for affirmation of compliance. It is also recommended that an annual composite or summary of accomplished activity be maintained by the contractor and made accessible to the Contracting Officer on request. This summary should contain a sequential listing of all buildings and the dates of their inspection.

Section 6 -- Building Maintenance and Repair

Paragraph 6.01 -- Scope of Work. It is recommended that the units of measure established for this section represent RPMA workload using a per task frequency or a real property unit of measure such as square meters. This will provide the Contracting Officer and the contractor with easily measurable workload criteria and thus provide a realistic basis for monitoring and enforcing the performance requirements.

Paragraph 6.02.2 -- Work Not Included in This Section. Work exclusions for the contract should be specified in Section 2. Work related to each specific section within the contract should identify only that workload that is to be accomplished. This will minimize interpretation conflicts.

Paragraph 6.03 -- Technical Requirements. The first paragraph should be revised to read: "Inspect and maintain all items specified in the following Paragraph numbers 6.03.1 through 6.03.16. In the event

the contractor discovers a structural deficiency beyond the scope of this contract, he/she shall immediately notify the Contracting Officer before the completion of the work. The contractor shall arrange for personnel, in the performance of their duties, to report to their supervisor fire hazards, unsafe conditions, and items in need of maintenance; the contractor shall report the deficiencies in accordance with the terms of this contract to the Contracting Officer."

Paragraph 6.03.3.1 -- Exposed or Other Concrete Floors. The term "pleasing" should be replaced with "acceptable."

Paragraph 6.03.4 -- Ceramic Tile. The regulation that specifies the performance criteria for ceramic tile repairs should be specified in this paragraph; this will eliminate specification of the work performance requirements which may be limited in content because of an oversight. Installation of tile and grounding may be specified in accordance with the Tile Council of America (TCA) handbooks, or a related German regulation.*

Paragraph 6.03.7 -- Built-in Equipment. Replace "have a pleasing appearance" with "acceptable appearance."

Paragraph 6.03.16 -- Touch Up. It is recommended that the last sentence of this paragraph be treated as a separate paragraph, which reads: "Clean Up. Work area shall be cleaned after the maintenance has been performed. Cleaning shall include the removal of all smudges, grease, stains, dirt, paint drips, and refuse resulting from the contractor's work. Glazing materials shall be cleaned as part of the replacement activity."

Section 7 -- Repair Vacant Quarters

In Paragraph 7.01 -- Scope of Work, a joint inspection of the vacated quarters is a costly Government inspection requirement, because the Government must bear both the cost of the contractor and the Contracting Officer's representative. Normally, the responsibility for inspection of quarters being vacated is a function of the family housing personnel assigned to the housing division. A family housing inspector identifies the maintenance requirements and submits his/her request to the FE organization responsible for performance of these requirements. It is recommended that this procedure be continued and, after the workload requirements are received, necessary work authorization documents be prepared to initiate performance of the work as specified by the family housing inspector. The RPMA identified in this section parallels RPMA for preventive maintenance visits (Section 4); it is recommended that the requirements of Sections 4 and 7 be combined under one section entitled Preventive Maintenance. Since maintenance between occupancy is covered by maintenance-related sections of the contract (e.g., sanding

* A list of pertinent handbooks can be obtained from the Tile Council of America, Inc., Princeton, NJ 08540.

of floors, interior painting, and installation of household equipment), it is recommended that repairs to vacant quarters be eliminated and that the time limitations specified in Paragraph 7.03 appear in the maintenance-related sections of the contract. Vacant quarters maintenance will continue to be performed, as requested, by the respective work authorization documents prepared from the family housing inspector's pretermination inspection report.

Section 8 -- Exterior Painting

Exterior paint products are to be selected from those listed in TM 5-618 as specified in AR 210-50. Normally, exterior painting will not be accomplished more often than every 4 years under average climatic conditions. Colors will be selected from those listed in TM 5-807-7.[13] For Paragraph 8.05.1 -- Description of Facilities, it is recommended that a drawing of the housing area, maintained by the terms of the contract, be attached as a contract document for determination of building type and approximate surface area to be painted. This will alleviate conflict over the Government's workload determination data.

Section 9 -- Interior Painting

Interior painting requirements as specified in AR 210-15 require paint products to be selected from those listed in TM 5-618 and interiors of family housing quarters to be repainted with off-white colors on walls and ceilings of all rooms, except kitchens and bathrooms which may have acceptable tinted colors. Tinted colors are to be selected from those listed in TM 5-807-7.

Paragraph 9.01.2.2 -- German Regulations. The relevance of German Regulation VDE 0100, which covers installation of electrical power supply systems, to this section of the contract should be ascertained.

Paragraph 9.03.5.1 -- General. It is recommended that this paragraph be replaced by: "Application of paint shall be by brush or roller unless otherwise specified in this contract. Interior paint shall be applied in dust-free conditions in accordance with manufacturer's recommendations. The atmospheric temperature reading shall meet the manufacturer's recommendations. Each coat shall be prepared in accordance with the paint manufacturer's recommendations before the next coat is applied. Each coat of paint shall be of sufficient thickness to completely cover the previous coat or surface. Sand and dust each coat as described by the paint manufacturer to produce a finish free of visible defects when viewed from a distance of 5 feet. Edges of paint adjoining other materials or colors shall be sharp and clean without overlapping.

[13] Paints and Protective Coatings, TM 5-618 (DA, 15 January 1969); Family Housing Management, AR 210-50 (DA, 6 January 1971); and Color for Buildings, TM 5-807-7 (DA, 15 December 1975).

All finish surfaces shall be free from runs, drips, ridges, waves, laps, brushmarks, and other imperfection and variations in color, structure, and finish. (Note: Page 9-10 was missing from the contract document and could not be evaluated.)

Paragraph 9.04.2 -- Forecast of Requirements. It is recommended that the occupancy turnover data provided in Annex G of the contract replace the workload data referenced in this paragraph.

Paragraph 9.05 -- Rate of Work. The last statement of this paragraph should be eliminated since the occupancy turnover data specified in Annex G of the contract establishes the workload requirements for this maintenance activity.

Section 10 -- Repair, Sanding, and Sealing of Floors

Section 10 is added to the contract by modification #P00005.

Paragraph 10.03.14 -- Recording and Reporting. Bid Schedule formatting is discussed in general terms above, and in detail in the Housing Maintenance Contract Guide.

Paragraph 10.04.2 -- Quantities of Repair Work. It is recommended that this paragraph be eliminated and replaced with the criteria specified in Paragraphs 10.04.3 and 10.05.1.

Paragraph 10.05.1 -- Time Limitations. It is recommended that all references to the volumes of orders issued daily or weekly be eliminated from the contract. Historical data provided in this paragraph and Paragraph 10.04.3 are adequate for workload determination.

Section 11 -- Household Appliances

Paragraph 11.02 -- Scope of Work. It is recommended that a detailed inventory specifying manufacturer, model number, etc. become part of the historical workload data provided in Annex G of the contract.

Paragraph 11.03 -- Work Not Included. Work exclusions should be specified in Section 2 of this contract; only that work to be performed by the terms of Section 11 should be specified.

Paragraph 11.04 -- Tools and Test Instruments. It is recommended that this paragraph be revised to read: "Provide sufficient tools and test equipment for immediate repair of safety hazards and breakdowns of household appliances."

Section 12 -- Load Pressure Heating

Paragraph 12.01 -- General. Identify American Society of Mechanical Engineers (ASME) standards and Army regulations by their respective identification numbers; otherwise, enforcement of these criteria is difficult.

Paragraph 12.04 -- Registers and Reports. Examples of logs and related forms should be included in the contract documents and preparation instructions should be specified; otherwise, whatever information is provided by the contractor is in compliance with the terms of this contract.

Paragraph 12.05 -- Operating Personnel. Skills of operating personnel are inherent in the specifications of the respective RPMA requirements. If these requirements are not met, then noncompliance action is initiated. Heating and water temperatures should be specified to insure sufficient heat and hot water supply for the housing area. Specifying the desired temperature settings and levels to be achieved requires the contractor to perform continuous boiler operations during the low degree days; therefore, it is not necessary to specify that shift work be established.

Paragraph 12.08 -- Repair and Maintenance. The last sentence of this paragraph should be eliminated since the requirement to perform seasonal repair work during the summer months is specified. It is also recommended that the schedule of summer overhaul of the entire system during the summer months (specify respective months) be submitted monthly for Contracting Officer approval before work accomplishment.

Paragraph 12.09 -- Preventive Maintenance. Revise this paragraph to read: "Specify the provisions detailing preventive maintenance requirements for boiler operations in the standard operating procedures as required by Paragraph 3.05 of the contract. All repair and inspection requirements for preventive maintenance activities shall be performed regularly, as specified, to preclude major damage to boilers, units, devices, pipes, radiators, etc."

Paragraph 12.10 -- Minor Repairs. This section of the contract should be revised to read: "Perform minor repair and maintenance activities as necessary for continuing, efficient operation of all boiler plants covered in the scope of this contract." Examples of RPMA that fall within this category should be identified in the contract. In addition, the Government cannot direct the effort of the operating personnel other than to specify the requirement for boiler operations. If operating personnel fail to perform their primary operational responsibilities and allow minor repair work to interfere with boiler plant operation, then noncompliance action should be initiated.

Paragraph 12.11 -- Major Repairs. Section 2 excludes major repair work from the scope of this contract; however, under Section 12, low

pressure heating requires major repair maintenance. A qualification will have to be stated in Section 2 and in Section 12 to remedy this conflict. It is important that the contract specify only the maintenance requirement, not the requirement for installation teams, apprenticeships, authorized welding test/examinations, etc. The contract should specify the minimum time or temperature fall allowable for interruption and start up of heating and hot water supply systems.

Paragraph 12.12 -- Maintenance and Operating Personnel. The scheduling and performance of all RPMA related to boiler plant operation activities are the contractor's responsibilities. However, the contract should specify that a schedule of boiler plant operations and maintenance activities be submitted and approved before the heating season.

Paragraph 12.13 -- Spare Parts. Revise this paragraph to read: "Only parts and materials which comply with German DIN standards and which are compatible with original parts shall be used. Stock levels shall be determined based on consumption histories. Sufficient parts to maintain the required service standard shall be ordered through Government supply." Approval of a list of covered stock items before the heating season should be required for forecasting appropriate supply needs.

Paragraph 12.14.1 -- Fuels. If fuel supply levels are to be monitored by the contractor, specify minimum fuel levels (for ordering purposes) and specify the notification requirement (e.g., notify the contracting officer or designated official to initiate the fuel order, allowing adequate delivery time to avoid depletion of the fuel supply).

Paragraph 12.14.2 -- Materials. This requirement should be covered in Section 3, Paragraph 3.03.

Paragraph 12.14.3 -- Equipment. This section should be entitled Government-Furnished Equipment and reference should be made to Annex D of the contract for equipment allocations. Or, this paragraph should be deleted from the contract, since Section 2 specifies this requirement.

Paragraph 12.14.4 -- Materials and Equipment Not Furnished. Since materials are furnished by the Government, the first term of this paragraph heading should be deleted, and since equipment responsibilities are identified in Section 2, Paragraph 2.02.4, the entire paragraph should be deleted. If local purchase authority is to be authorized when the Government cannot furnish a specific item, then the procedure should be detailed in the contract. Any items which the Government has a continual problem to furnish should be specified to be contractor furnished.

Paragraph 12.16 -- Removal of Cinders. This requirement is added to the contract by modification #P00005. Weekly or monthly reporting criteria should be required to identify the quantity of cinder removal activity and historical workload data; Annex D of the contract should be revised to reflect the heating season cinder removal requirements.

Section 13 -- Pavements and Surfaced Areas

Paragraph 13.01 -- Scope of Work. The scope of work should identify the units of measure appropriate to the RPMA requirement. It is recommended that the unit of measure be based on frequency of tasks ordered or a real property unit of measure rather than on a total surface area percentage as specified in this section.

Paragraph 13.02.1 -- Pavements and Appurtenances. Approval of an inspection schedule before work performance should be required. Also, the contractor should be required to maintain a summary of completed inspections which may be easily identified by pavement zones for review by the Contracting Officer, on request. Identification of pavement zones and their appropriate sequencing should become part of the contract documentation. The contract should specify that the pavement be inspected, but should not require how the inspection should be done, e.g., following a rain storm. Instead, the contract should specify an inspection cycle (e.g., quarterly or semi-annually).

Paragraph 13.02.2 -- Signs and Traffic Markings. Work authorization documents for signs, traffic markings, etc. should be specified. Also, performance timeframe deviation (performance period: 1 working day) should be specified from the performance periods identified in Section 3, Paragraph 3.01.4. Section 3 should be modified accordingly.

Paragraph 13.02.6 -- Pavement Cleaning. This paragraph has been deleted by modification #P00005.

Paragraph 13.02.7 -- Tile and Interlock Pavements. Easily definable units of measure using frequency or real property indicants should be specified.

Paragraph 13.05 -- Records. The requirement for record maintenance is specified in this section; however, the contractor should be required to submit these records or copies of these records on a weekly basis.

Section 14 -- Lawns, Landscaped Areas, and Playgrounds

Paragraph 14.02 -- Work Description and Planning. Approval of work schedules should be required before startup of all related maintenance activities.

Paragraph 14.02.9 -- Damage to Nonstabilized Surfaces. The specified maintenance requirement should be considered for unit price performance, since the activities are clearly nonrecurring in nature.

Paragraph 14.02.10 -- Removal of Leaves and Rubbish. Biweekly cleaning/collection of rubbish such as bottles, cans, paper, branches, sticks, stones, and all other waste material may be in conflict with work exclusions, since Section 2 excludes refuse collection. The cost effectiveness of contracting this RPMA should be considered. If this is

to be retained in the contract, a unit price performance for leaves and rubbish removal should be considered; this will allow the work to be ordered as needed. An outline of those areas to be serviced should be included in the contract documentation and approval of a work schedule before start up should be required. Also, a frequency that is clearly definable should be specified, since biweekly could be interpreted as twice a week or every 2 weeks.

Paragraph 14.02.11 -- Jaeger Fences. The cost effectiveness of this quarterly inspection requirement should be evaluated before it is included in the contract specification. If this requirement is retained, a monthly work schedule should be submitted before work accomplishment.

Paragraph 14.03 -- Reports. A form for weekly reporting purposes should be provided and an annual summary of completed work to be maintained should be specified; this summary should be sequenced by area and be available for review on request.

Section 15 -- Exterior Electrical System

Paragraph 15.02 -- Definition of Terms. The contract specifies that periodic checking of enclosures for signs of tampering, adjustment, or resetting of automatic switches should be accomplished as the need arises. The contract should be revised to specify a frequency for enforcement purposes. In addition, a frequency for all RPMA specified in this paragraph (e.g., relamping, lamp cleaning, inspection) should be identified.

Paragraph 15.03 -- Scope of Work. Since the contractor has lamp replacement responsibility, determination of work performance is at his/her discretion; i.e., the contract should not specify that evening or early morning personnel check lamp outages; it should, however, provide the criteria for compliance.

Paragraph 15.04 -- Work Not Included. This paragraph should be deleted from the contract and expand work exclusions, if necessary, as specified in Section 2, Paragraph 2.02.3.

Paragraph 15.01 -- General. This paragraph should specify that exterior electrical maintenance is covered in this section of the contract and that interior electrical maintenance is covered in Section 6.

Paragraph 15.06 -- Coordination. It appears that the repair/replacement inspection of electrical components within the scope of this contract may be controlled at a location remote from the work area of this contract. This specification requirement is not clear.

Paragraph 15.07 -- Reports. Examples of ledgers, sheets, logs, forms, etc. should be provided and their completion procedures should be described. The Contracting Officer can use this documentation for

forecasting purposes, since the Government orders the work, not the contractor (as inferred by this paragraph).

Section 16 -- Water Lines

Paragraph 16.01.1 -- Scope of Work. What is meant by "unless otherwise noted" should be clarified; e.g., unless otherwise specified by the Contracting Officer.

Paragraph 16.01.2 -- Operating Personnel. This requirement should be inferred by the RPMA specifications and, therefore, should be deleted from the contract.

Paragraph 16.02.1 -- Water Supply Systems. It should be specified that an inspection schedule shall be approved before work accomplishment. Before approval of the schedule, the Contracting Officer should coordinate the schedule with fire department personnel so that their inspection activity does not interfere with the contractor's work performance. Reports, inspection forms, etc. should be provided as contract documents and included as part of the work documentation procedure for this contract.

Paragraph 16.03 -- Performance Standards. Revise this paragraph to read: "All work shall be performed in accordance with regulations and standards specified in Paragraph 16.04, Annex A, and with pertinent safety regulations of both governments."

Section 17 -- Sewer Systems

Paragraph 17.03 -- Description of Work. Submission of a work schedule before work accomplishment should be required.

Paragraph 17.04 -- Work Not Included. This paragraph should be deleted from the contract and the accuracy of the work exclusions specified in Section 2, Paragraph 2.02.3, should be ascertained.

Paragraph 17.05 -- Records and Planning. Examples of ledgers, logs, forms, records, etc. to be maintained by the contractor should be provided as contract documents; their completion instructions should be specified.

Section 18 -- Exterior Heating

Paragraph 18.01 -- General. It is assumed that the buildings located on Grant's Circle, Taylor Street, and Hays Street (no building numbers) are also covered by this scope of work in this contract. This should be clarified.

Paragraph 18.02 -- Preventive Maintenance. This paragraph could be entitled "Seasonal Maintenance." The inspection frequency may be confused with preventive maintenance inspections as specified in Section 4;

those inspections are scheduled quarterly rather than semi-annually. In addition, submission of a work schedule to Contracting Officer approval before performance should be specified.

Paragraph 18.03 -- Personnel. This paragraph should be deleted from the contract because conflict may arise over personal vs nonpersonal services.

Paragraph 18.04 -- Repair. The repair procedure should be specific to related RPMA categories. In addition, repairs should be made in compliance with applicable regulations and standards (cite regulation numbers). The last two sentences of this paragraph should become part of Paragraph 18.01.

Paragraph 18.05 -- Records. Examples of ledgers, logs, forms, records, etc. to be maintained by the contractor should be provided as contract documents; their completion instructions should be specified.

Annex A -- References on Policy and Standard Practices

Regulations should be organized by major work categories and functions as outlined in the contract document.

Annex D -- Government-Furnished Facilities and Equipment

II. Equipment. The contractor should complete necessary property documentation in order to be accountable for any equipment furnished by the Government.

III. Fuel. Fuels supply, monitoring, and reporting requirements should be specified as indicated in Section 12, Paragraph 12.14.1.

Annex F -- Forms

The guidance provided in CERL's technical report on work documentation alternatives should be reviewed.[14]

Annex G -- Workload Data

Paragraph 2 -- Street Signs. A locator map of all signs should be provided.

Paragraph 3 -- Preventive Maintenance. Preventive maintenance workload data should merely state the number of units to be maintained (e.g., 2,091 units) which require the specified number of visits per annum.

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[14]Joyce L. Nay and David W. Brown, Housing Maintenance Contract Guide, TR P-107 (CERL, March 1980).

Paragraph 6 -- Work Order Data. Work order volume should be specified for a 1-year period and should represent accomplished, unaccomplished, and new work requirements. It is not desirable to provide manhour estimates since manhour indicants often include many dissimilar variables. For example, productive manhours for one analysis may include travel time to and from the shop area, supply pickup, and disposition, etc., and another analysis may include only onsite work time. If manhours are provided, the determination factors must be specified. It is also important to specify annual workload for other inspection activities, e.g., water system, sewer system, electrical system, roofing, heating system, floor refinishing.

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Seneca Army Depot
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Tooele Army Depot
Watervliet Arsenal
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White Sands Missile Range

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FORSCOM Engineer, ATTN: AFEN-FE
ATTN: AFEN-RM-H (25)
ATTN: Facilities Engineers
ATTN: Housing Division Manager
Fort Buchanan
Fort Bragg
Fort Campbell
Fort Carson
Fort Devens
Fort Drum
Fort Greely
Fort Hood
Fort Indiantown Gap
Fort Sam Houston
Fort Lewis
Fort McCoy
Fort McPherson
Fort George G. Meade
Fort Ord
Fort Polk
Fort Richardson
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Fort Stewart
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Vancouver Bks.

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ATTN: Facilities Engineer
ATTN: Housing Division Manager
Fort Belvoir
Fort Benning
Fort Bliss
Carlisle Barracks
Fort Chaffee
Fort Dix
Fort Eustis
Fort Gordon
Fort Hamilton
Fort Benjamin Harrison
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Fort Lee
Fort McClellan
Fort Monroe
Fort Rucker
Fort Sill
Fort Leonard Wood

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Vint Hill Farms Station
Arlington Hall Station

MDW
ATTN: Facilities Engineer
ATTN: Housing Division Manager
Cameron Station
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ATTN: Facilities Engineer
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ATTN: AEREH (5)

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