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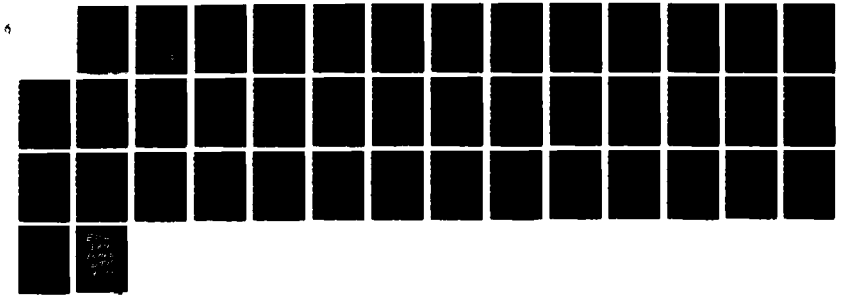

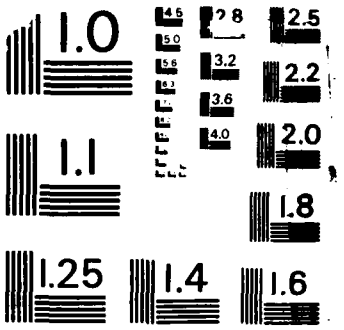

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US Army Corps
of Engineers
Construction Engineering
Research Laboratory

Assessment of the Need for Standards for Preparing Maintenance and Repair Contracts, Volume I: Analysis and Recommendations

by
Robert B. Blackmon

This report documents the results of a study conducted to determine the need for new maintenance and repair (M&R) guide specifications for use by District Engineer (DE) and Directorate of Engineering and Housing (DEH) organizations. A questionnaire was distributed to DEH organizations and Corps of Engineers (CE) District Offices with military missions to ascertain the needs of individual organizations for new guidance. Results indicated that many activities want guidance that will make the specification preparation process more efficient and less costly.

Development of the new M&R guide specifications (MARGS) can start with the new Fort Irwin specifications which are updated and tailored Real Property Maintenance Activities Guide Specifications (RPMAGS), or with the original RPMAGS since both sets are short form specifications with an established section numbering system and the scope of work for each section is defined. A new set of MARGS could also be developed using a variety of source specification sections. Regardless of approach, consideration will be given to existing site prepared specifications.

MARGS should be developed for use within the Continental United States and a separate system called EMARGS (European MARGS) should be developed for use in Germany. Recommendations on methods of development and distribution to users are included.

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FOREWORD

This research was conducted for the Office of the Chief of Engineers (OCE) under Intra-Army Order No. E8786L060 dated December 1985, March 1986, and May 1986. The work was performed by the Facility Systems Division (FS), U.S. Army Construction Engineering Research Laboratory (USA-CERL). Mr. Helmut Gramberg (DAEN-ZCF-B) was the OCE Technical Monitor.

The contributions of the following people to this study are acknowledged: Mr. Jerry Clark, U.S. Army Engineer Division, Huntsville (CEHND) and the maintenance and repair guide specifications (MARGS) users' group--Mr. Helmut Gramberg (OCE), Mr. Frank Schmidt (Headquarters, U.S. Army Corps of Engineers [HQUSACE], Mr. Jack Chaffee (Headquarters, U.S. Army Training and Doctrine Command [TRADOC]), Mr. Kumar (Headquarters, U.S. Army Forces Command [FORSCOM]), Mr. Sabah Issa (Fort Sill, OK), Mr. George Petithory (Fort Eustis, VA), Mr. Mike Ackerman (Fort Bragg, NC), and Mr. Brian Doyle (USACE, Sacramento District).

Mr. E. A. Lotz is Chief of USA-CERL-FS. COL Norman C. Hintz is Commander and Director of USA-CERL, and Dr. L. R. Shaffer is Technical Director.

CONTENTS

ASSESSMENT OF THE NEED FOR STANDARDS FOR PREPARING MAINTENANCE AND REPAIR CONTRACTS

1 INTRODUCTION

Background

Corps of Engineers Guide Specifications (CEGS)* are actively maintained for preparing specifications for new military construction projects. Other guides and standard specifications for constructing special projects such as mobilization facilities, housing, and emergency construction are also maintained, but less frequently than CEGS. However, no standards or guide specifications are maintained for use by District Engineer (DE) and Directorate of Engineering and Housing (DEH) organizations in preparing maintenance and repair (M&R) contracts. Previous examination[1] of DEH activities found that CEGS guidance was inadequate for preparing maintenance, repair, and operation contracts. This led to the development of the Real Property Maintenance Activities Guide Specifications (RPMAGS), which were first issued to all DEH organizations in 1977. However, the RPMAGS were not maintained and have become obsolete. DEH and DE preparation of M&R contracts is currently based on a number of reference documents, including the RPMAGS. During FY87, a U.S. Army Engineer Division, Huntsville (CEHND) report[2] was published covering a study to evaluate the usefulness of the CEGS in preparing M&R project specifications. The study found that "regardless of how good CEGS are for regular new military construction, they are not fully meeting the needs for small projects" which would include major M&R contracts.

The major objectives of standards and guide specifications are to:

1. Significantly reduce the technical and administrative time required to prepare high-quality, technically correct contract specifications and other contract documents.

2. Ensure that the specifications used represent the current market for acceptable materials and equipment.

3. Require the most acceptable construction/installation techniques, including appropriate safety measures.

4. Provide a good foundation for settling claims.

5. Provide consistent quality and requirements in the finished products. Consistent specifications not only help the contracting office monitor the quality of work, but also present consistent requirements for contractors that bid on work from more than one

*A list of acronyms used in this report is provided on pp 37-38.

[1] *Management Plan for Developing RPMA Specifications for Facilities Engineers*, Letter Report C-54 (U.S. Army Construction Engineering Research Laboratory [USA-CERL], September 1975).

[2] *Guide Specifications for Small Projects* (U.S. Army Engineer Division, Huntsville [CEHND], 30 December 1986).

installation or area. Consistent specifications can also form the foundation for training quality assurance evaluators.

6. Provide a method of avoiding materials or techniques that have been proven inferior during other projects.

7. Reduce dependency on highly qualified specification writers in each organization to produce a good project specification.

Specifications should be appropriate for the intended use and easy to maintain. Over the years, contractors have complained that using CEGS for M&R projects produced specifications that were too complex and long, and required submittals that were inappropriate for the type and value of the M&R contracts. In developing the RPMAGS, one of the driving forces was to establish a method for minimizing the volume of specifications used without losing the essential quality control requirements. Subsequent development of the Job Order Contracting (JOC) specifications reduced the volume of the specifications even further.

To fully satisfy the objectives listed above, the specifications must be updated periodically to:

1. Include the current edition of the referenced specifications, standards, and codes as well as the appropriate classes and types specified in each referenced document.

2. Ensure that the specifications reflect the current market for materials and equipment.

3. Include materials, equipment, and processes that have been shown to be acceptable and delete those that have not produced good results. Specifications and standards for RPMA should be consistent with the technical requirements of the CEGS and be designed to take advantage of the CEGS updating activities.

M&R specification standards are also needed to help installation specification writers do their jobs more effectively. Specifiers have a wide variety of technical backgrounds and normally learn their trade through on-the-job training. Expert specifiers tend to specialize by technical areas and are familiar with all of the codes, specifications, and standards used in the project specifications. Less qualified specifiers depend heavily on the guide specifications and the attached notes and may not have a good working knowledge of what they are actually specifying. Specification mistakes may get duplicated into many project specifications and take a long time to correct. Mistakes can result in expensive modifications to the contracts or claims against the Government.

M&R specifications are prepared by DE, DEH, and contractors. DE designers and specification writers receive training for CEGS and use them daily in their new construction orientation. Since CEGS cover most specification areas, specification writers are concerned primarily with identifying and specifying unique requirements. In the absence of appropriate guide specifications for M&R contracts, these people often find it difficult to customize CEGS or prepare unique specifications appropriate for M&R contracts. Specification writers at Fort Campbell find the CEGS difficult to use for M&R projects. Personnel at Fort Polk use CEGS and commercial specifications but have requested more narrowly scoped guide specifications to "get around the time spent sifting through current specifications." Writers at Fort Lee commented that the CEGS tend to have too many options that can lead to repairs that meet the specifications but are not what was really intended. Considering this comment another way, Fort Lee

writers are having difficulties tailoring the CEGS to fit project requirements. The capability in the DEH organizations to produce adequate M&R specifications varies widely among installations, depending on factors such as their size, budget, demand for M&R contracts, and ability to attract and retain qualified personnel. While the larger organizations are fully capable of producing M&R specifications by using various sources as guidance, the smaller installations need more technical assistance in such forms as M&R guide specifications.

Objective

The objectives of this report are to (1) quantify the need for specifications/standards for preparing M&R contracts, (2) analyze the merits of alternative methods for meeting those needs, and (3) recommend actions to improve the M&R contract preparation process.

Approach

1. A questionnaire was designed to collect data on the volume of work being performed and the opinions of field personnel on several questions. Respondents were requested to send copies of site developed specifications that could be used to develop new M&R guides.

2. The survey response was reviewed and analyzed. Several respondents were called to supply information missing from their questionnaires and to confirm data.

3. A draft report was prepared by two Corps of Engineers (CE) specification writers with extensive experience in preparing guide and project specifications over a very wide range of projects. Information was collected from CEHND concerning distribution of CEGS on microcomputer disks and concerning plans for distributing CEGS on compact disks.

4. The draft report was reviewed by the users' group representing DEH and DE organizations. The report was revised to include the group's comments and its evaluation of current problems in producing M&R project specifications and the need for new guide specifications for supporting District Offices.

5. The possibility of taking advantage of work already accomplished on two new sets of M&R specifications was identified in the draft report. A detailed analysis was made of a representative sample of both sets of specifications.

6. A concept was developed for maintaining the new specification system. Cost estimates were prepared to develop and maintain guide specifications for major M&R tasks.

7. U.S. Army Construction Engineering Research Laboratory (USA-CERL) was involved in a parallel task with CEHND to determine if CEGS were considered adequate for use in preparing M&R specifications and if commercial guide specifications could be used in preparing M&R project specifications. Findings from this effort have been incorporated into this report.

8. A telephone survey was conducted during February 1987 to determine why several installations responded that there was no need for a new set of M&R guide specifications. The question could be interpreted several ways and more information was needed to ensure that the correct interpretation was reflected in the report.

9. The final report with a recommended development plan was completed and furnished to members of the users' group for comment. Their comments have been incorporated into this report.

Mode of Technology Transfer

It is recommended that the information in this report be transferred through the development and publication of new M&R guide specifications.

2 EXISTING STANDARDS AND GUIDE SPECIFICATIONS

Real Property Maintenance Activities Guide Specifications

The initial issue of the RPMAGS covered maintenance, replacement, repair, inspection, and operation activities. In some cases, the contractors were required to match the existing materials, configurations, functions, and erection methods and to use materials no longer specified in the CEGS. The format, which was employed prior to the use of microcomputers, was designed to simplify publication of specifications, with very little typing. Material for each topic was subdivided into a general text and a series of specific narrow-band topics. Specifications could be prepared by selecting the appropriate general sections plus any required narrow-scope specification sections. Any changes were entered in the wide right margin of the final specification. Preparation of the project specification thus primarily involved selecting sections and copying them. This approach resulted in a set containing 70 major topics and 257 narrow-scope sections--a very high number compared to the number of broad-based CEGS then in use. The RPMAGS were developed to include all of the topics requested by the DEH organizations; the idea was that over time, rarely used sections would be eliminated and new sections added to keep the guides responsive to field needs. At that time, the developers were unable to quantify the projected frequency of use for any of the sections and therefore could not economically justify developing them.

Corps of Engineers Guide Specifications

New construction CEGS, as prepared and maintained by CEEC-ES, are quite different from the RPMAGS. These CEGS establish the minimum acceptable quality of materials, equipment, and construction/erection techniques to be used. Contractors have the option of selecting materials and construction/erection procedures that meet the performance requirements. The CEGS are well maintained, with every section being thoroughly reviewed periodically, compared to the related segment of the industry, and revised accordingly. Generally, the CEGS do not require the contractor to match existing materials, finishes, or construction techniques that are frequently required in M&R contracts. While several DEH organizations are using CEGS for M&R contracts, massive changes must be made to limit the available options, specify work to match surrounding or existing materials, and delete inapplicable provisions. CEGS can be used to keep DEHs informed about materials and construction techniques acceptable to the CE. However, unless the CEGS are well edited, using them to prepare M&R contracts can lead to several problems:

1. The specifications can contain unnecessarily detailed or restrictive requirements that tend to drive away some bidders and increase cost.

2. They provide detailed technical requirements in terms of standards such as those of the American Society for Testing and Materials (ASTM), which are unfamiliar to small contractors and fail to communicate requirements effectively. This results in difficulties throughout the contract period.

3. Using the CEGS and extensively editing them for M&R contracts is very expensive and often requires the DEH to acquire technical assistance from other sources.

Fort Irwin Specifications

During FY85, the Fort Irwin DEH, working through the Los Angeles District Office, updated and tailored the RPMAGS for use in their Commercial Activities (CA) base-wide maintenance contract for RPMA. The contract using these specifications was awarded in October 1986. The decision was made to develop a new set of guides rather than use the existing guides available to help prepare Performance Work Statements (PWS). The Fort Irwin specifications were prepared to try to overcome problems experienced during CA contracting. These specifications are now available for reference or to serve as the foundation for a new specification system.

Job Order Contracting Specifications

A new set of specifications has been prepared for use during the field testing of the JOC technique. JOC specifications were based on the RPMAGS and reduced in volume by combining some topics and by deleting duplicated text and paragraphs pertaining to current issues of the referenced specifications/standards, submittals for quality control, delivery, safety, and preparation techniques. The specifications have a unique numbering system. The JOC method is currently being tested at five installations, and outstanding results have been achieved to date.

Performance Work Statement

Guides for helping DEHs prepare PWS for CA contracts are available from the Facility Engineering Support Agency (FESA). These guides were developed from project specifications written by installations for CA contracts. M&R specifications can be used in CA contracts following the Fort Irwin example; a well written and maintained set of such specifications should significantly simplify PWS preparation.

3 DATA COLLECTION AND ANALYSIS

Data for this study were gathered from several sources. The primary source was a questionnaire designed to collect quantitative data on the current process to produce project specifications and to gather opinions of professional specification writers on several related topics. The questionnaire was developed and coordinated with Headquarters, U.S. Army Corps of Engineers (HQUSACE) and CEHND. It was given worldwide distribution through the Major Commands (MACOMs), District Offices with installations support programs, and several other organizations responsible for developing specifications for DEH organizations. The data obtained were analyzed by professional CE specification writers. Analysis of the data was based on questionnaire responses and on a thorough knowledge of specifications and the project preparation process. Appendix A provides a copy of the survey questionnaire. Appendix B contains a list of specifications received from installations. (Appendix C [unpublished] provides a copy of the completed questionnaires.)

The following sections are keyed to the questions answered by questionnaire respondents.

General Information

One hundred survey responses were received from 124 installations representing 20 MACOMs and 12 District Offices. The District Offices that responded support 14 Army installations that did not respond to the DEH survey, 28 Air Force installations, and 6 other Federal installations. Reserve Centers served were not included. No response was received from the Defense Logistics Agency (DLA) and three MACOMs: the Armament, Munitions, and Chemical Command (AMCCOM), the Armament Research and Development Command (ARRADCOM), and the Tank Automotive Command (TACOM). Some of these installations did not respond because their M&R specifications are being prepared by a supporting District Office or another DEH organization. Others under CA contracts did not respond since no M&R contracts were being prepared. Responses were provided by about 94 percent of the installations.

The Continental United States (CONUS) installations surveyed prepare about 9,000 project specifications annually. The volume of DEH-prepared project specifications varies from 1 page to more than 350 pages, depending on the types of contracts being used. The average length of M&R specifications for 50 percent of the respondents is less than 50 pages. For more than 40 percent of the respondents, the average specification varies between 51 and 150 pages. Less than 10 percent of the average specifications exceed 150 pages. Some of the specifications are for annual contracts, and some are for specific task contracts. The volume of specifications prepared by DE organizations tended to be larger; about 42 percent contained 51 to 150 pages, and 33 percent of the specifications contained more than 150 pages. The total number of pages produced each year were about equal between the DEH and DE organizations participating in the study. Together, these represented about 930,000 pages of project specifications. The respondents' specification preparation work required more than 199,711 typist hours and 342,556 specifier hours annually. This represents an annual investment of about $15M, not considering the preparation cost of architect-engineer (AE) prepared specifications.

U.S. Army, Europe (USAREUR) reported 4,425 project specifications containing 334,700 pages. About 50 percent of the project specifications contained between 51 and 150 pages; 44 percent contained 50 or fewer pages. The specifications required 180,560

typing hours and 618,625 specification writer and translator hours to complete. This represents an annual investment of about $25M, not considering preparation cost of specifications prepared by AEs. Most installations use word processing equipment.

After adjusting the recorded resource investment for the installations not responding to the survey, it was conservatively estimated that the in-house labor component for preparing M&R project specifications is over $46M. About 50 percent of the cost is related to USAREUR. The AE related costs have not been included in these estimates. One installation reported that an AE had offered a 30 percent reduction in fees if good guide specifications were made available.

Currently Used Guides and Standards

Respondents were found to use a wide variety of guides when preparing project specifications (Table 1). Each source of guides and standards used was prepared for different purposes and/or with a different set of assumptions. Site-generated specifications could be based on either CEGS or RPMAGS, and modified to suit local conditions, based on commercial/vendor guides. The percentage of the total number of pages prepared from each type of source is indicative of the relative importance of each source.

Use of CEGS

Based on the CONUS sample, 55.9 percent of the pages of specifications published each year are based directly on the currently maintained CEGS. Although not shown in Table 1, only about 2.3 percent of the pages of specifications published outside the *Continental United States* (OCONUS) are based on CEGS. Some organizations may be using the CEGS for reference in updating their own specifications. Even though some organizations are heavily dependent on the CEGS, they have asked for a new set of guide specifications tailored for M&R projects.

Use of RPMAGS

Respondents reported the continued use of more than 50 sections of the RPMAGS. It has been assumed that these users have updated the sections of interest. Table 2 gives the sections reported along with the number of installations using each section and the estimated frequency of use. Five installations use RPMAGS more frequently than CEGS as source documents. Some respondents reported actual section numbers or titles of the sections being used, and others provided only general topics. The estimated frequency-of-use data contain both annual and task contracts, which tend to understate the importance of the specification sources.

Site Generated and Past Project Specifications

Site generated specifications can be based on specifications from a wide range of sources including the CEGS, state and regional standards, commercial systems sold by the Construction Specifications Institute (CSI) and the American Institute of Architects (AIA), and trade and vendor specifications. Past project specifications should reflect the distribution of the identified sources. Site generated specifications are commonly used to simplify the project specification process, take advantage of state and regional specifications, and to fill gaps in existing systems. Past project specifications are used to speed the preparation process by maximizing the use of locally successful specifications. All guide specifications, regardless of source, need to be updated periodically; these types of specifications must be updated by the DEH based on changes in the source

Table 1

Distribution of Sources

Responses	All		CONUS		USAREUR		Far East	
Source*	No. Sites	% Pages Based on Source	No. Sites	% Pages Based on Source	No. Sites	% Pages Based on Source	No. Sites	% Pages Based on Source
CEGS	55	32.7	50	55.9	4	0.7	2	44.4
RPMAGS	27	2.9	24	4.8	5	0.5	-	-
GSA	10	0.3	5	0.3	4	<0.1	1	0.9
CSI	22	1.5	19	2.5	3	<0.1	-	-
Site-Prepared	63	17.1	37	5.2	29	37.2**	-	-
Past Projects	81	25.1	49	20.0	36	32.9**	2	31.1
Vendor	51	3.5	33	3.2	19	3.9**	1	1.5
Trade	56	12.2	29	6.4	29	18.2**	2	9.1
Other	24	4.7	8	1.7	17	6.5**	2	13.0***

*CEGS = Corps of Engineers Guide Specification; RPMAGS = Real Property Maintenance Activities Guide Specification; GSA = Government Services Administration; CSI = Construction Specifications Institute.

**Based on German Standards.

***Includes Japanese Standards.

Table 2

RPMAGS Currently in Use

Topic No.	Description	Number of Installations	Number of Users/Yr
1	Traffic Control Devices and Pavement Markings	1	1
2	Surfaced Areas	1	2
	32640 Overlays	4	6
	32650 Repair of PCC Pavements	3	3
	32660 Repair of AC Pavements	4	4
3	Sidewalks, Paths, and Walkways	3	5
6	Railroads and Appurtenances	2	2
	32850 Trackage and Accessories	1	4
	32860 Rail Highway Crossing Surfaces	0	0
7	Fences and Gates	1	2
10	Roof Repair and Maintenance	6	24
	37001 Preparation for Reroofing and Repairs	1	2
	37191 Vapor Barrier for Roofs	1	2
	37241 Roof Insulation and Underlayment	1	2
	37300 Shingles and Roofing Tiles	1	2
	37500 Membrane Roofing	1	2
	37600 Sheet Metal for Roofing	1	2
12	Masonry Repair and Restoration	1	5
	34100 Masonry Repair and Replacement	3	4
	34500 Masonry Restoration	5	10
14	Doors and Windows	2	6
	38510 Steel Windows M&R	1	2
	38360 Overhead Doors M&R	1	1
15	Plastering and Wallboard Repair		
	39110 Plaster Repairs	2	3
	39210 Wallboard Repairs	1	2
16	Floors and Floor Finishes	1	1
	39300 Tile Flooring--General	1	1
	39550 Wood Flooring M&R	1	2
	39650 Resilient Floors M&R	1	1
17	Interior Painting (50200)	9	33
18	Water Storage Tank Painting (50310)	2	3

Table 2 (Cont'd)

Topic No.	Description	Number of Installations	Number of Users/Yr
19	Exterior Painting (50100)	8	19
21	Bleachers and Training Facilities M&R	1	1
24	Elevator M&R	2	2
27	HVAC and Refrigeration Equipment M&R	2	7
28	Cathodic Protection of Steel Water Tanks	1	1
29	Cathodic Protection Systems for Underground Utilities	1	1
33	Water Well M&R (45180)	1	1
35	Sewer Line M&R	1	2
36	Sewer Line Inspection	1	2
40	Piping, Valves, and Accessories	1	4
47	Fire Protection Sprinkler Systems	1	4
49	Interior Electrical M&R	1	5
51	Electrical Distribution System M&R	4	8
56	Window Cleaning Service	1	1
57	Ground Maintenance Services	2	2
59	Refuse Disposal Services	3	6
71	Swimming Pool O&M	1	1
--	Carpentry	1	50

documents and other publications. Although site generated and past project specifications can speed the project specification preparation time, local specification writers must be able to add material to replace text deleted during the last editing, update the reference materials, and maintain an awareness of the limitations written into the tailored sections and the available guidance on how to modify the specifications to meet project requirements. The practice of inserting specification sections from the last project because it was similar to the current project can be a source of real problems.

Standards

In USAREUR, many military installations are producing contract specifications in both English and German. The English version is the legal document for contract administration, and the German translation is provided to ensure communication with the contractors. The specifications use the host nation's standards to establish product quality rather than the reference publications normally used in the CEGS for the same purpose. This change recognizes the fact that contractors in Germany are trained to follow the standards being used in Germany (Deutsches Institut Fuer Normung [DINS]); all construction materials, equipment, and construction methods used must also conform to the DINS. In Germany, the problem is in preparing the guide specifications based on the DINS and other locally used standards, and then translating the project specifications into German. Preparation of these guides requires expert knowledge of the DINS. Telephone interviews indicated that some installation communities generally do not have the personnel needed to fully accomplish this task. Most of the survey responses from USAREUR indicate a need for German guide specifications using the DINS and other commonly used host nation standards.

DEH organizations in Korea use the *Standard Technical Specifications for Miscellaneous Projects, Korea,* prepared by the Far East District, as reference in all contracts. The specifications appear to be tailored CEGS. In Japan, the 9th Area Support Group needs new M&R specifications; they are currently using Japanese standards (20 percent) and CEGS (55 percent). The U.S. Garrison on Okinawa uses CEGS (40 percent) and past projects (40 percent) and does not see the need for new M&R specifications. Other sources are used at both locations for the remaining project specifications. If new M&R guide specifications became available, they would most likely be used in the Far East organizations.

Need for New M&R Standards

About 78 percent of the CONUS DEH respondents indicated a need for a new set of M&R standards. About 83 percent of the District respondents agreed with the development of new M&R guides. In USAREUR, 62 percent agreed that there is a need for M&R guides based on German standards and written in both English and German. Japan needs a new M&R guide. Many respondents suggested topics for the new standards and a few provided copies of their site generated specifications.

Topics To Be Covered by New Standards

CONUS questionnaire respondents identified the topics (Table 3) that they felt should be covered by new standards. Table 4 lists the suggested topics by RPMAGS

Table 3

RPMA Topics to Be Included in New M&R Standards (CONUS)

All Areas of Construction

All Available Guide Specifications

All Repairs to Real Property

Appliance Repair

Asphalt Patching

Asbestos

Bathroom

Cabinetwork Replacement--More Types

Calking and Sealant

Carpentry

Concrete

Demolition

Doors and Windows

Elevators

Electrical Equipment

Equipment

Fencing

Floors and Floor Finishes

Furnishings

Hardware

Heating Plants/External Heating Distribution System

HVAC M&R

Industrial Floor Toppings

Interior Rehabilitation

Joint Repairs (Concrete)

Kitchen

Masonry

Mechanical

Metal Ducts

Miscellaneous Utilities

Painting

Paving

Plumbing

Security Grilles

Sheet Metal

Siding

Site Work

Specialties

Structural Concrete Repair

Updates for: Material, Regulations, Standards, Techniques

Utilities

Wallboard Repair

Water Towers

Welding

Wood Structure Repair

Table 4

Suggested New Subjects for Standards by RPMAGS Section Number

32050	Demolition
32662	Asphalt Rubber Surfacing
33300	Concrete, General
33302	Sea Wall M&R
33304	Pier M&R
33306	Joint Repair
33308	Structural Concrete Repair
33310	Repair of One-Way Slabs
35120	General Welding
35500	Miscellaneous Metal, General
35502	Security Grilles M&R and Replacement
36100	Rough Carpentry, General
36102	Wood Structure Repair
36202	Wood Siding Replacement
37414	Protected Metal Roofing and Siding
37416	Siding M&R
37418	Roofing M&R
37463	Asbestos Cement Roofing and Siding
37464	Siding M&R
38612	Replacement of Windows in Historic Structures
38710	Industrial Floor Topping M&R
43414	Water Tower M&R
40810	Toilet Accessories M&R
42307	Cabinet Replacement, General

section numbers. Topics identified by USAREUR respondents are given in Table 5. In addition, several installations recommended that the following topics be included:

- Roof repair work order contract (open-end)
- Small appliance M&R
- Dehumidification and aircraft storage M&R
- Asbestos abatement.

Guide specifications and standards generally set the quality/performance required of the materials but allow the contractor to select the materials. This approach maintains materials quality, but also provides the maximum of competition among suppliers. A respondent in USAREUR suggested that all specifications include those of DINS, Verdingungsordnung Fuer Baildistungen (VOB), and Verband Deutscher Electrotechniker (VDE), and employ the special procurement language now used in USAREUR projects. Another respondent suggested that the RPMAGS format for specifying quality/performance be simplified.

Need for Guidance in Use of CEGS to Prepare M&R Specifications

One approach to providing the needed guide specifications in CONUS is to use the CEGS, modified to include a new set of notes on how to prepare M&R project specifications from CEGS. About 42 percent of the respondents agreed that this is one approach to be considered.

Distribution of New Specifications and Standards

Traditionally, CEGS have been distributed either as paper copies or on microfilm. In the past, Districts and Divisions were able to download CEGS from the CEHND computer, but this service was not available to DEH organizations. Users then reproduced the number of copies needed. Specifiers marked up these draft guides to reflect project requirements, and the text was completely retyped for production of the final project specification. There are several variations to this process. For example, one approach is to create local guides by modifying the CEGS to include project-unique requirements and language. Changes made in the CEGS are then incorporated into the local guides as time permits.

Recognizing the significant costs of traditional CEGS distribution methods, the questionnaire also collected data on distribution techniques. Several installations indicated a variety of choices. As a result, the response percentages below exceed 100 percent. It should be noted that the questionnaire addressed only the method of transfer; the actual method used will depend heavily on the estimated total cost of each option.

Survey respondents indicated the following preferences for transfer methods. About 56 percent of the respondents wanted hard copies in addition to other transfer media. All but five of these respondents selected more than one distribution technique. These respondents wanted the guides and standards on computer or word processor disks as well as the hard copies. These combinations would eliminate the need for installations to print reproducible masters from their own word processing or microcomputer disk copies. Only five respondents requested hard copies of the guides and standards as the sole distribution method; of these, three do not have word processing equipment.

Table 5

Requirements From European Organizations*

Sections

Air-Conditioning Systems

Asbestos Removal

Boilers

Carpentry

Coal Conveying Systems

Compressed Air Systems

Concrete and Masonry Repair

Concrete and Reinforced Concrete

Dehumidification Systems

Electrical Cables

Electrical Distribution Boxes

Electrical Equipment in Heating Plants and Substations

Electrical Installations

Elevators

Fire Alarms

Fire Extinguishing Systems

Flooring

Intruder Detection Systems (IDS)

Interior Gas Distribution Systems

Heat Exchangers

Heating Lines

Heating Systems

Hot Water Generators

Kitchen Equipment

Masonry

Metal/Locksmith

Painting

Pavements

Plastering

Plumbing

Roofing Repair

Sanitary Installation

Sewer Systems

Tanks

Tiling

Ventilation

Water Pipes

Water Softeners

General

Architectural

Civil

Electrical

Mechanical

Sanitary Sewer

Others

A complete set of German standard specifications

All available guide specifications

All types normally included in a set of specifications applicable to USAREUR to include DINS, VOB, and VDE plus special procurement language used in Europe.

*These requirements were collected from the questionnaires from European organizations in response to the request that they "list the topics that should be covered by the new standards."

About 49 percent of the respondents elected to download master standards and guides from a central computer. About 55 percent of the respondents preferred IBM-compatible floppy disks, and about 44 percent preferred WANG-compatible floppy disks. Approximately 14 percent preferred computer tapes. About 21 percent of the respondents suggested other distribution media, including disks for various types of word processing equipment, microfilm/microfiche, disks for other types of computers, and cartridges.

Comments From Survey Respondents

The following comments were provided on the completed questionnaires.

1. The Fort Bragg respondent recommended that the new M&R specifications be the same or as nearly the same as those used by the supporting DE. Both the installation and the District award contracts for maintenance projects at the installation. Different types of specifications are confusing to the contractors, hard to enforce, and sometimes lead to different standards. Because of this, Fort Bragg has adopted the CEGS specifications as modified by the Savannah District. The Fort Bragg respondent offered to assist in formulating a plan for developing and maintaining standards if a users' group were formed.

2. The Fort Sam Houston respondent suggested that a guide be prepared on how to review contract specifications and that such a guide be included in an appendix to the CEGS. While the DEH does not prepare project specifications, a guide on how to review specifications prepared by the San Antonio Contracting Center would be very helpful.

3. The Okinawa respondent commented that there is a definitive need for a clear, concise specification system readily adaptable for use by AEs in the DEH and CE chains. The respondent recommended unmodified industry standards or CE generated standards. There is also a need for the standards to be available on floppy disks adaptable to all commonly used word processors and microcomputers.

4. Oakland Army Base does not prepare project specifications but does review specifications prepared by the AE firms. Most AEs have little experience in M&R work. Any specification improvements, such as the use of up-to-date standards for M&R work, would be very beneficial to all concerned.

5. Several DEHs in USAREUR commented on the need for specifications based on the DINS, VOB, and VDE, and the special procurement language used in Europe.

6. The 47th Area Support Group expressed the need for a set of guide specifications for use in checking project specifications prepared by the Property Services Agency (PSA). All specifications are prepared by the PSA under the United States/ United Kingdom Government Agreement.

7. Several respondents stated that they were doing the best that they could with the resources available and any help provided would make a significant difference.

8. Information gathered from the telephone survey indicated that the majority of DEH organizations contacted want the RPMAGS updated, revised, and maintained in the future. One installation confirmed that it did not need a new set of M&R guides because the RPMAGS had been updated for in-house use. This installation is now faced with maintaining its guide specifications in the future, which is a significant cost. If new

M&R guides are made available, this DEH would probably use them to eliminate the specification maintenance cost. Some respondents were reluctant to provide a definite answer but expressed a need for more up-to-date, simpler guides.

Summary of Data Obtained

DEH organizations use a variety of guides to prepare M&R project specifications. These guides are being used in the absence of standards and require an excessive amount of editing and typing to produce each M&R project specification.

Army performance and quality requirements are not generally consistent among installations since each post selects its own sets of guides.

A large percentage of the survey respondents indicated a need for a new set of M&R guides. This need is reflected in the high costs reported for current procedures, the continued use of the RPMAGS, the need to improve the Installation Support Program at the District Offices, and the need to raise the quality of M&R specifications without having to add staff and increase costs.

According to survey results, the new M&R standards should, as a minimum, include 37 RPMAGS topics plus 9 new topics. It is impossible to identify the need for individual sections within the selected existing topics because responses varied widely, ranging from such general comments as "all areas of construction" and "architecture" to detailed topics such as "repair of one-way concrete slabs." This list must be better defined. Several special topic specifications were also requested.

M&R contracts vary widely in terms of the quality control requirements which can indicate the presence of several problems, including lack of adequate guides, lack of preparation time, and lack of time to perform technical reviews.

About $46 million in labor resources is being invested annually to maintain, translate, and develop M&R project specifications, not considering the cost of AE specifications preparation time.

A wide range of word processors is being used in DEH organizations, making it more difficult to issue masters that are easily and directly usable by all organizations.

Most organizations in USAREUR requested that guides/standards be translated into German. Project specifications are published in two languages, requiring translation of all specifications.

One Army installation uses only guide specifications generated and maintained by the Navy.

4 TECHNICAL ANALYSIS AND EVALUATION

Comments on Current Practice

Past project specifications often are used as the starting point for preparing a new set of project specifications. The specifications may appear to be good and no problems have been experienced. In some cases, this is an excellent solution (e.g., requiring the same siding on a series of facilities). Each project specification is prepared around a fixed set of constraints, requirements, and assumptions. At the end of each CEGS section, there is a set of technical notes to assist the specification writer in modifying the text to meet project requirements. The originator of the specification section may have used the notes to modify the section. Since these notes are made part of the project specifications, writers using past project specifications must review the notes from the source before accepting the section for a new project.

The originator of the specification tailored the original source and subsequent writers do not have the advantage of reviewing the deleted portions or paragraphs in their unmodified form.

The effective dates/revisions of all referenced publications were updated by the section originator. Subsequent users of past project specifications are faced with several problems:

- Are the constraints, requirements, and assumptions of the new project essentially the same as the last project that used the specification section?
- The contents, including the source material, must be fully reviewed. For example, if the section is based on the CEGS, the writer should review the CEGS section and notes to confirm that the section is appropriate to the current project.
- Past project specifications sections may be inserted into a number of new projects before they are proven with a completed project. A mistake or problem suddenly identified could cause related problems in a number of projects. Without an excellent system, it is difficult to keep track of all of the changes the next time the section is used as the basis for a new project specification.
- The CEGS are being updated by change notices and periodic major revisions. To prevent the project specification from being more restrictive than the CEGS, the past project specification should be periodically compared to the CEGS.

Site generated specifications sections can be based on a variety of sources, including the CEGS, commercial specifications, and state highway standards. Site standards are often well maintained by a local engineer, architect, or specification writer. These specifications are prepared to fill the need for installation-unique requirements or language.

In past project or site generated guides, local specifiers must be responsible for the technical and legal aspects of the text, meaning that each installation must develop the needed indepth expertise. In one case, an installation was learning from its errors and incorporating the knowledge gained into updated guides. They lacked expertise and were

learning through the experience of claims. If standards were used, faults could have been identified and the guides revised to eliminate future claims; this would benefit all installations. Incorporating lessons learned from all installations into a set of guides or standards would be a quicker, less expensive way of creating a good set of standards and guides. Vendor specifications are written to specify a particular product and thus generally attempt to limit the competition for supplying the product. Therefore, specifying products through vendor guides without modification, may impose unrealistic requirements and eliminate products that are equal and less expensive. More deviations from existing standards require more expertise at the local level to develop and maintain guides.

There seems to be a high probability that M&R projects are completed at a level of quality that is less than would be expected in new construction. This is due to the lack of comprehensive guide specifications, the use of a wide variation in source material used to prepare project specifications, and the expectation that designers in DEH organizations are equally expert in maintaining and preparing specifications.

Other sources of guides include DINS (the standards used in Germany), Japanese Standards, and Korean Standards for OCONUS installations, and Department of Transportation (DOT), Naval Facilities Engineering Command (NAVFAC), and performance specifications for CONUS installations. NAVFAC guides are good guide specifications and are actively maintained by knowledgeable specifiers. The quality of the finished product is equivalent to that achieved with CEGS. None of the installations reported the use of commercial specifications developed by the AIA.

Using CEGS as the Source

It has been suggested that M&R specifications can be produced from CEGS if adequate and appropriate notes are added to the CEGS to guide the specification writer. Such notes could identify applicable portions of various paragraphs that should be used for specific M&R tasks. Each CEGS section now carries at least two pages of notes. The ratio of pages to specification text indicates the results of the effort to reduce the volume of specifications needed to control the quality of work performed under contract. For example, CEGS-07510, Built-Up Roofing, contains 8 pages of text and 3 pages of notes; CEGS-07920, Calking and Sealants, 6 pages of text and 4 pages of notes; CEGS-08201, Wood Doors, 5 pages of text and 4 pages of notes; and CEGS-09300, Ceramic Tile, 7 pages of text and 5 pages of notes. To provide guidance to the specification writer on how to edit CEGS-09300 for use with an M&R contract, it would be necessary to add several more pages of notes. These new notes could take the form of identifying the paragraphs or sentences that should be used for each different type of application. If this required 5 more pages, the section would then have 7 pages of text and 10 pages of notes. The writer should read through the new construction notes to see if any apply and then follow the guidance provided in the M&R notes. The approach of using additional notes on the CEGS rather than developing a dedicated set of M&R specifications becomes impractical when considering the volume of notes to be added and maintained, and the writing time required each time the section is used in the field. The DEH/DE users' group agreed that if this method were used, every organization would convert the CEGS into a set of M&R specifications by applying the guidance and only use future issues of the CEGS to check the reference material. It would be far less expensive to publish a set of well written M&R guide specifications than expect users to either use the notes to write each project or to create their own installation specifications. It was therefore concluded that M&R standards should be based on well maintained CEGS or other sources, but maintained at a central source and furnished to the field in a format appropriate for M&R contracting.

In a separate effort, the CEHND study concluded that the CEGS do not fully meet the needs for small projects which includes M&R projects.

Evaluation of Alternative Approaches

Analysis of the questionnaire responses indicated that a separate set of M&R guides is needed by both DEH and DE organizations for use in preparing M&R contracts. Having a common set of guide specifications would result in several benefits. Contractors working on a military installation should find little difference between projects prepared by the two organizations; contractors and contract administration personnel will become familiar with the requirements of the specifications which should simplify activities. DE personnel will also become trained to use the MARGS and be able to develop project specifications in much less time than currently required.

Accepting the findings that a new set of specifications are needed, the issue became how best to approach the development process. It appeared that there were five approaches that should be considered. The new specifications could be based on the Fort Irwin specifications. The Fort Irwin specifications are tailored for one site and text and notes would have to be added to produce a comprehensive guide specification. The JOC specifications could serve as the basis for a new specification system. The scope of work in the JOC specifications may have to be modified to include all of the needed subject matter. The specifications would also have to be reformatted and expanded to include technical notes. The CEGS could also serve as the basis since it is currently being used in this role for many specification sections. The CEGS would have to be developed into a large number of narrowly scoped sections, the text minimized, and appropriate notes added to each section. A new specification system could also be based on a combination of good specifications from several sources. It appeared that the quickest and easiest approach was to make maximum use of the Fort Irwin specifications. To test this approach, samples of the Fort Irwin specifications were compared with equivalent samples from the RPMAGS, JOC specifications, and the CEGS, and then reviewed for adequacy.

The Fort Irwin specifications were based on the original RPMAGS. In the tailoring and updating process, text not pertaining to Fort Irwin was deleted. Requirements pertaining to removal and disposal of deteriorated and damaged material were retained. The section numbering system was retained. Notes intended to help the writer edit the specification sections were also deleted; appropriate choices were taken and all inapplicable paragraphs for Fort Irwin were deleted. In some cases, this guidance was used to revise the text. The effort to update the quality requirements needs more work before these specifications could be used as a set of guide specifications. The Fort Irwin specifications are a subset of the RPMAGS in that not all sections were updated for immediate use.

As expected, a detailed comparison of technical contents found a wide disparity between the Fort Irwin specifications and the current CEGS. The CEGS are intended to satisfy a different purpose than the Fort Irwin specifications. The Fort Irwin specifications did not fully reflect the technical changes made in the CEGS over the years. The Fort Irwin specifications contain some sections for which there are no comparable CEGS (e.g., Section 32310, "Repair and Replacement of Electrical Control Signals--General"). In some cases, one CEGS section covers subjects contained in more than one Fort Irwin specification section. In other cases, the reverse is true. In most cases, the Fort Irwin specifications could be revised, without detrimental effect, to reference the publications

currently referenced in the CEGS and to reflect the same quality requirements as the CEGS.

If the Fort Irwin specifications were to be issued as guide specifications for use at all installations, they would first need to be technically reviewed. The review could be done in two phases, which would allow early publication of the first phase specifications. In the first phase, the reference publication lists would be updated and quality requirements changed to be consistent with those in the CEGS. Existing procurement regulations require that the specific issue of each publication referenced be identified. While this is being done, specified materials types, classes, grades, etc., would be verified and changed to be consistent with those referenced in the CEGS. In the second phase, notes and deleted text should be added to the sections, and new sections prepared to cover topics needed but not included in the Fort Irwin set. During this phase, notes to the specifiers would be added to provide guidance on how to use the guides and standards. In addition, the specifications should be given a more detailed review to update requirements and to eliminate discrepancies. Needed sections not included in the Fort Irwin specifications should be identified and provided to complete the set. These sections could be updated RPMAGS or modified sections generated by the installations. The total number of topics covered in the final set of specifications should be established during this review.

A detailed comparison of the Fort Irwin specifications with the JOC specifications revealed a variety of conditions. In some sections, paragraphs were worded identically, while in others, referenced publications and requirements differed greatly. Each set of specifications contained sections not included in the other set. Comparison of the two sets of specifications showed that it will not be easy to merge the two sets because of the inconsistencies in requirements. In preparing the JOC specifications, an effort was made to further simplify the text and to reduce the number of referenced publications used to establish minimum quality of work. This approach should be reevaluated before using the technique in the MARGS.

Contents of MARGS

The framework for a comprehensive set of MARGS should be developed. The initial development process should be directed toward providing the most frequently used sections and the unique sections listed in the questionnaire. Additional sections could be added in the future as needs are identified.

Updating Technique

It is feasible to develop an automated system for updating reference material in the MARGS from the CEGS. If the MARGS, for example, were treated as a subset to the CEGS, global changes and keyword searches could be made with existing software. New materials and equipment options added to the CEGS would still require manual changes within the MARGS.

5 MARGS AND EMARGS DEVELOPMENT PLAN

To simplify maintenance and to ensure consistency in requirements, the MARGS should be based on the CEGS. However, MARGS would tend to be broader in scope, since the DEH must maintain materials and equipment no longer specified in the CEGS. A computer-based system should be developed and implemented to update MARGS from the CEGS. This is primarily intended to ensure that new options and reference publication information is automatically transferred into the MARGS system. The format containing general sections and a series of narrow-scoped technical sections should be retained in the new MARGS. The format has been used successfully in the RPMAGS, JOC, and in the Fort Irwin specifications. The European Maintenance and Repair Guide Specifications (EMARGS) should be based on the DINS and other standards commonly used in Germany. The EMARGS should be written in both English and German. Development work should be accomplished by making maximum use of CE's expertise in specifications. Major participants in the development process will include USA-CERL, CEHND, the U.S. Army Waterways Experiment Station (CEWES), and the users' group representing DEH and DE organizations. Contract work will be supervised by specification writers with expertise in the section topics. Involvement of the users' group and/or other personnel will be determined by the group.

MARGS

Development

The following tasks would be required to establish a viable MARGS system:

Task 1. Revise the Fort Irwin specifications to complete and update the reference publications list, and compare the references with those in the CEGS to ensure consistency of quality requirements.

Task 2. Develop a new numbering system for the MARGS and incorporate it into the CEGS system. The numbering system would be consistent with the CSI-based numbering system and relate the narrow-scoped sections to the broader-scoped sections in the CEGS.

Task 3. Publish a preliminary version of the MARGS specifications with appropriate notes on use of the guides.

Task 4. Adapt custom installation specifications into the new M&R specification system to fill the gaps or to improve the initial specifications.

Task 5. Prepare new specifications for the newly identified topics and incorporate them into the system.

Task 6. Complete a detailed technical review of the specifications, add notes and previously deleted text, simplify the language, combine new sections developed under Task 5 with those modified under Task 6, and publish the first complete set of MARGS.

Task 7. Develop an automated system for maintaining the MARGS using the CEGS. A detailed functional description will be prepared to define requirements, method of operations, algorithms, and the user's interface. The MARGS users' group should review the functional description before initiation of coding. The system will be

compatible with the software CEHND uses to maintain CEGS. After coding, the system will be tested and implemented.

Task 8. Establish and execute system maintenance procedures to ensure the specification's quality and consistency with the CEGS. Each year, the MARGS users' group will meet to review the program, consider changing user requirements, and participate in developing related activities.

In the initial development work, specifications will be prepared for the more commonly used sections within each topic and the new section subjects for topics identified in the survey. Topic priority will be based on the number of requests received for each topic during the survey. Lower-priority section development will be scheduled after the higher priority work is completed. During the development period, an effort will be made to further reduce the number of specifications that must be reviewed and maintained through further coordination with the DEH organizations. Specification sections will be issued each year to introduce new and revised standards to the field.

The work will be done through a combined effort of USA-CERL, CEHND, a users' group, and contracts. CE personnel and the users' group will design the system, including the maintenance system, and perform technical reviews. To ensure thorough and timely reviews, the users' group will be supplemented with additional DEH personnel as needed. Most final products will be prepared by contractors in accordance with the developed guidance.

Estimated funding requirements (in thousands of dollars) for developing the MARGS are:

	Year					
	1	2	3	4	5	Thereafter
Publishing Specifications (Tasks 1-6)	75	150	75			
Developing Maintenance Program (Task 7)	25	150	50			
System Maintenance (Task 8)			50	50	50	50/yr
Total	100	300	175	50	50	50

Note: outyear estimates are subject to modification based on MARGS users' group actions.

Savings

The MARGS could generate annual savings of about $4 to 7 million. If the DEH organizatons were to receive the MARGS on laser disks, the benefit-to-cost ratio would be about 70, considering maintenance and distribution costs. This figure is based on the assumption that 120 copies of the disk will be distributed quarterly. With appropriate funding, the initial system could be in place within 3 years.

EMARGS

Development

The following tasks will be required to establish a viable USAREUR specification system.

Task 1. Develop sample guide specifications for two topics to illustrate format, numbering system, and depth of detail. These specifications will be based on sample project specifications received from several military communities during the survey. The guide specifications will be written in English and German, using references to DINS and related documents.

Task 2. Form a users' group in Germany to review the sample specifications, the proposed list of guide specifications, and the numbering system.

Task 3. Develop guide specifications in accordance with the plan approved by the users' group, making maximum use of locally prepared guide specifications.

Task 4. Establish a system for reviewing the guide specifications in draft format. The users' group will be responsible for performing the review.

Task 5. Make the completed guide specifications available through a SPECBASE-type computer system and/or diskettes as needed.

Task 6. Develop a computer-aided system for maintaining the EMARGS. A detailed functional description will be prepared to define requirements, method of operations, algorithms, interfaces with existing systems, and the user's interface. The functional description will be reviewed and accepted by the users' group before coding is initiated. The functional description will be coordinated with other agencies and the command. After coding, the system will be tested and documented.

Task 7. Establish and execute system maintenance procedures to ensure specification quality. Each year, the EMARGS users' group will meet to review the program, consider new/changing user requirements, and participate in developing related activities.

The work will be done through a combined effort of USA-CERL, the EMARGS users' group, and contractors. Initially, USA-CERL will prepare the English specifications and the University of Illinois will translate them into German. As the work progresses, sections will be contracted out and USA-CERL will perform technical reviews and manage the translation process. After the sample specification sections are approved, the users' group will review the final draft of each specification section. This review will concentrate on the scope of work of each section and on the acceptability of the German translation. This part of the project will be performed by people who are not part of the development group responsible for the MARGS. However, the EMARGS development group will make maximum use of the work being done by the MARGS group.

Estimated funding requirements are:

	Year					
	1	2	3	4	5	Thereafter
Developing Specifications (Tasks 1 - 5)	75	200	200			
Developing Maintenance Program (Task 6)	25	75				
System Maintenance (Task 7)			75	75	75	75/yr
Total	100	275	275	75	75	75

Note: outyear estimates are subject to modification based on EMARGS users' group actions.

Savings

The EMARGS could generate annual savings of about $8 to 12 million. The potential benefit-to-cost ratio would be 188. This figure considers maintenance and distribution costs and is based on the assumption that 38 copies of the disk will be distributed quarterly. With appropriate funding, the initial system could be in place within 3 years.

6 CONCLUSIONS AND RECOMMENDATIONS

CEGS do not fully meet the needs for preparing M&R specifications for either the DE or DEH environment. There is a demonstrated need for well maintained M&R guide specifications in the Army. Development of M&R guide specifications for CONUS (MARGS) and Germany (EMARGS) will greatly improve the efficiency and reduce costs of the specification preparation process. The new specifications will have a positive impact on the specification writers and quality assurance inspectors in the DEH and DE organizations as well as others involved in the contract administration process. The MARGS and EMARGS should be developed as soon as possible and implemented in the field.

MARGS

Seventy-eight percent of the CONUS DEH organizations and 83 percent of the DE respondents using guide specifications agreed on the need for a new set of M&R guide specifications. In the absence of well maintained M&R guides, the survey found that installations are using a wide variety of guides in preparing specifications. This approach to preparing project specifications requires more effort than using M&R guides and provides an opportunity for inconsistencies among projects.

Three alternatives were considered for use as a basis for developing the MARGS: use of the Fort Irwin specifications, updating the original RPMAGS, or developing a new set of guides from the CEGS and other sources. Several recommended specification samples were submitted with the completed questionnaires for consideration in writing the MARGS. It appears that the least expensive and most responsive approach is to take advantage of the Fort Irwin specifications and outstanding specifications prepared by the various installations.

The MARGS should be consistent with the CEGS in the areas of quality of products to be delivered, range of acceptable products, and references used to establish quality. This can be accomplished with a computer-based system designed to update the MARGS from the CEGS. This will ensure that all applicable changes to the CEGS will be reflected in the MARGS

The MARGS should retain the format of general sections and a series of narrow-scoped technical sections. The sections should be numbered to fit within the CEGS numbering system to simplify system maintenance.

EMARGS

In Germany, 62 percent of the respondents using guides indicated a need for German guide specifications. The EMARGS should be based on the DINS and other standards commonly used in Germany to specify quality of materials and workmanship. The specifications should be written in English and German.

Benefits

The MARGS could produce savings of about $4 to 7 million each year. If the DEH organizations received the MARGS on compact disks, the benefit-to-cost ratio would be about 70, considering estimated maintenance and distribution costs.

The EMARGS could produce savings of about $8 to 12 million annually. The potential benefit-to-cost ratio would be 188.

Distribution

Guide specifications should be made available through the SPECBASE or compact disk system, or on word processing disks for organizations that do not have compatible equipment. One installation will need to receive paper copies of the guides until appropriate automation equipment can be acquired. To encourage use of the most current guides, subscription to the disk service should be funded by the MACOMs.

APPENDIX A:

DEH MAINTENANCE AND REPAIR STANDARDS QUESTIONNAIRE

22 January 1986

Organization _____ (1-36)

Installation _____ (28-53)

Point of Contact _____ (55-81)

Telephone: Comm _____ (82-93)

FTS _____ (94-104)

Autovon _____ (105-116)

Average number of project specifications prepared per year _____ (118-120)

Average number of pages per project specification _____ (122-124)

Average number of manhours required to produce the average contract specification

Typist: ____ (126-127) Specifiers: ____ (129-130)

Is a word processor being used to prepare project specifications? (Y/N) ___ (132)

If YES, does the word processor have a communication feature? (Y/N) ___ (134)

What guide specifications are being used in preparing project specifications? Estimate the average percentage of use.

CEGS _____% (136-137) RPMAGS _____%(139-140) GSA _____% (142-143)

CSI _____% (148-149) Site-Generated _____%(151-152)

Past Projects _____% (154-155) Vendor _____% (157-158)

Professional and Trade Standards _____% (160-161)

Others _____% (163-172) _____% (174-183)

If RPMAGS sections are being used, list the specifications that are being used most frequently (topic, topic number, or section number). Estimate the average use per year.

RPMAGS	USES PER YEAR	RPMAGS	USES PER YEAR	RPMAGS	USES PER YEAR

Is there a need for new repair and maintenance standards for preparing specifications for repair and maintenance work? (Y/N) ___ (185)

If YES, list the topics that should be covered by the new standards.

_____ _____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____ _____

Is there a need for guidance on how to use the CEGS in preparing specifications for repair and maintenance contracts? (Y/N) _____ (187)

How would you like to receive guide specifications and standards?

Hard copies that can be locally reproduced? (Y/N) __ (189)

Downloading from a central computer to a local microcomputer or word processing system? (Y/N) ___ (191)

Floppy disks for use on IBM-compatible microcomputers? (Y/N) ___ (193)
If YES, how many copies of the disks? _____ (195-196)

Floppy disks for use on Wang microcomputers or word processing system? (Y/N) _____ (198)
If YES, how many copies of the disks? _____ (200-201)

Computer tapes? (Y/N) _____ (203)

Other techniques? (Y/N) ____ (205)
Specify technique _____ (207-226)

Would you be interested in participating in the users' group responsible for planning development and maintenance of the new standards? (Y/N) ____ (228)

Would you be willing to contribute funding to the development and updating of a new Repair and Maintenance Standards System? (Y/N) _____ (230)

If you are currently using unique site-generated guide specifications, please send a copy of the specifications with your completed questionnaire.

APPENDIX B:

LIST OF SPECIFICATIONS RECEIVED FROM INSTALLATIONS

Troop Support and Aviation Material Readiness Command (TSARCOM)

Sample Specifications for Enclosing Main Dock Area, Building 231:

01010 General Requirements

02050 Demolition Work

03300 Cast-in-Place Concrete

03600 Concrete Grout

05100 Structural Metal Framing

07414 Thermal and Moisture Protection; Protected Metal Roofing and Siding

07600 Sheet Metalwork, General

07920 Caulking & Sealants

08300 Special Doors

09910 Painting

11160 Loading Dock Equipment

13970 Fire Suppression and Supervisory System

16400 Electrical Work, Interior

Fort McPherson

15G3 Fueling System for Motor Vehicles, Service Station Type

Fort Benning

16D-1 Electrical Work, Interior

Fort McCoy

07213 Fibrous Batt Insulation

07622 Soffit and Fascia System

07212 Rigid Insulation

Tooele Army Depot

15D Water Pressure Booster System, Packaged

Sample: Install New 200-HP Compressor in Building 613
Project Specifications

1. Metal Roofing and Siding, Plain

3. Prefabricated Interior Office Enclosures

Fort Hood

Project Specifications

1A Environment Protection

1B As-Built Drawings

1C Project Sign

2D Hot-Mix Asphaltic Concrete

2E Hot-Mix/Cold-Laid Asphaltic Concrete

-- Subterranean Termite Control

Repair and Refinish the Stucco Trim Bands on the Original Portion of Building 36000, DARNELL Army Community Hospital.

Repair Storm Damage and Other Deterioration at Building #512.

Install and Test FM Radio Switches Designed for Interior Installation on Air-Conditioning and Heating Units as Part of the Energy Monitoring Control System.

Fort Bliss

1B Asbestos Insulation Removal

15A Evaporative Cooling System

-- Flexible Gas Appliance Connectors

11A Range Hoods

Fort Sill

General Requirements

Roofing: Strip Shingles

Single Ply Roofing System

Aluminum Replacement Windows

Vinyl Coated Wall Covering (VWF - Vinyl Wall Fabric)

Signage and Graphics

ACRONYMS

AC: Asphalt Concrete

AE: Architect-Engineer

AIA: Architectural Institute of America

AMCCOM: Armament, Munitions, and Chemical Command

ARRADCOM: Armament Research and Development Command

CA: Commercial Activities

CE: U.S. Army Corps of Engineers

CEGS: Corps of Engineers Guide Specifications

CEHND: U.S. Army Engineer Division, Huntsville

CEWES: U.S. Army Waterways Experiment Station

CONUS: Continental United States

CSI: Construction Specifications Institute

DE: District Engineer

DEH: Director of Engineering and Housing

DINS: Deutsches Institut Fuer Normung (standards used in Germany)

DLA: Defense Logistics Agency

DOT: Department of Transportation

EMARGS: European Maintenance and Repair Guide Specifications

FESA: U.S. Army Facility Engineering Support Agency

FORSCOM: Forces Command

GSA: General Services Administration

HVAC: Heating, Ventilation, and Air Conditioning

HND: USA Engineer Division, Huntsville

HQUSACE: Headquarters, U.S. Army Corps of Engineers

IDS: Intruder Detection Systems

JOC: Job Order Contracting

MACOM: Major Army Command

M&R: Maintenance and Repair

MARGS: Maintenance and Repair Guide Specifications

NAVFAC: Naval Facilities Engineering Command

OCE: Office of the Chief of Engineers

OCONUS: Outside of Continental United States

O&M: Operation and Maintenance

PCC: Portland Cement Concrete

PSA: Property Services Agency

PWS: Performance Work Statements

RPMA: Real Property Maintenance Activities

RPMAGS: Real Property Maintenance Activities Guide Specifications

RPMAS: Real Property Maintenance Activities Specifications from Fort Irwin

TACOM: Tank Automotive Command

TRADOC: Training and Doctrine Command

TSARCOM: Troop Support and Aviation Material Readiness Command

USAREUR: U.S. Army, Europe

USA-CERL: U.S. Army Construction Engineering Research Laboratory

VDE: Verband Deutscher Electrotechniker

VOB: Verdingungsordnung Fuer Baildistungen

VWF: Vinyl Wall Fabric

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FORSCOM
FORSCOM Engr, ATTN: AFEN-DEH
ATTN: DEH (23)

HSC
ATTN: HSLO-F 78234
ATTN: Facilities Engineer
Fitzsimons AMC 80240
Walter Reed AMC 20012

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ATTN: Facilities Engineer (3)

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