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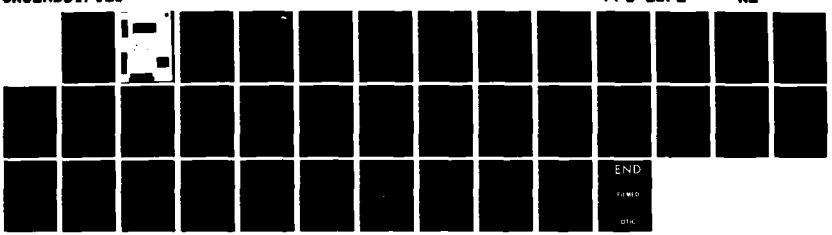

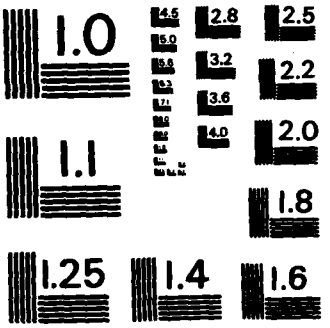

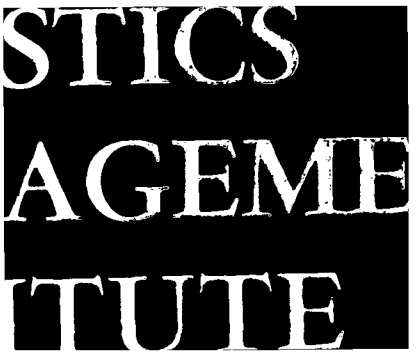
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CHANGING THE DOD CONSTRUCTION GUIDE SPECIFICATIONS

June 1985

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Executive Summary

CHANGING THE DOD CONSTRUCTION GUIDE SPECIFICATIONS

Construction guide specifications are the primary reference documents used by designers in preparing the descriptions of technical requirements of individual construction projects. The Deputy Assistant Secretary of Defense (Installations) (DASD(I)) has questioned whether the guide specifications maintained by the U.S. Army Corps of Engineers (COE) and the Naval Facility Engineering Command (NAVFAC) should be replaced by commercially available guide specifications. We recommend against this change. Commercially available specifications lack the precision needed in DoD's contracting and procurement environment and would require DoD to make extensive changes to the documents and procedures supporting the military construction process.

Rather than adopt a commercial system, we recommend that the DoD change the existing guide specification systems to make them more effective. A dramatic improvement can be achieved by permitting private companies to translate the guide specifications from existing magnetic media into formats compatible with commonly used word processors. The companies would distribute the products to interested users for a competitive fee. The Deputy Assistant Secretary of Defense (Installations) (DASD(I)) should coordinate this action.

We also recommend that DoD coordinate the development of consolidated COE and NAVFAC guide specifications. The DASD(I) should create a tri-Service committee to establish uniform DoD guide specification goals and to develop a plan for achieving those goals.

We further recommend that DASD(I) prepare a pamphlet on techniques for streamlining the wording of DoD guide specifications. This effort should be

coupled with a review of instructional material used in DoD courses on specification writing to ensure that such courses encourage the streamlining effort.

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1. INTRODUCTION

The U.S. Army Corps of Engineers (COE) and the Naval Facilities Engineering Command (NAVFAC) manage virtually all new major construction projects in the Department of Defense (DoD). Both organizations maintain construction guide specifications that serve as the basis for preparing specifications for individual construction projects. Project specifications serve a twofold purpose: during the bidding phase, they communicate the quality level in materials and workmanship that is required, and during the construction phase, they provide the contractual means for monitoring contractors' adherence to project requirements. Guide specifications and project specifications should not be confused with Federal (FED) and Military (MIL) specifications, which are detailed descriptions of construction materials prepared by the Federal Government and the DoD, respectively. FED and MIL specifications are often referenced in DoD guide specifications but are not used to directly specify construction materials or processes.

Construction and engineering organizations in the private sector have developed similar construction specification systems for satisfying their communication and construction monitoring requirements. The two most widely used systems are MASTERSPEC, which is produced by a service corporation affiliated with the American Institute of Architects (AIA), and SPECTEXT, which is produced by a research foundation under the auspices of the Construction Specification Institute (CSI). Both systems are primarily intended for private sector use but, in some situations, are used for public sector projects. The General Services Administration (GSA) has adopted and modified MASTERSPEC for their construction projects. This study addresses whether either a commercial

system alone, or in conjunction with existing DoD construction guide specification systems, could provide a more effective means for specifying DoD construction requirements.

An assessment of the COE and NAVFAC construction guide specification systems, based on the views of architectural and engineering (A/E) firms and DoD construction organizations, is presented in Chapter 2. The advantages and disadvantages of the DoD adopting a commercially available construction guide specification system are discussed in Chapter 3. Issues such as potential costs and savings, increased industry activity on DoD contracts, and potential changes in the quality of the construction guide specifications are addressed in that chapter. Our recommended actions for the DoD and Military Services are presented in Chapter 4. A detailed comparison of the major specification systems (COE, NAVFAC, MASTERSPEC, and SPECTEXT) is presented in Appendix A.

2. ASSESSMENT OF THE DOD CONSTRUCTION GUIDE SPECIFICATION SYSTEMS

An assessment of DoD construction guide specification systems, based on interviews with 21 A/E firms and DoD organizations, indicates that no major dissatisfaction exists with either the COE or the NAVFAC system. Figure 2-1 lists the organizations contacted. The term "guide specification system," as used in this report, encompasses more than just the guide specifications. It also includes the supporting materials, documents, and automated systems that make the construction specifications work. Although industry and government organizations are supportive of the existing DoD systems, they do see a need for improvement.

ARCHITECTURAL AND ENGINEERING FIRMS

A/E firms strongly support keeping a DoD construction guide specification system in place. They perceive the role of the guide specifications as an integral part of the overall DoD construction management process. They feel that replacing the COE and NAVFAC systems with a commercially available system would be a mistake because the DoD requires construction specifications similar in content to those currently employed. However, the A/E firms point out that the current DoD guide specifications, in many instances, emphasize competition at the expense of maintaining adequate control over the quality of products and materials being incorporated into a construction project. Several firms believe that a more effective means of defining quality would be to list three or more manufacturers for each product rather than relying solely on nonproprietary specifications. One very experienced firm routinely uses this practice for other government clients' projects and some DoD projects.

FIGURE 2-1. ORGANIZATIONS INTERVIEWED

INDUSTRY
National Institute of Buildings VVKR - Architectural & Engineering RTKL - Architectural & Engineering Dravo Engineers - Engineering, Design, Construction Eichleay Engineers - Engineering, Design, Construction EHNI Associates, Ltd. - Architectural & Engineering Lucass, Stubbs, Pascullis, Powell & Penny Ltd. - Architectural & Engineering Cummings & McGrady, Inc. - Architectural & Engineering Liollio Associates, Inc. - Architectural & Engineering Trane - Heating, Ventilating & Air Conditioning Manufacturer Richard Fisher Associates - Architectural & Engineering
ARMY
Office of Chief Engineer COE Districts New York District Baltimore District Directorates of Engineering and Housing Fort Belvoir Fort Meade
NAVY
Naval Facilities Engineering Command NAVFAC Engineering Field Divisions Atlantic Division South Atlantic Division Public Works Offices and Centers Annapolis PWO Norfolk PWC Charleston PWO
AIR FORCE
Charleston Air Force Base

The A/E firms all strongly support the DoD's use of the CSI 16-division, 3-part format. Many believe that commercial systems have positive attributes that the DoD guide specifications should emulate, particularly streamlined wording. The A/E firms uniformly believe that the separate COE and NAVFAC systems could and should be merged into a single tri-Service guide specification system. From the view of these design firms, a tri-Service guide specification system would be of tremendous benefit to both the DoD and the A/E industry. They see it as an important step toward a much-needed national standard in construction specification organization and structure. They strongly believe a tri-Service guide would reduce construction oversights and errors in contract documents.

All A/E firms express the need for the DoD to simplify and streamline the guide specifications, to eliminate the use of MIL specifications and FED specifications, to see improvements in the distribution of guide specification updates and revisions, and to have the guide specifications made available in a variety of word processing formats. A/E firms do not consider technical problems within the specifications themselves to be significant and, in most cases, are more concerned about word processing capabilities than any technical shortcomings. The A/E firms overwhelmingly believe that the DoD should maintain a construction guide specification system.

DOD CONSTRUCTION ORGANIZATIONS

The DoD construction organizations at headquarters, regional, and local offices are generally very satisfied with the COE and NAVFAC guide specification systems and believe that both are responsive to their needs. The organizations include engineers responsible for writing project specifications, engineers who manage A/E design contracts, procurement officials who award and administer construction contracts, and inspectors who are responsible for

observing construction projects. All were familiar and comfortable with the current systems.

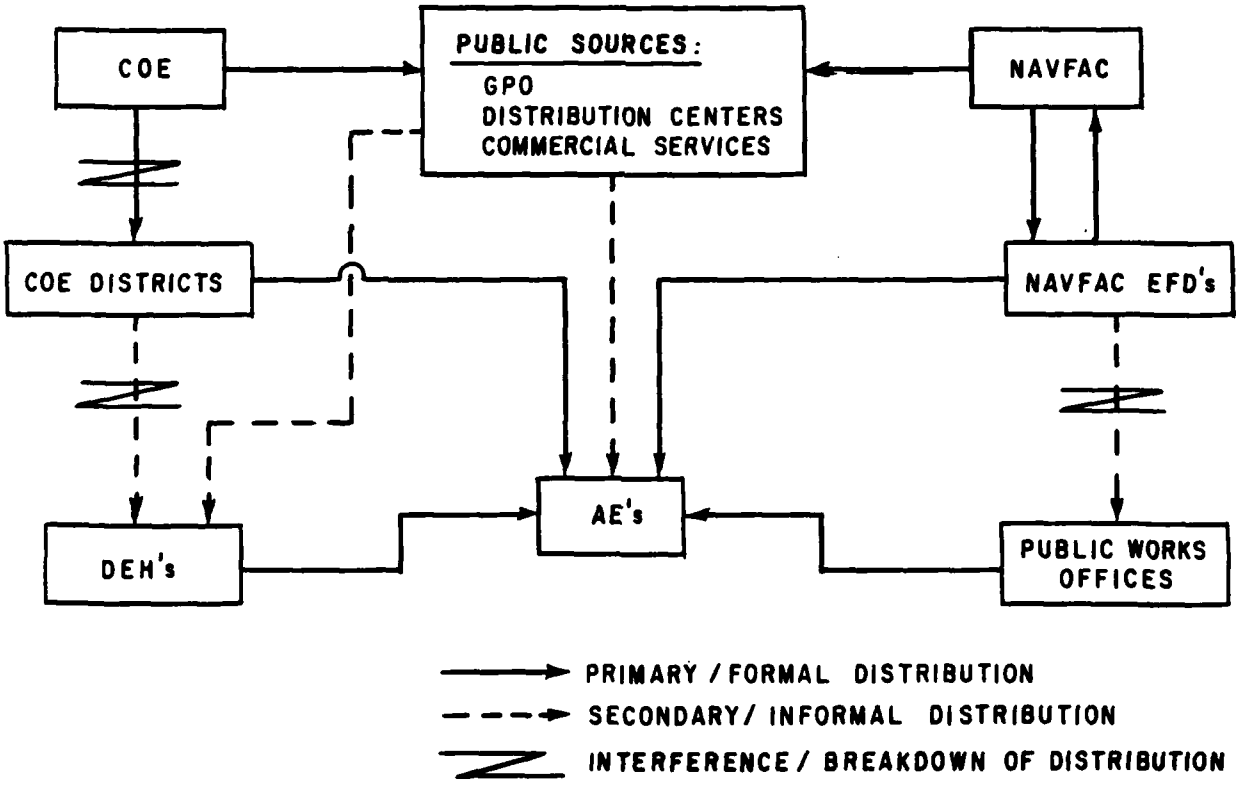
Designers and contractors who are not familiar with using the COE and NAVFAC guide systems have to be oriented to the systems by DoD personnel. This problem is more prevalent on smaller maintenance and renovation projects than on major military construction (MILCON) projects. It is exacerbated by current "spread the work" directives that require regional offices to deal with 300 to 400 design firms rather than the 50 or 60 with which they previously dealt. Orientation to the use of guide specifications is a continuing requirement because of the rotation of DoD staff as well as the arrival of new A/E firms. DoD personnel generally believe that because the "Feds are viewed as fair game" by the construction contractors, the DoD is forced to use guide specifications similar to those currently in use.

DoD guide specification writers are moving away from referencing MIL and FED specifications and would like to streamline the text whenever possible. In general, they incorporate lessons learned from past design and construction experience into the guide specification systems. This feedback mechanism is, to a large extent, responsible for the current desire to move away from FED and MIL specifications and streamline the wording.

The major problem with the current COE and NAVFAC guide specification systems is the distribution of guide specifications, guide specification revisions, and supporting materials from the specification writers to the field offices and private users. Many users are unaware of current revisions or how to get them. Distribution of NAVFAC guide specifications between NAVFAC Headquarters, Engineering Field Divisions (EFDs), and Public Works Centers (PWCs) is good. There is, however, a breakdown of distribution between NAVFAC EFDs and the installation Public Works Offices (PWOs). In the

Army, distribution problems exist between COE Headquarters and the districts as well as between districts and installations' engineering directorates [the Directorates of Engineering and Housing (DEH)]. A/E firms generally receive whatever information is available from their DoD contract manager but are limited in most cases to material that is available in the contract manager's organization. A graphic display of the distribution scheme for guide specifications as well as the locations of problem areas is presented in Figure 2-2.

FIGURE 2-2. DISTRIBUTION OF DOD GUIDE SPECIFICATIONS



A problem mentioned by construction personnel is the need to make the DoD guide specifications available in multiple word processing formats. Word processing is a major concern of everyone writing guide specifications or

project specifications. The feeling is, "Give us something we can word-process and we'll take care of the rest." The Navy Headquarters and regional offices utilize Wang word processing systems. However, this uniformity does not necessarily exist at the PWOs or installations that NAVFAC supports. In the COE, there is even less uniformity and consistency in the type and availability of word processing systems. The compatibility problem must be solved to make the guide specification systems more effective for managing DoD construction.

3. ADVANTAGES AND DISADVANTAGES OF ADOPTING A COMMERCIALLY AVAILABLE CONSTRUCTION GUIDE SPECIFICATION SYSTEM

Adoption of a commercially available construction guide specification system would not be beneficial to the DoD at this time. The disadvantages of such an action outweigh the advantages and would result in a decrease in the effectiveness of the DoD construction guide specification systems.

ADVANTAGES OF ADOPTING A COMMERCIAL SYSTEM

Adopting a commercially available construction guide specification system would benefit the DoD in five ways. The potential benefits, however, are not large.

Streamlined Wording

A commercially available system would quickly provide the DoD with a more streamlined wording of the construction guide specifications. While the DoD is currently making progress in its effort to streamline the guides, adoption of a commercial specifications system would result in a rapid quantum improvement. Streamlining makes the guide specifications easier to use and results in a smaller printing requirement. Both of these factors would result in minor benefits to the DoD.

Movement Toward an Industry Consensus System

A general desire for an industry-wide construction guide specification system was identified during the interviews. Adoption of a commercial specification system for DoD use would hasten movement toward a consensus system. While the DoD would realize few direct benefits from such a system, it would realize some intangible benefits such as a greater familiarity with the specifications by more A/E firms and contractors. However, a consensus

system would develop slowly, and the benefits generated by increased efficiency and fewer errors would be minor.

Free Resources to Work on Service-Specific Specifications

In the long run, adoption of a commercial system would free some DoD resources that could be channeled into improving Service-specific specifications. In the short run, however, those resources would be required for the conversion. Administrative requirements would still exist, and as a result, few additional resources would be available for other activities. Thus, the DoD would probably realize only minor benefits from the freed resources.

More Rapid Adoption of New Technologies

Commercial specification systems adopt new technologies more rapidly than do DoD systems. However, the DoD has other means for introducing innovative technologies into the design process when the guide specifications do not provide for them. Value engineering is one such means, and although it requires additional effort, it does prevent new technologies from being totally excluded from consideration on DoD projects. Commercial specification systems would simplify the introduction of new technology, but the benefits to the DoD would be small.

Decreased Government Market-Entry Barriers

A commercial specification system would eliminate some of the barriers that a contractor faces when first entering into the government market. This elimination of entry barriers would only benefit the DoD when a shortage of qualified bidders for government work existed. If such a shortage existed, an increase in qualified bidders would increase competition and could be expected to decrease construction costs. However, no such shortage of bidders exists, and while easing entry into the government market is a positive factor, it would provide few benefits to the DoD.

DISADVANTAGES OF ADOPTING A COMMERCIAL SYSTEM

There are major disadvantages in adopting a commercially available guide specification system. Our interviews with DoD and industry personnel support this conclusion. The five major problem areas are discussed below.

Subscription Costs

If a commercially available construction guide specification system were adopted, the DoD would have to pay annual subscription fees to the system developer. The amount of the fees would vary with the system chosen and would most likely vary over time. Initially, the subscription cost could be as high as $500,000 depending on the assumptions used to estimate the usage and makeup of users, e.g., what percentage of A/E firms that do contract work with the DoD already subscribe to the system. The subscription fees could be expected to decrease in the following years because of the fee structures currently being used by system developers. Subscription costs are dwarfed, however, by the A/E design fees associated with the DoD construction program, making any negative impact associated with specification subscription costs minor in comparison.

Construction Contract Provisions Enforcement Problems

The adversarial relationship that exists in most DoD construction contracts requires guide specification characteristics that are not always found in commercial systems. The existence of this adversarial relationship requires that the minimum acceptable level of quality be closely defined in the specifications. If this is not done, problems with contract enforcement by construction administrators will almost certainly follow. Such problems most often arise with the use of low-quality contractors who cannot always be excluded from the bidding process by prequalification procedures. Experience with government construction contracts has shown that such problems can be

significant when specifications have insufficient detail. Problems in enforcing construction contract provisions are a potential major cost to the DoD.

Revisions Needed to Implement a Commercial Guide Specification System

A number of revisions would have to be made to any existing commercial system used by the DoD. The revisions would consist of numbering specification sections, eliminating proprietary products, and providing generic technical descriptions where proprietary products have been removed. The GSA's experience with reworking a commercial system indicates that these costs are relatively small. We feel that the requirements would be similar for the DoD (this assumes that the lower level of detail present in the GSA version of MASTERSPEC is acceptable for DoD use) and that the costs would be minor when compared with other design costs.

Required Revisions to References Supporting the DoD Guide Specifications

All Services maintain references that support the guide specifications, and those references would have to be revised if a commercial system were adopted. Commercial systems often have explanatory notes and tutorials as part of their guide specification system. None of the existing commercial systems has references that are as detailed and numerous as those of the Military Service systems. The Services maintain thousands of publications that support the construction criteria effort. Among these publications are technical manuals, design manuals, engineering regulations, DoD course materials, and handbooks, etc. These references play an important part in the DoD design and construction process and provide continuity between DoD design criteria and the final constructed project. Revision of these reference materials to accommodate a commercial guide specification system would be minor in some cases but, in most cases, would require major rewriting. These

revisions would be a major cost to the DoD if a commercial system were adopted.

Required Retraining and Familiarization

Commercial guide specifications are structured and used in a different manner than any of the DoD systems. These differences would require retraining of DoD personnel in the use of the commercial system. Similarly, users of DoD guide specifications would have to become familiar with a new system. Although the retraining and familiarization actions would not constitute large direct costs, they would entail significant indirect costs. The primary indirect costs would be incurred by lowered efficiency of specification writers and, most likely, an increase in errors in the contract specifications. Based upon GSA's experience, these effects could be expected to last up to two years. Although these impacts would be transitory in nature, they would constitute a major cost in the short run.

4. RECOMMENDATIONS

We recommend that the DoD retain the existing COE and NAVFAC construction guide specification systems. Adoption of any of the existing commercial specification systems would decrease the overall effectiveness of the DoD construction specification process. However, there are improvements to existing DoD specification systems that should be made. Some improvements require Assistant Secretary of Defense (Manpower, Installations and Logistics (ASD(MI&L)) action, and others require action by the Military Services.

IMPROVEMENTS REQUIRING MI&L ACTION

We recommend that the ASD(MI&L) undertake three actions to improve the existing DoD construction guide specification systems. First, we recommend that the ASD(MI&L) coordinate an initiative in which private data processing firms be permitted to take the DoD construction guide specifications in machine-readable formats and translate them into formats compatible with popular word processing/microcomputer equipment. Virtually all users of DoD construction guide specifications have expressed the need for improving their word processing capabilities. MI&L would not have any contractual responsibilities in this initiative but would coordinate making the guide specifications available to private firms. Private data processing companies are successfully marketing commercial guide specification systems on flexible disks and could readily adapt the capabilities to DoD guide specification systems. One firm providing this service for a commercial specification system has indicated a strong interest in providing similar services for the DoD. They believe data processing firms could make flexible disks of COE and NAVFAC guide specifications, including quarterly updates, available to users for

$1,000 to $2,000 per year. Enhancing the word processing capabilities of user organizations would greatly improve the effectiveness of the existing DoD specification systems. A more detailed description of this recommendation is presented in Appendix B.

We also recommend that the ASD(MI&L) establish a Tri-Service Construction Guide Specification Committee to coordinate DoD specification efforts. The Committee's efforts would include: sharing information among specification producers, representing the DoD with industry organizations such as the AIA, and establishing DoD goals for development of tri-Service guide specifications. The establishment of a tri-Service committee would provide a focal point for DoD construction guide specifications and would facilitate making needed changes now and in the future.

Our third recommendation is that the ASD(MI&L) initiate a renewed effort to streamline the wording of existing construction guide specifications. Streamlining has, and continues to be, a stated objective of the Military Services. Nationally recognized consultants on specification writing indicate that the DoD can undertake certain actions to enhance this effort. Examples include making revisions to DoD specification writing courses, and the development of a pamphlet on streamlining specification wording. A more detailed description of this recommendation is presented in Appendix C.

IMPROVEMENTS REQUIRING SERVICE ACTION

We recommend two actions that should be undertaken by COE and NAVFAC. First, we recommend that both organizations review their construction guide specification distribution system to ensure that users know what documents are available and how to get them. This review is particularly critical at the installation level and where information is transferred between commands.

We also recommend that COE and NAVFAC give priority to streamlining the wording of all new specification revisions and that existing commercial systems be used as a benchmark for brevity. Commercial systems use proprietary products as a "shorthand" for specifying technical requirements, which DoD guide specifications cannot use. However, the commercial systems use other editorial approaches and techniques for reducing specification length that COE and NAVFAC can adopt. Adoption of these two recommendations will greatly improve the effectiveness of the COE and NAVFAC construction guide specification systems.

APPENDIX A

A COMPARISON OF DOD AND COMMERCIALLY AVAILABLE CONSTRUCTION GUIDE SPECIFICATION SYSTEMS

The U.S. Army Corps of Engineers (COE) and the Naval Facility Engineering Command (NAVFAC) develop and maintain separate construction guide specification systems. Both have been writing and maintaining construction guide specifications that have been used successfully on construction projects for a number of years. The COE develops, distributes, and maintains all of its specifications through the Huntsville Division. That division writes some guide specifications, but most are produced by other sources, with the Huntsville Division providing coordination and quality assurance. Various COE districts or laboratories write specifications in a particular area when they are recognized leaders in that area. In many cases, contractors assist with specification updating and writing when COE staff resources are not available. NAVFAC develops and maintains its specifications at its six Engineering Field Divisions (EFDs). Direction and coordination is enhanced by the limited number of EFDs and the positioning of a criteria manager at each EFD to maintain close ties with the NAVFAC headquarters criteria manager. Specifications are developed and maintained by NAVFAC project specification personnel or infrequently through contracts with industry.

Two commercially available guide specification systems are recognized as being the industry leaders. The American Institute of Architects Service Corporation (AIA/SC) is associated with the American Institute of Architects (AIA) and has MASTERSPEC as the registered trademark of its construction guide specification system. MASTERSPEC was developed primarily to aid practicing architectural and engineering (A/E) firms in the compilation of project

specifications. MASTERSPEC 2 (referred to as MASTERSPEC in this appendix), the latest edition of this specification, is sold through subscriptions by the AIA/SC.

The General Services Administration (GSA) has recently modified MASTERSPEC to meet its needs. In this study, the GSA version of MASTERSPEC is considered a subset of MASTERSPEC rather than a separate specification system. Most comments concerning MASTERSPEC apply equally to the GSA version, and any differences are noted. SPECTEXT, another leading industry guide specification system, was developed by the Construction Sciences Research Foundation (CSRF) under the auspices of the Construction Specification Institute (CSI). SPECTEXT is developed and updated by technical committees with coordination from CSI and is marketed by CSI. The salient characteristics of these guide specification systems are compared in the following sections with a summary presented in Table A-1.

SPECIFICATION FORMAT

The three-part format is a technique for organizing the content of each specification. In the three-part format, the first portion of the specification is devoted to general information such as references, etc.; the second portion details the material requirements for an item or the area being addressed; and the final portion covers the execution of the work. In most cases, the execution portion covers installation requirements, but it could cover processes or procedures. The three-part format has been widely accepted by all guide specification users and is being adopted by the COE and NAVFAC as they write and revise their specifications.

The guide specification systems all follow the CSI 16-division format. This criterion is jointly sponsored by CSI and the Construction Specifications Canada (CSC) and is accepted as an industry standard in both countries. This

TABLE A-1. CHARACTERISTICS OF EXISTING GUIDE SPECIFICATION SYSTEMS

CHARACTERISTIC	COE	NAVFAC	MASTERSPEC	SPECTEXT
SPECIFICATION FORMAT:				
CSI 3-Part Format	MOST	MOST	ALL	ALL
CSI 16-Division Format	YES	YES	YES	YES
TOPIC AREA COVERAGE:				
Buildings:				
Residential	YES	YES	YES	YES
Industrial	YES	YES	SOME	SOME
Roads	YES	YES	YES	YES
Airfields	YES	YES	NO	NO
Dams	YES	YES	NO	NO
Harbor/Waterfront	YES	YES	NO	NO
Primary Utilities	YES	YES	NO	NO
AVERAGE SPECIFICATION[1] ACE (Years):	1.7	3.6	2.0	1.9
GENERIC (Nonproprietary):	YES	YES	NO	YES
USE OF REFERENCE STANDARDS:				
Industry-Promulgated	YES	YES	YES	YES
FED & MIL Specs	YES	YES	LIMITED	LIMITED
MEDIA CAPABILITY:[2]				
Printed Text	YES	YES	YES	YES
Flexible Disk (Micro)	YES	YES	YES	YES
Tape (Mainframe)	YES	NO	NO	NO
OBSERVED USE OF[3] AUTOMATION:				
Within DoD:				
District/Division	VERY LIMITED	EXTENSIVE	N/A	N/A
Installation	NONE	SOME	N/A	N/A
A/Es	NONE	NONE	EXTENSIVE	EXTENSIVE
INDUSTRY USE OF SYSTEMS:	EXTENSIVE	EXTENSIVE	EXTENSIVE[4]	VERY LIMITED

[1]The average specification age was established by determining when the last change to the specification took place and then calculating the age of the specification in years. The age for all specifications within each system was then averaged.

[2]Systems were examined to determine what media capabilities existed at the major command or home office level. The existence of a capability does not mean that it was being used at all levels of the organization.

[3]The use of automation at the organizations is described in this category. The data are based only upon observed organizations and may not be representative of all organizations using the system being described.

[4]The GSA version of MASTERSPEC is used by a small segment of the industry. Currently, few GSA regions are using the GSA version of MASTERSPEC. Even with full-scale implementation, GSA's construction budget is not large enough to require extensive usage.

format provides a uniform approach to the organization of construction criteria. Division 1 contains general contract requirements, and Divisions 2 through 16 contain requirements for specific technical areas. Each division is further subdivided to facilitate the retrieval and identification of a specific section. For example, waterproofing is designated as 07100, a subdivision of Division 7, Thermal and Moisture Protection. In the same manner, each subdivision can be further subdivided into smaller sections as necessary. Except for SPECTEXT, no system follows the designated CSI subdivision identification scheme exactly. The COE and NAVFAC utilize a numeric system to categorize all specifications except the older ones; SPECTEXT and GSA use an alphanumeric system; and MASTERSPEC does not use any numbering system beyond the major specification section identification. The differences in specification numbering and organization that exist in the various systems are minor and are not major inhibitors of the comparison.

All guide specification systems use technical notes to clarify and advise the specification writer when there are wording choices to make. These notes also provide insight into the reference specification's intended use. The COE and NAVFAC put technical notes at the end of the specifications, and they are cross-referenced to the main body of the specification through capital letters located in the right-hand margin of the specification. MASTERSPEC provides the technical notes throughout the body of the specification. This system requires more editing than the Department of Defense (DoD) systems and can be cumbersome for the specification writer. SPECTEXT puts its technical notes in a technical aid series that complements each specification. Another difference is in the use of design aids or technical manuals. The COE and NAVFAC provide design aid through technical manuals, engineering pamphlets, etc., while MASTERSPEC and GSA provide green evaluation sheets at the end of each

specification. These evaluation sheets provide the designer and specification writer with a narrative on the particular guide specification, but it is generally much less detailed than the DoD-provided design aids. These differences in organization can have a major impact on the effectiveness of the specification system.

TOPIC AREA COVERAGE

DoD construction covers a wide spectrum of facility requirements. The Military Services design and construct everything from child care centers to large dams. Their specification systems must be capable of addressing requirements for residential, industrial, and heavy civil projects. MASTERSPEC and SPECTEXT do not fully cover the heavy construction requirements of dams, airports, etc. However, these industry guide specification systems do cover residential, commercial, and light industrial construction. The topic area coverage for each specification system is shown in Table A-1.

UPDATING AND AVERAGE SPECIFICATION AGE

All the specification systems examined update their material on a planned schedule. They also make changes on an as-needed basis such as when a major reference document or product is changed. The COE and NAVFAC review and update (rewrite) their specifications on a five-year cycle. They review each specification by the beginning of the third year to determine whether updating is required. If necessary, the specifications are rewritten and reissued. In addition, the COE and NAVFAC issue notices and amendments, respectively, to cover minor revisions that do not necessitate a complete rewriting of the guide specification. Both MASTERSPEC and SPECTEXT are reviewed and revised, if necessary, on a three-year cycle. Major changes to the specifications are made immediately. All changes are issued as a complete specification update and not as a notice or amendment. After establishing the updating policy of

each of the specification systems, we examined the actual age of the specifications within each system.

The average specification age reflects the actual currency of the specification as opposed to the proposed updating. When determining specification age, it is assumed that all needed changes are incorporated into the specification whenever an amendment or notice is issued. The average specification age for the major specification systems are: COE, 1.7 years; NAVFAC, 3.6 years; MASTERSPEC, 2.0 years; and SPECTEXT, 1.9 years. We found that the specification age often differed from that which would be expected from the system's established updating cycle. We did not attempt to establish the cause for this deviation.

GENERIC NATURE OF THE SPECIFICATIONS (NONPROPRIETARY)

Not all guide specification systems utilize nonproprietary or generic specifications. The Military Services use specifications that are almost exclusively nonproprietary and rely on detailed technical descriptions to describe the product. MASTERSPEC uses proprietary names to a large extent, which enables them to eliminate a significant amount of wording in specifying the desired product. In the GSA version of MASTERSPEC, the proprietary names have been removed and a lower level of detail exists in the GSA technical descriptions than in those of DoD specifications. SPECTEXT does not specify proprietary products but makes provisions to insert them in lieu of detailed descriptions. DoD use of and subsequent compliance with Federal Acquisition Regulations (FARs) require nonproprietary specifications with sufficiently detailed technical descriptions to permit free and open competition. Not all existing commercial specification systems meet these requirements.

USE OF REFERENCE STANDARDS

All major specification systems utilize established national reference standards to efficiently communicate material and construction requirements.

The two major reference standards employed are the American Society for Testing Materials (ASTM) and the American National Standards Institute (ANSI). Both are recognized nationally and worldwide as the leading industry sources of reference standards. The Military Services and the commercial systems extensively refer to ASTM and ANSI standards. These standards are familiar to the construction industry and present few communication problems. In addition to the ASTM and ANSI standards, the Military Services frequently use Federal (FED) and Military (MIL) standards, which are not construction specifications although they are often referred to as FED and MIL Specifications or SPECS. FED and MIL SPECS are analogous to the ASTM and ANSI standards but are not as widely accepted. The Military Services have recognized the shortcomings of the FED and MIL SPECS and have made a conscious decision to minimize their use in their guide specifications.

MEDIA CAPABILITY

All specification systems examined employ a variety of media to communicate their product. The Military Services and the commercial systems both use printed text as their prime medium. Both also utilize flexible (floppy) disks for microcomputers, although the commercial systems are available on disks compatible with a greater number of machines. The Military Services guide specifications are available on either IBM-compatible media for COE or Wang for NAVFAC, while MASTERSPEC and SPECTEXT are available in a number of different formats. Only the COE has the capability of transferring specifications via magnetic tapes from one mainframe computer to another. Although each of the specification systems has a variety of media available, we found that the Military Services rely heavily on the printed text for distribution of the guide specifications.

OBSERVED USE OF AUTOMATION

We found that the use of automation varied greatly from system to system. Despite the fact that every specification system examined was capable of automating the specification writing, we found many guide specification users retyping every line of text when preparing project specifications. This was particularly true for the COE where district offices were not aware of the system capabilities and were struggling to use the computer tapes that are available. Army installations were not even aware of the automated capabilities of the COE guide specifications and in some instances obtained their specifications from a commercial service on microfiche; A/E firms doing work for the Army relied exclusively on printed text. NAVFAC EFDs, however, are highly automated, using the Wang system extensively, although some Navy installations are often in the same situation as their Army counterparts. Public Works Centers (PWCs) were aware of the system capabilities and use Wang word processors effectively. Public Works Offices (PWOs), on the other hand, are not utilizing existing capabilities and are in much the same situation as Army installations. A/E firms doing Navy work rely almost exclusively on printed text. Users of commercial systems, in contrast, use automation extensively at every level with a variety of machines and methods. The Military Services lag commercial systems in the automation of project specification production despite their apparent capability to automate specification writing.

INDUSTRY USE OF SPECIFICATION SYSTEMS

Three of the five specification systems examined (including the GSA subset of MASTERSPEC) are used extensively by the construction industry. The guide specifications promulgated by the Military Services are used not only on the DoD's extensive construction program but are also used by many A/E firms

doing private work. MASTERSPEC is used extensively in the private sector and has been used on some Air Force installations. Conversely, SPECTEXT has limited usage, having only a small fraction of the number of subscribers that utilize MASTERSPEC. When comparing the Military Services' systems with MASTERSPEC, it is difficult to say which is used more often since many firms use both. We have not attempted to differentiate between MASTERSPEC and the Military Services' systems in terms of total usage and have chosen instead to classify both MASTERSPEC and Services' guide specifications as being used extensively.

APPENDIX B

ENHANCEMENT OF THE WORD PROCESSING CAPABILITIES OF DOD CONSTRUCTION GUIDE SPECIFICATIONS

A need to improve the existing capabilities to word process the DoD construction guide specifications was clearly identified during the study. Both the DoD and the private sector A/E firms who work for the DoD noted this need. The time requirement to word process guide specifications to produce project specifications was a major factor when determining what changes should be made to technical wording in the documents. Difficulty in word processing almost always leads to lower quality project specifications since needed changes are sometimes overlooked because of the delay that they will impose. We found that specification writers were much more concerned about the ability to word process guide specifications than they were about the technical quality of the guide specifications themselves. This perception was rooted in the belief that project specification writers could correct any technical problems that might exist if it were possible to efficiently word process the guide specifications. This feeling existed at both DoD organizations and at private sector A/E firms doing work for the DoD.

Little word processing is being done on DoD construction specifications despite the existence of some capability at each Service. We found word processing on construction specifications being done at the NAVFAC EFDs and some PWOs. However, most Navy installations and contractors were not making full use of the word processing capabilities of the NAVFAC Guide Specifications (NFGSs). This failure to make full use of such capabilities occurs for a number of reasons, but a primary one is that different word processing equipment exists at the various organizations. We found little word processing

being done by COE organizations or contractors on construction specifications. The availability of specifications on flexible disks and incompatibility of equipment were the main problems. Army installations have an even more difficult time with word processing since they do not have ready access to COE Guide Specifications (CEGSs) on magnetic media of any kind. The DoD does not utilize the word processing capabilities of its guide specification systems to the extent possible and, as a result, is downgrading the effectiveness of the CEGSs and the NFGSs.

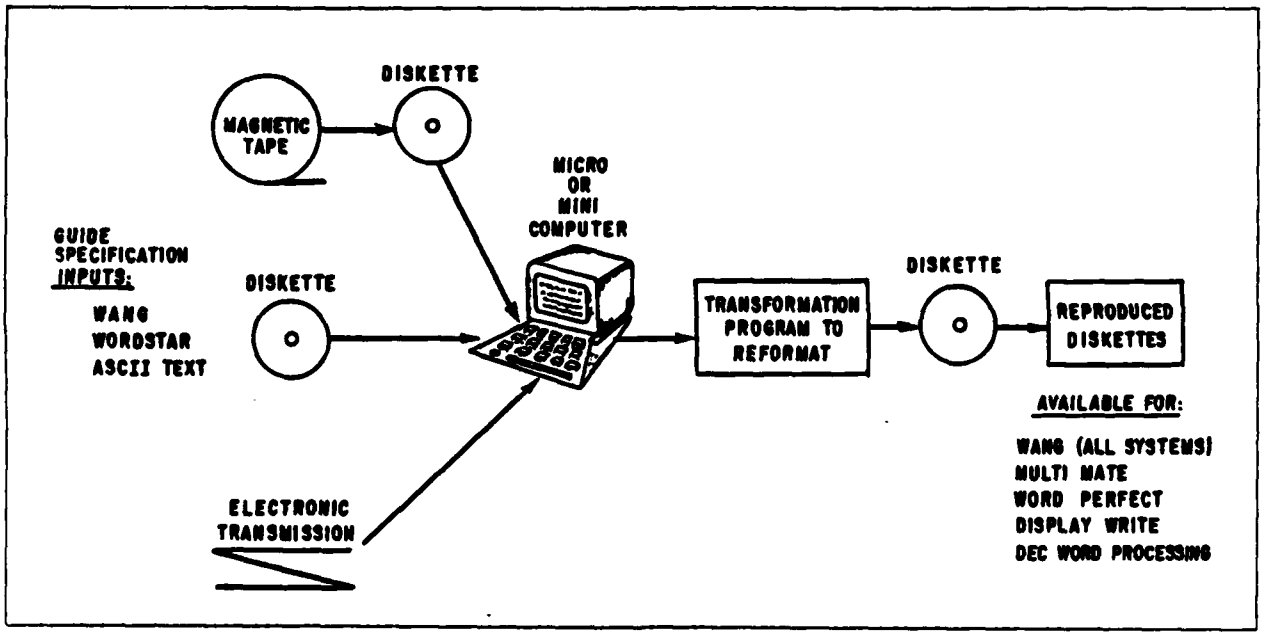
The absence of word processing on construction specifications within the DoD can be contrasted to the extensive use of word processing on construction specifications in the private sector. A number of firms provide commercially available guide specification systems in formats compatible with many of the more popular word processing systems. These firms pay a licensing fee to the owner of the proprietary specification material and then make that material available to A/E firms and others. This system could be used for DoD guide specifications. A firm providing this service for MASTERSPEC indicated that it would be extremely interested in doing something similar with the DoD. Such an approach would enable the DoD to make available to its guide specification users the same types of word processing capabilities that are available in the private sector.

Word processing capabilities could be made available to users of DoD construction guide specifications at no cost to the guide specification producers. The Services could make their guide specifications on magnetic media available to a commercial service after every quarterly update. Any costs for the transfer of this information would be borne by the commercial service. The commercial service would then reformat the information to be compatible with various types of word processing equipment and would market

the reformatted guide specifications to users. The DoD would not be involved in either the distribution or certification of the reformatted guide specifications. Updated material would be distributed by the commercial service on a quarterly basis. Initial estimates for such a service indicate that the yearly cost would be between $1,000 and $2,000 for a subscriber.

A flowchart depicting the process is shown in Figure B-1.

FIGURE B-1. PRODUCTION OF WORD PROCESSING PACKAGES FOR CONSTRUCTION GUIDE SPECIFICATIONS



APPENDIX C

STREAMLINING SPECIFICATION WORDING

DoD construction specifications (both guide specifications and project specifications) have been criticized for being "too wordy." DoD guide specifications have grown over the years from attempts to reflect requirements for more situations. These modifications have often meant including more words than are needed to convey the meaning of the specifications in the interest of closing "loopholes." As a consequence, DoD construction specifications have become less effective in communicating the technical requirements of the project.

The DoD can take two major actions that will enhance the Services' efforts to reverse this trend. The Military Services sponsor construction specification writing courses that are conducted by a private consulting firm. These courses are held throughout the year and are well attended by military construction specification writers. The content of these courses should be reviewed to ensure that they specifically address the issue of reduced wording in DoD construction specifications. Additionally, a DoD pamphlet should be prepared to provide guidance on how to achieve more streamlined wording in DoD construction specifications. This pamphlet should cover such items as: streamlining techniques, areas within specifications that often contain excess wording, and examples of specifications before and after streamlining. Adoption of these two recommendations would provide direction to the Services' streamlining effort and would enhance the quality of DoD construction specifications.

Listed below are examples of how DoD construction guide specifications can be streamlined by eliminating excess wording on two DoD guide specifications currently being used.

Existing - Cement: Cement shall conform to the requirements of ASTM C150, Type 1

Streamlined - Cement: ASTM C150, Type 1 (67% reduction in wording)

Existing - Fencing Fabric: Fabric shall conform to the requirements of Fed. Spec. RR-F-191/1, Type 1, zinc-coated steel with 1.2 ounces of coating

Streamlined - Fencing Fabric: Fed. Spec. RR-F-191/1, Type 1 (71% reduction in wording)

We estimate that streamlining of guide specifications could eliminate 30-40 percent of the existing length.

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This report compares the guide specification systems used by the DoD and the private sector. Advantages of the various systems are discussed and compared. Recommendations for improving the DoD guide specification systems are presented in detail.

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