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A PROPOSED HIERARCHICAL STRUCTURE OF FUNCTIONAL SPACES FOR BUIL--ETC(U)
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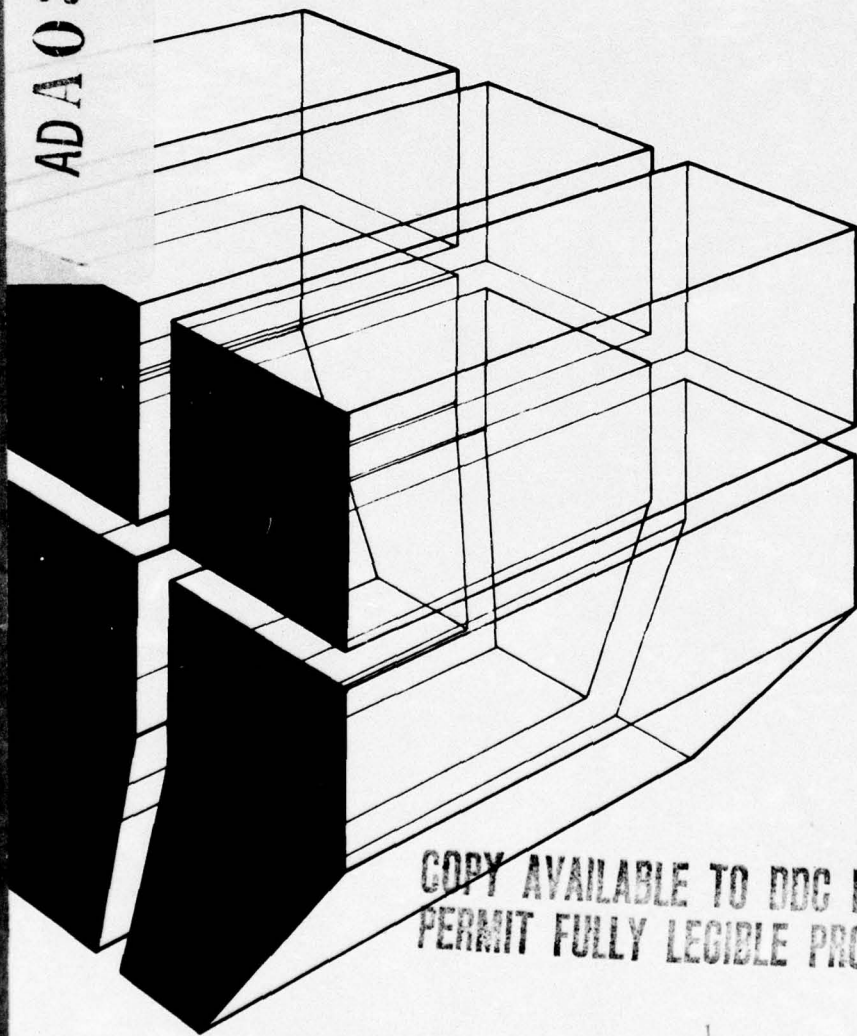
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SPECIAL REPORT P-75
September 1976

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A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS



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structure and descriptors is introduced with an explanation of its use. Recommendations for future work, including the structure, contents, and eventual computerization are presented in the conclusion.

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FOREWORD

This study was conducted for the Directorate of Military Construction, Office of the Chief of Engineers (OCE), under Project 4A762719AT05, "Initial Investigation of Military Construction Technology"; Task 02, "Engineering Design Criteria and Technology for Military Facilities"; Work Unit 002, "Systems Approach to Design Criteria Format Development." The work was performed under Contract No. DACA 88-74-C-0024 by the Engineer's Collaborative Ltd., in association with Harry Weese and Associates, Ltd.

Mr. William Cochran was the OCE Technical Monitor.

This work was performed by the Management Systems Branch (FAM) Facility Acquisition and Construction Division (FA), U.S. Army Construction Engineering Research Laboratory (CERL), Champaign, Illinois. The project investigator was Mr. Michael J. O'Connor and the associate investigator was Mr. D. A. Jordani. Dr. O. Rood, Jr. is Chief of FAM. Mr. E. Lotz is Chief of FA.

COL J. E. Hays is Commander and Director of CERL, and Dr. L. R. Shaffer is Deputy Director.

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Dick Shaffer

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A PROPOSED HIERARCHICAL STRUCTURE OF FUNCTIONAL SPACES FOR BUILDINGS

1 INTRODUCTION

Background

This report proposes a structure within which to organize facility design criteria for quick and easy reference and retrieval.

The Corps of Engineers has a large volume of data and design criteria that addresses many of the aspects of a facility's functional space at various levels. This information is continuously in demand for use in the Corps' many construction projects.

It is necessary for both Corps personnel and their outside A/E contractors to be able to more readily and completely access this large body of information, so that they in turn can assure a timely, appropriate and complete response to the need for Department of Defense facilities. Installation and Corps personnel need quick and ready access to this data--first as an aid to programming a facility and later to facilitate their review of the design and working drawings. A/E contractors need quick and ready access to all the data pertinent to their project in order to develop a responsive design and produce complete and coordinated contract documents.

A review of facility types presently programmed for the next several fiscal years indicates a prevalence of the following five facility types:

1. Administrative office facilities
2. Bachelor housing
3. Classroom training facilities
4. Research and development laboratories
5. Shop maintenance facilities

Data pertaining to these facility types will be in the greatest immediate demand.

Purpose

The purpose of this report is to devise a means for providing quick and easy access to the body of information commonly referred to as "design data," and solve design problems of current projects.

Approach

In response to the problems and objectives stated above the Construction Engineering Research Laboratory (CERL) has determined that the most appropriate course of action is:

1. To provide an organizational structure for the body of information commonly referred to as "design criteria."
2. To apply this structure to the five most prevalent facility types to be constructed over the next several fiscal years.

To accomplish this, CERL has contracted with TEC, in association with Harry Weese and Associates, to develop a Hierarchical Structure of Functional Spaces for specific use with the following facility types:

1. Administrative Office Facilities
2. Bachelor Housing
3. Classroom Training Facilities
4. Research and Development Laboratories
5. Shop Maintenance Facilities

TEC, with Harry Weese and Associates, in turn has developed a six-step strategy in response to the above.

1. Identify, collect, and analyze sources of hierarchical theory.
2. Explore and develop concepts of hierarchical structure.
3. Identify, collect, and analyze descriptor sources.
4. Select and apply descriptors to the proposed structure.
5. Review, test, and modify the structure and applied descriptors.
6. Propose a hierarchical structure with descriptors applied to each of the five building types.

This report is a result of this strategy, and is the culmination of the sixth step.

2 STRUCTURE

It is proposed that a five-level hierarchical structure be used to organize the Corps' facility design criteria. In addition, it is proposed that one (or more) levels be developed above this hierarchy in which to organize information pertaining to each of the facility types. Each of these levels is seen as having distinct functional space characteristics that relate to the other levels in some order of rank, grade, class, etc. The entire structure, therefore, is based on functional space differences and consists of six distinct levels which range in logical steps from the broad scope first level Facility Type category to the sixth and lowest level Activity Space category.

The Basic Hierarchy

The various levels of the hierarchy were assigned names for ease of working reference as the structure was developed. They are presented here with the thought that they will prove helpful in understanding the structure. It is believed that they will be helpful in its final use. The following levels, numbers, and names are used throughout this report:

1. Level I Facility Type
2. Level II Spatial Type
3. Level III Functional Type
4. Level IV Functional Group
5. Level V Functional Space
6. Level VI Activity Space

Level I--Facility Type

This first level of the structure, which has been termed "Facility Type" is seen as categorizing facilities by their major functional and spatial differences, e.g., Administrative Office Facilities are seen as being significantly different in both functional and spatial requirements from Shop Maintenance Facilities and are therefore considered as a distinct category.

This level of structure relates readily to what is often referred to as "Building Type" but is intended to go beyond that concept to include other aspects of a project than just the building. Both programmers and designers commonly focus in on projects from this initial

stand. It also sets a valuable context in which to review the preliminary project designs.

It is proposed that two types of information or criteria be located under each Level I Facility Type. First, that which is pertinent to all such facilities in that category, and second, that which is pertinent solely to that facility at hand. In both cases, the information would pertain to the facility in general. It would include:

1. Facility Type philosophy and policy
2. Intended use of the specific facility
3. Relationship of the facility to its surroundings.

An example of such contents is found in the Appendix.

Level II--Spatial Type

The second level of the structure divides each Facility Type into two broad categories of facility spaces--interior and exterior (definitions of these categories will be addressed later).

This provides a natural division of current information and criteria. It also relates well to normal project programming procedures which distinguish between site and building requirements, and is compatible with most design procedures.

Information and criteria envisioned as being located under these Level II descriptors will be either pertinent to all such spaces in the category or pertinent solely to the facility space category at hand, and include:

1. Spatial type philosophy and policy, e.g., two- or three-story building with a maximum of 10,000 sq ft; or criteria for height to width and length ratio; or area criteria.
2. General description of the type of enclosed or open functions; e.g., the facility will include separate structures for repair shop, inspection, and point storage; or incorporate provisions for a new sanitary lift station, parking lot, and two new tennis courts.

Level III--Functional Type

The third level of the proposed structure divides each of the Level II Spatial Types into categories having to do with broad functions, e.g., a category of spaces serving a support/services function. It is expected that the following type of information and criteria would be located under these Level III Functional Type categories:

1. Information as to who the users are and a general description of their functions and relationships.
2. Quantities of user groups.
3. Information that distinguishes between categories.
4. Basic Functional Type philosophy.

Thus, this level provides the next logical step in degree of detail used by both the project programmer and designer. We anticipate that there is a relatively small body of existing written information or criteria for this level. If so, it is likely due to the fact that much of such information is provided verbally in the form of clarifications and explanations.

Level IV--Functional Group

The fourth level of the structure, which has been termed "Functional Group," divides each of the Level III Functional Types into categories of spaces distinguished by the similarity of functions or activities which occur in each space. For example, one such category on this level is "Residence." Under this category are grouped the numerous living spaces associated with Housing (see Appendix). This is opposed to office type spaces, which have been grouped under the "Administrative" category.

The type of information proposed to be listed under a Level IV descriptor includes the following:

1. The basic intent and philosophy of the Functional Group.
2. Specific criteria that pertains to all the spaces within that Functional Group, e.g., criteria stating that all ceiling heights in administrative offices shall be 10 ft, or lighting levels shall be 100 footcandles.
3. Relationships between Functional Groups, e.g., criteria that would separate the administrative (office spaces) in a training facility from the actual training rooms or classrooms within a facility, or conversely, integration requirements stating the need for combining administrative type spaces with research type spaces in a particular facility.

This level of the structure performs two important functions. First, it provides a natural location for a body of information and criteria which is too often unrecorded and passed on (as above) verbally in the form of clarifications and explanations. This is primarily true of the first and third types of information.

The second function is to provide a natural level for a large body of existing information and criteria that deals with broad categories of spaces.

This Level IV Functional Group should prove a valuable source for schematic design review by the Corps and Installation, while providing the A/E designer with an important set of information normally requested or generated when not provided. It should also prove valuable to the programmer of a more unique type of project by providing a natural grouping of all similarly functioning spaces, e.g., a grouping of all "Administrative" space types on the levels below.

Level V--Functional Spaces

The "Functional Spaces" of Level V of the proposed structure act as the next natural subset of the hierarchy. This level of the structure is intended to categorize information pertinent to the room level of functions and spaces. Criteria and data expected to be found under this set of descriptors may prove to be the most extensive of any of the levels. It is likely to include:

1. Precise area, occupancy, and functional criteria.
2. Environmental criteria such as temperature, humidity, and light.
3. Adjacency criteria.
4. Safety and convenience criteria.
5. Service and utility criteria.

All programming efforts known to the authors that deal with categorizing information for functional spaces use some form of the "Functional Space" level. A/E's commonly use such categories in design and it will undoubtedly be of use to the reviewer as a result.

Level VI--Activity Spaces

This sixth and lowest level of the proposed structure provides a level for categorizing information that deals with functions and spaces at the sub-room level.

This proposed lowest level of the hierarchical structure is seen as providing considerable flexibility to the structure, as well as keeping the Level V categories within manageable quantities. These Level VI categories have been called "Activity Spaces." They deal with spaces within Functional Space where distinct, discernible activity takes place, e.g., Student Seating Area, or Teaching Station within a

classroom. Without them it might be necessary to separately classify each of a group of classrooms as a unique Functional Space. The use of Level VI Activity Space categories are intended to be used to define the unique Activity Spaces of each otherwise duplicate Functional Space, thereby permitting the several Functional Spaces to be described as one, e.g., two "Briefing Rooms" differ only in the requirement that one also provides a lecture platform at one end for assembly functions; use of a Level VI, Activity Space category in the hierarchy will permit a single Level V descriptor, "Briefing Rooms."

It is anticipated that the following type data will be stored on this level:

1. Activity criteria
2. Unique furniture and service utility criteria.

Flexibility

The proposed structure described above has been developed to relate well to programmer, designer, and reviewer while accommodating existing sources of data. It is constructed to work with normal professional design procedures as well as with logical program development. The broad scope to narrow scope structure is intended to permit the A/E first receiving data to absorb it in a logical way. Later, it is structured to allow him to move successively through or to selectively skip portions of the data, depending on his need.

The programmer's development of the project program from information on DA Form 1391, supplemented by AR and DOD Design Criteria, and refined by pertinent TM and installation criteria has been considered in the development. It is believed that the same logical structure will serve the reviewer well, as he proceeds through the several review phases for his individual project.

The horizontal organization of the structure, the number of categories, and their identity is intended to expand or contract depending on the Facility Type. In this way, new or modified Facility Types may be added or obsolete ones readily removed. This is also intended to allow for easy update on all levels of the structure.

3 DESCRIPTORS

Each of the categories worked with on the various levels of the structure described above has also been assigned a name or "descriptor." This descriptor serves to identify the contents of the category to which it is assigned, much as the titles of the six levels describe the contents of the level.

Origins

The origins of the descriptors generated for this report are diverse. Where possible, military terminology has been used, but where other terminology was felt to be more appropriate or terminology did not exist, other sources were collected and included.

Level I (Facility Type) descriptors were taken directly from the pre-established scope of this report. They relate quite closely to the Department of the Army Facility Classes and Construction Categories contained in AR 415-28.

Level II (Spatial Type) descriptors reflect the initial subject areas sought in this report. They also have a strong basis in civilian and military terminology.

Level III (Functional Type) descriptors were generated internally and relate to previous programming work and to a lesser extent to civilian design terminology.

The descriptors generated for Level IV (Functional Group) resulted from internal analysis of potential functional space groupings. Most of these descriptors relate to common design terminology.

Department of Defense, Army, and Corps documents and drawings were the primary source of Level V (Functional Space) and some Level VI (Activity Space) descriptors. Where these were insufficient, civilian publications, drawings, and facility programs were used. Many of the Level V and VI descriptors dealing with the "Exterior" segment of the structure were generated internally, as no existing sources were found.

Terminology varied considerably from source to source, and in many cases it was necessary to establish a single generic descriptor from many pages of terms, e.g., many pages of names relating to offices were finally reduced to less than a dozen descriptors. The key criterion used to decide if a term was suitable for a descriptor was its capability to define a unique set of requirements that would be contained under that descriptor.

Level I--Facility Type

Due to the scope of the project, the Level I "Facility Type" descriptors have been limited to the following:

1. Administrative office facilities
2. Bachelor housing
3. Classroom/training facilities
4. Research development and training laboratories
5. Shop maintenance facilities

It is envisioned that this level can readily be expanded for future use by including the appropriate facility type descriptor, e.g., Hospital Facilities, Family Housing, or Community Facilities.

It is the authors' opinion that the descriptors finally used for this level should represent a narrowly defined, commonly constructed building category. (See Conclusions and Recommendations.)

Level II--Spatial Type

The proposed second-level descriptors define the two Spatial Types:

1. Interior
2. Exterior

It is intended that the descriptor "Interior" will encompass those spaces physically enclosed on at least five of the six theoretical sides of a space. Hence a storage type structure with floor, roof, and three enclosed sides (one side open) would be described as "Interior," whereas a structure covering a walkway and open on its remaining sides would be described as "Exterior."

It should not be necessary to revise the descriptors on this level in order to accommodate either future Facility Type additions or changes to the levels below.

Level III--Functional Type

The proposed third-level descriptors are:

1. Primary
2. Support/Services

These define the two Functional Types of Space.

The "Primary" functional type includes those spaces which are unique to groups of occupants performing the functions for which the facility is intended.

The "Support/Services" functional type includes those spaces which:

1. Are common to all occupants.
2. Provide support functions for the facility.
3. Provide service functions for the facility and occupants.

It should be noted that in using these definitions, maintenance space in a maintenance facility would be considered a "Primary" function, while in an administrative facility it would be considered a "Support/Service" function. Similarly, storage spaces used by the occupants of primary function rooms are considered as "Primary" spaces, whereas building type storage spaces fall under the "Support/Service" category.

These two descriptors are utilized under each of the Level II Spatial Types--Interior and Exterior. This, in effect, creates four Functional Types:

1. Interior Space/Primary Functional Type
2. Exterior Space/Primary Functional Type
3. Interior Space/Support/Services Functional Type
4. Exterior Space/Support/Service Functional Type

These third-level descriptors should be able to be repeated for any future "Facility Type" and their generality should allow changes at the lower levels to be accommodated without revision.

Level IV--Functional Group

On Level IV, the following descriptors, which occur under the four types of Level III Functional Spaces, are proposed. Under the first type, "Interior Space/Primary Functional Type":

1. Administrative
2. Assembly
3. Maintenance

4. Production
5. Research
6. Residence
7. Social/Recreation
8. Training

Under the second type, "Exterior Space/Primary Functional Type":

1. Ceremonial
2. Landscape
3. Maintenance
4. Research
5. Social/Recreation
6. Training

It will be noted that several of the second set of descriptors are repeats of descriptors in the first set, e.g., "Maintenance." In the first instance, the descriptor can be read as "Interior Space/Primary Functional Type/Maintenance Functional Group" or, in more manageable words, "Interior Maintenance." In the second instance, the descriptor can be read "Exterior Maintenance" (Exterior Space/Primary Functional Type/Maintenance Functional Group).

The proposed descriptors which occur under the third and fourth types of Level III Functional Spaces also use repetitious descriptors and should be read as indicated above. Under the third and fourth types, "Interior Space/Support/Service Functional Type," and "Exterior Space/Support/Services Functional Type," the following are proposed:

1. Access Areas
2. Service Areas
3. Utility Areas

These Level IV Functional Group descriptors identify categories composed of a set of spaces in which a distinct type of function occurs, i.e., the descriptor "Maintenance" was generated to categorize information and criteria that relate to a set of spaces in which the maintenance function is dominant.

Level V--Functional Space

Functional Space descriptors form the bulk of items in the hierarchical structure proposed. They will primarily be composed of what are commonly understood to be room names, where they occur as in "Interior" space function, e.g., "Classroom" or "Laboratory." Where these descriptor categories occur within the "Exterior" Portion of the structure, the descriptors do not all have the benefit of a close association with a commonly defined space such as a room. In these instances, an attempt has been made to maintain the same space and function reference that naturally occurs in most rooms, e.g., Gas Distribution Space, Vehicle Circulation Space, or Electrical Equipment Area.

Figure 1 illustrates Functional Space categories contained under the "Exterior" segment of the structure and has been developed to better illustrate the nature of descriptors selected and used in this report. It has been found that there is a strong tendency for people to think in terms of hardware and equipment when dealing with these areas, rather than in terms of function and space categories, which are meant to contain information and criteria.

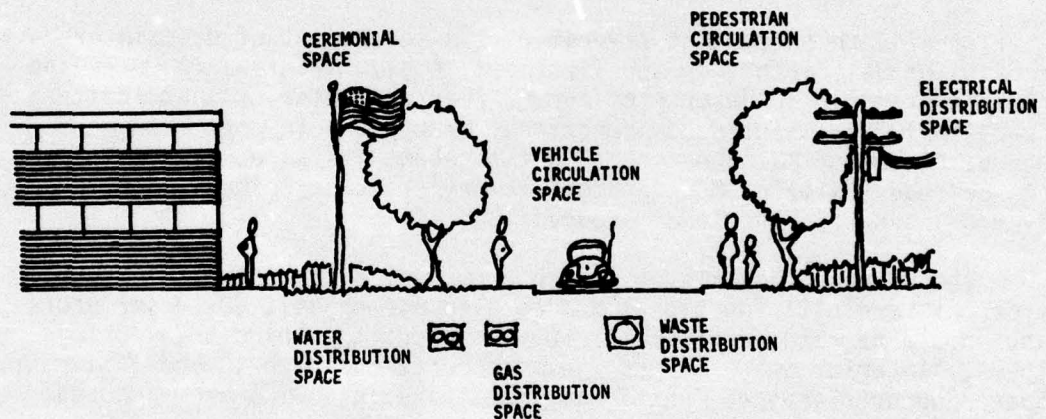


Figure 1. Functional space categories.

When adding descriptors or modifying those presented here it is recommended that descriptors be developed with these factors and criteria in mind.

It is likely that some of the Level V descriptors presented here will be modified when information and criteria are entered under these categories. Their basis is the functional information and criteria which they contain and as this content is gathered, it may demonstrate the need for two descriptors where one was proposed or vice versa, e.g.,

the Physical Chemistry Electron Microscope Room category may be found to have no real significant difference in information and criteria content than the Metallurgy Lab Microscope Room.

Level VI--Activity Space

The proposed Activity Space descriptors are composed of terms identifying key subroom level spatial activity categories (to repeat a previous example, "Student Seating Area" or "Teaching Station" within a classroom). The descriptors of this level have all of the characteristics of the Level V descriptors except for size (they are a subset of the room type space).

Descriptors in the "Exterior" portions of the structure have been generated with the same effort to maintain space and activity functions parallel to those descriptors in the "Interior" portion of the structure. Their eventual modification is also predicted on the same basis as the fifth level.

Reference System

A reference system has been developed to identify each of the descriptors (used in the hierarchical structure). The system consists of a two-segment number. The first segment identifies the level on which the descriptor occurs; i.e., if the descriptor is a Level III, Functional Type Descriptor, the first number is three).

The second segment is a number which is uniquely assigned to each descriptor in a given level. The descriptors are sequentially numbered within each level starting at .010 for Levels I through IV, and .001 for Levels V and VI. Levels I through IV progress at an interval of .01, while Levels V and VI progress on an interval of .001.

Descriptor File

The following pages present the final list of descriptors developed for this report. It will be noted that some descriptors have been repeated. This occurs whenever the information or criteria that will be continued under each descriptor category will be significantly different in spite of the duplication of terms. For example, there are two Level VI descriptor categories identified as "Toilet Area" (number 6.186 and 6.187); one descriptor category will contain information and criteria which pertain to a public toilet area, while the other will contain information and criteria which pertain to a residence space. It should be noted that this becomes quite obvious when these descriptors are seen in the context of the structure and will become even more so when their contents are included.

Descriptor File--Levels I through IV

Table 1 is a list of all descriptors from Level I through IV, preceded by their assigned reference numbers.

Descriptor File--Level V

Table 2 is a list of all descriptors from Level V preceded by their assigned reference numbers.

Descriptor File--Level VI

Table 3 is a list of all descriptors from Level VI, preceded by their assigned reference numbers.

Table 1

Level I through IV Descriptor File

GENERAL HIERARCHICAL STRUCTURE		PAGE 1
CERL NO.	DESCRIPTOR	FILE
LISTING OF SORTED LEVEL I		
1.010	ADMIN OFFICE FACIL	
1.020	BACHELOR HOUSING	
1.030	CLASSRM THNG FACIL	
1.040	R08T LABORATORY	
1.050	SHOP MAINTN FACIL	
LISTING OF SORTED LEVEL II		
CERL NO.	DESCRIPTOR	FILE
2.010	EXTERIOR	
2.020	INTERIOR	
LISTING OF SORTED LEVEL III		
CERL NO.	DESCRIPTOR	FILE
3.010	PRIMARY	
3.020	SUPPORT/SERVICES	
LISTING OF SORTED LEVEL IV		
CERL NO.	DESCRIPTOR	FILE
4.010	ACCESS AREAS	
4.020	ADMINISTRATIVE	
4.030	ASSEMBLY	
4.040	CEREMONIAL	
4.050	LANDSCAPE AREAS	
4.060	MAINTENANCE	
4.070	PRODUCTION	
4.080	RESEARCH	
4.090	RESIDENCE	
4.100	SERVICE AREAS	
4.110	SOCIAL/RECREATION	
4.120	STORAGE	
4.130	TRAINING	
4.140	UTILITY AREAS	

Table 2
Level V Descriptor File

CERL NO.	HIERARCHICAL STRUCTURE	LISTED 06-22-74	PAGE 1
CERL NO.	DESCRIPTION	FILE	
5.001	APPARATUS ROOM		
5.002	AUDITORIUM		
5.003	BALANCE ROOM		
5.004	BARRIER/SCREEN		
5.005	BEDROOM		
5.006	BREAK AREA		
5.007	BRIEFING		
5.008	BRIEFING		
5.009	BUILDING SEPARATION		
5.010	CEILING CAVITY		
5.011	CENTRAL BATHROOM		
5.012	CENTRAL FILE		
5.013	CENTRIFUGE ROOM		
5.014	CHEMISTRY, CONSTANT TEMP. ROOM		
5.015	CHEMISTRY, ELECTRON MICROSCOPE LAB		
5.016	CHEMISTRY, GENERAL LAB		
5.017	CLASSIFIED READING ROOM		
5.018	CLASSROOM TESTING		
5.019	CLASSROOM, INSTR. LAB.		
5.020	CLASSROOM, LECTURE		
5.021	CLASSROOM, LECTURE/LABORATORY		
5.022	CLASSROOM, READING LAB.		
5.023	CLOSET, EYE EQUIP.		
5.024	CLOSET, HVAC EQUIP.		
5.025	CLOSET, JANITORS		
5.026	CLOSET, PLUMBING EQUIP.		
5.027	COMPUTER ROOM		
5.028	CONFERENCE		
5.029	CONFERENCE (PRIVATE)		
5.030	CORRIDOR		
5.031	COURT YARD		
5.032	CRAWL SPACE/UTILITY TUNNEL		
5.033	DARK ROOM, LABORATORY		
5.034	DARK ROOM, LABORATORY		
5.035	DEFUSING AREA		
5.036	DISPOSAL, STORM WATER		
5.037	DISPOSAL, WASTE		
5.038	DISTRIBUTION SPACE, E/E		
5.039	DISTRIBUTION SPACE, GAS		
5.040	DISTRIBUTION SPACE, STORM WATER		
5.041	DISTRIBUTION SPACE, WASTE		
5.042	DISTRIBUTION SPACE, WATER		
5.043	DUST FREE ROOM		
5.044	EASEMENT		
5.045	ELEVATORS		
5.046	ENTRY AREA, PEDESTRIAN		
5.047	EQUIP. AREA E/E		
5.048	EQUIP. AREA HVAC		
5.049	EQUIP. AREA PLUMBING		
5.050	EQUIP. RM, MEMOTE		
5.051	EQUIP. ROOM		
5.052	EQUIP. ROOM, ELEVATOR		
5.053	EQUIP. ROOM, TELEPHONE		
5.054	FILM REVIEW ROOM		

Table 2 (cont'd)

CENCL. HIERARCHICAL STRUCTURE		LISTED 08-22-74	PAGE 2
CERC NO.	DESCRIPTOR		
5.055	FLAG POLE AREA		
5.056	FUTURE EXPANSTION		
5.057	GREASE RACK		
5.058	GREASE RACK AREA		
5.059	HALL		
5.060	HORIZONTAL SERVICE CAVITY		
5.061	INCINERATOR ROOM		
5.062	INSPECTION RUNWAY VEHICLE		
5.063	KITCHEN		
5.064	KITCHEN SELF SERVICE		
5.065	KITCHETTE		
5.066	LANDING PAD		
5.067	LANGUAGE LABORATORY		
5.068	LAUNDRY ROOM		
5.069	LIBRARY BOOK CIRCULATION		
5.070	LIBRARY STACK/READING AREA		
5.071	LIBRARY WORK ROOM		
5.072	LINEN ROOM		
5.073	LIVING/SLEEPING AREA, E1		
5.074	LIVING/SLEEPING AREA, E2-E4		
5.075	LIVING/SLEEPING, E5-E6		
5.076	LIVING/SLEEPING, E7-E9		
5.077	LIVING/SLEEPING, GRADE 02-		
5.078	LIVING, GRADE 03+		
5.079	LOADING DOCK		
5.080	LOBBY		
5.081	LOCKER ROOM		
5.082	LOUNGE AREA		
5.083	LUNCH AREA		
5.084	MAIL ROOM		
5.085	MAINTENANCE APRON		
5.086	METALLURGY LAB SAMPLE PREP/POLISHING		
5.087	METALLURGY LAB, FELTING SHOP		
5.088	METALLURGY LAB, MICROSCOPE RM		
5.089	MISSION PLANNING		
5.090	POWMENT AREA		
5.091	NUCLEAR PHYS., RADIOACTIVE CHEM. LAB		
5.092	NUCLEAR PHYS., REACTOR LAB		
5.093	OFFICE, BATTALION COMMANDER		
5.094	OFFICE, BLDG. ENGINEER		
5.095	OFFICE, BRANCH HEAD		
5.096	OFFICE, CHIEF OF STAFF		
5.097	OFFICE, CONTROL		
5.098	OFFICE, INSPECTION		
5.099	OFFICE, INSTALLATION COMMANDER		
5.100	OFFICE, PROFESSIONAL AND ADMIN.		
5.101	OFFICE, REGIMENTAL COMMANDERS		
5.102	OFFICE, RESEARCHER		
5.103	OFFICE, SLCMTAMJAL/CLERICAL		
5.104	OFFICE, SHIPPING/RECEIVING		
5.105	OFFICE, SUPERVISORS		
5.106	PARADE FIELD		
5.107	PANTRY APRON		
5.108	PARKING, AUTOCMOBILE		

Table 2 (cont'd)

GENERAL HIERARCHICAL STRUCTURE		LISTED 08-22-74	PAGE 3
CENL NO.	DESCRIPTION	LISTING OF SORTED LEVEL V FILE RECORDS	
5.109	PARKING, BICYCLE		
5.110	PARKING, SERVICE/DELIVERY		
5.111	PATHS, BICYCLE		
5.112	PERSONELL LIFT		
5.113	PHOTO LABORATORY		
5.114	PHYS. CHEM., COLD ROOM		
5.115	PHYS. CHEM., CONSTANT TEMP. ROOM		
5.116	PHYS. CHEM., ELECTRON MICROSCOPE LAB		
5.117	PHYS. CHEM., GENERAL LAB		
5.118	PHYSICAL TRAINING FIELD		
5.119	PHYSICS, GENERAL LAB		
5.120	PHYSICS, OPTICAL LAB		
5.121	PICNIC AREA		
5.122	PROJECTION ROOM		
5.123	PROJECTION ROOM, REAR SCREEN		
5.124	RECEPTION AREA		
5.125	RECREATION ROOM		
5.126	REFUSE ROOM		
5.127	REPRODUCTION		
5.128	ROADWAYS, AUTOMOBILE		
5.129	ROADWAYS, EMERGENCY		
5.130	ROADWAYS, SERVICE/DELIVERY		
5.131	ROADWAYS, TRANSIT		
5.132	SHIPPING/RECEIVING ROOM		
5.133	SHOP, MOTOR REPAIR AND REBUILD		
5.134	SHOP, ARMAMENT		
5.135	SHOP, CARPENTRY		
5.136	SHOP, COMMUNICATIONS		
5.137	SHOP, ELECTRIC		
5.138	SHOP, ELECTRONIC		
5.139	SHOP, GENERAL EQUIPMENT		
5.140	SHOP, HYDRAULIC		
5.141	SHOP, LARGE VEHICLE		
5.142	SHOP, MACHINE		
5.143	SHOP, METAL		
5.144	SHOP, MODEL		
5.145	SHOP, PAINT		
5.146	SHOP, PAINT AND DOPE		
5.147	SHOP, PLUMBING		
5.148	SHOP, SHEET METAL		
5.149	SHOP, SMALL VEHICLE		
5.150	SHOP, WELD AND RADIATOR		
5.151	SHOP, WELDING		
5.152	SHOP, AIRCRAFT		
5.153	SHOWER ROOM		
5.154	SPARE PARTS ROOM		
5.155	SPECTROGRAPHIC LAB.		
5.156	SPORTS FACILITY		
5.157	SPORTS FIELD		
5.158	STAIRS		
5.159	STORAGE YARD, EQUIPMENT		
5.160	STORAGE YARD, MATERIALS		
5.161	STORAGE/SOURCE, WATER		
5.162	STORAGE, AMMUNITION		

Table 2 (cont'd)

C.E.R.N.L. HIERARCHICAL STRUCTURE
 LISTING OF SORTED LEVEL V FILE RECORDS

CERL NO.	DESCRIPTOR
5.163	STORAGE, BLOG
5.164	STORAGE, CHEMICAL
5.165	STORAGE, CLOSET
5.166	STORAGE, EXPLOSIVES
5.167	STORAGE, FUEL
5.168	STORAGE, LUMBER
5.169	STORAGE, PAINT
5.170	STORAGE, PARTS
5.171	STORAGE, SANITARY WASTE
5.172	STORAGE, SPARE PARTS
5.173	STORAGE, TOXICS
5.174	STORAGE, VISUAL/TRAINING AID
5.175	STORAGE, WASTE
5.176	STUDY HALL, INDIVIDUAL
5.177	TAPE RECORDING ROOM
5.178	TAXIWAY
5.179	TESTING AREA, AIR FRAME
5.180	TESTING AREA, ARMAMENT
5.181	TESTING AREA, VEHICLE
5.182	TIRE ROOM
5.183	TOILET, MEN
5.184	TOILET, WOMEN
5.185	TOOL ROOM
5.186	TREATMENT, WASTE
5.187	UTILITY PENTHOUSE
5.188	UTILITY SHAFT
5.189	VAULT
5.190	VAULT, ARMS
5.191	VAULT, ELECTRICAL
5.192	VAULT, LIBRARY CLASSIFIED DOCUMENT
5.193	VAULT, PERSONAL ARMS
5.194	VEHICLE MAINTENANCE AREA
5.195	VERDIE AREA
5.196	VESTRIBULE
5.197	VIBRATION FREE ROOM
5.198	VISTA/SETTING
5.199	WALKWAYS, PEDESTRIAN
5.200	WASH RACK
5.201	WASHING APRON

Table 3
Level VI Descriptor File

CERL NO.	DESCRIPTION	FILE
6.001	'LAYOUT AREA'	
6.002	ACCESS AREA	
6.003	ACID TANK AREA	
6.004	ADMINISTRATION WORK AREA	
6.005	ADMINISTRATION WORK AREA	
6.006	AUDIO VISUAL AREA	
6.007	AUDIO VISUAL PROJECTION AREA	
6.008	AUDIO/VISUAL AREA	
6.009	BALANCE AREA	
6.010	BARRIERS, PHYSICAL ACCESS	
6.011	BASEBALL FIELD	
6.012	BASKETBALL COURT	
6.013	BOOK CLIP. AREA	
6.014	BREAK AREA	
6.015	BUILDING, SETTING	
6.016	BUS STOP	
6.017	CARREL, DRY	
6.018	CARREL, WET	
6.019	CATALOG AREA	
6.020	CHEMISTRY, QUANTITATIVE LAB.	
6.021	CIRC/CONVERSATION/REST	
6.022	CLERICAL/TYPING AREA	
6.023	CONFERENCE AREA	
6.024	CONFERENCE AREA	
6.025	CONTROL AREA	
6.026	CONTROL MONITORING AREA	
6.027	CONTROL STATION	
6.028	COOKING AREA	
6.029	COVERED WALKWAY	
6.030	DECONTAMINATION AREA	
6.031	DISPENSING	
6.032	DISPLAY AREA	
6.033	DISPLAY AREA	
6.034	DISPOSAL AREA	
6.035	DISTRIBUTION AREA, E/E	
6.036	DISTRIBUTION AREA, HVAC	
6.037	DISTRIBUTION AREA, PLUMBING	
6.038	DRY AREA	
6.039	DRYING AREA	
6.040	DRYING AREA	
6.041	DUPLICATION AREA	
6.042	E/E	
6.043	E/E EQUIP. AREA	
6.044	E/E EQUIP. AREA	
6.045	EATING AREA	
6.046	EATING AREA	
6.047	FILE AREA	
6.048	FILE AREA	
6.049	FILM DRYING AREA	
6.050	FILM TOUCH UP AREA	
6.051	FOOD PREP. AREA	
6.052	FOOTBALL FIELD	
6.053	FORMATION AREA	
6.054	FRESH AIR CIRCULATION	

Table 3 (cont'd)

GENERAL HIERARCHICAL STRUCTURE

LISTING OF SORTED LEVEL VI FILE RECORDS

DEAL NO.	DESCRIPTOR
6.055	FUME CUPBOARD AREA
6.056	FURNACE AREA
6.057	GAS
6.058	GENERAL WORK AREA
6.059	GENERAL WORK AREA
6.060	GROUP MEETING AREA
6.061	HANDICAPPED AREA
6.062	HOCKEY FIELD
6.063	HVAC
6.064	HVAC EQUIP.
6.065	HVAC EQUIP. AREA
6.066	INSPECTION AREA
6.067	KITCHEN AREA
6.068	KITCHENETTE
6.069	LAND USE DEFINITION
6.070	LAVATORY AREA
6.071	LAVATORY AREA
6.072	LIFT AREA, VEHICLE
6.073	LIVING AREA
6.074	LOBBY, EXTERIOR
6.075	LOCKER AREA
6.076	MACHINE AREA
6.077	MACHINE AREA
6.078	MACHINE AREA
6.079	MACHINE AREA
6.080	MAINT PIT
6.081	METERING AREA
6.082	MICROSCOPE AREA
6.083	POSTOR STATION
6.084	NATURAL LIGHT ENTRY
6.085	OIL SEPARATOR AREA
6.086	OUTSIDE DINING AREA
6.087	PAINTING AREA
6.088	PARADE AREA
6.089	PERIODICAL READING AREA
6.090	PETROLEUM
6.091	PHYSICAL TRAINING AREA
6.092	PHYSICAL TRAINING STAND
6.093	PLUMBING
6.094	PLUMBING EQUIP. AREA
6.095	PLUMBING EQUIP. AREA
6.096	POLISHING AREA
6.097	PREPARATION AREA
6.098	PREPARATION AREA
6.099	PRESSENTATION AREA
6.100	PRIMARY TREATMENT
6.101	PRINT CRYSTAL AREA
6.102	PRINT WORKING
6.103	PROJECTILE AREA
6.104	POTTING GREEN
6.105	REAR AREA
6.106	REAR AREA
6.107	REAR AREA
6.108	REACTOR AREA

Table 3 (cont'd)

LISTED 08-22-74 PAGE 3

C.E.R.C.L. HIERARCHICAL STRUCTURE	
CERL NO.	DESCRIPTION
6.109	RECEPTIONIST/DESK/INFO AREA
6.110	RECORDS AREA
6.111	REFERENCE AREA
6.112	REST AREA
6.113	REVIEW AREA
6.114	SCREEN, VISUAL
6.115	SCREEN, ACOUSTICAL
6.116	SCREEN, CLIMATIC
6.117	SEATING AREA
6.118	SEATING AREA
6.119	SEATING AREA
6.120	SEATING AREA
6.121	SEATING AREA
6.122	SECONDARY TREATMENT
6.123	SMO-KEN AREA
6.124	SLEEPING AREA
6.125	SOCER FIELD
6.126	SPARE PARTS STORAGE
6.127	SPEAKERS STATION
6.128	STAIRS
6.129	STORAGE AREA
6.130	STORAGE AREA
6.131	STORAGE/CHEM, FILM, PAPER,
6.132	STORAGE, ARMS
6.133	STORAGE, AUDIO
6.134	STORAGE, AUDIO VISUAL
6.135	STORAGE, BOOK
6.136	STORAGE, COAT
6.137	STORAGE, COAT
6.138	STORAGE, COAT
6.139	STORAGE, COAT
6.140	STORAGE, DOCUMENTS
6.141	STORAGE, ELEC. TEST EQUIP.
6.142	STORAGE, ELECTRONIC TEST EQUIP
6.143	STORAGE, GAS
6.144	STORAGE, GENERAL PURPOSE
6.145	STORAGE, LUMBER
6.146	STORAGE, OPTICS
6.147	STORAGE, PAINT
6.148	STORAGE, PAINT AND EQUIPMENT
6.149	STORAGE, PAINT AND EQUIPMENT
6.150	STORAGE, PAPER
6.151	STORAGE, PAPER
6.152	STORAGE, PARTS
6.153	STORAGE, PETROLEUM
6.154	STORAGE, RADIOACTIVE CHEMICAL
6.155	STORAGE, REAGENT
6.156	STORAGE, SPARE PARTS
6.157	STORAGE, SPARE PARTS
6.158	STORAGE, STOCK
6.159	STORAGE, SUPPLIES
6.160	STORAGE, SUPPLIES
6.161	STORAGE, TEST EQUIPMENT
6.162	STORAGE, TOOL

Table 3 (cont'd)

LISTING OF SORTED LEVEL VI FILE RECORDS

CERL NO.	DESCRIPTOR
6.163	STORAGE, TOOL
6.164	STORAGE, TOOL
6.165	STORAGE, VEHICLE
6.166	STORAGE, VISUAL EQUIPMENT
6.167	STORAGE, WELD EQUIPMENT
6.168	STORAGE, BUILDING MAINT EQUIP.
6.169	STORAGE, COAT
6.170	STORAGE, LUV'ER
6.171	STORAGE, MEDICAL
6.172	STORAGE, OIL
6.173	STORAGE, RUBBISH
6.174	STORAGE, SITE MAINT EQUIPMENT
6.175	STORAGE, SPARE PARTS
6.176	STUDENT SEATING AREA
6.177	STUDENT SEATING, WK. BENCH AREA
6.178	STUDENT SEATING, WRITING/REF.
6.179	STUDENT WORK TABLE AREA
6.180	SWIMMING POOL
6.181	TAXI STAGOS
6.182	TEACHING DEVICE/EQUIPMENT/AID AREA
6.183	TEACHING STATION
6.184	TENNIS COURT
6.185	TERTIARY TREATMENT
6.186	TOILET AREA
6.187	TOILET AREA
6.188	TOOL STORAGE
6.189	TRAFFIC AREA
6.190	UTENSIL CLEANING AREA
6.191	VEHICLE LIFT AREA
6.192	VEHICLE PAINTING AREA
6.193	VEHICLE WASHING AREA
6.194	VIEWING AREA
6.195	VISUAL RELIEF
6.196	VOLLEY BALL COURT
6.197	WAITING AREA
6.198	WALKWAYS
6.199	WASH AREA
6.200	WASHING AREA
6.201	WORK AREA
6.202	WORK AREA
6.203	WORK AREA
6.204	WORK AREA
6.205	WORK AREA
6.206	WORK AREA
6.207	WORK AREA
6.208	WORK AREA

END OF CERL NUMBERING SYSTEM ROUTINE FOR DESCRIPTORS

4 INTEGRATION OF STRUCTURE AND DESCRIPTORS

The following section presents the integration of proposed structure and descriptors. The integration demonstrates several issues of format while helping to present many of the previous comments in a more realistic context.

Expansion

Future expansion will require that new sets of descriptors be added, although many of the proposed descriptors developed here will undoubtedly be utilized. For example, should a Hospital Facility Type be added in the future, many of the descriptors within the Administrative Functional Group will be utilized, but Patient Rooms and certain Laboratories, Operating Rooms, and Treatment Rooms will have to be added.

"Primary" and "Support/Service"

It is proposed that Level V descriptors be categorized as "Primary" functional spaces when their primary use is for occupants involved in activities associated with the designated facility type, i.e., Administrative Office Facilities--spaces used for occupants involved in administrative and office activities. Conversely, it is proposed that Level V descriptors be categorized as "Support/Service" functional spaces when their primary use is for occupants involved in activities providing services or support to the facility or provided for public use, i.e., janitorial spaces, public corridors, and toilets.

The authors believe that this is necessary in order to describe the basic Shop Maintenance functional spaces as the "Primary" spaces which they are, while establishing separate "Support/Service" spaces. The "Primary" versus "Support/Service" distinction is both a useful programming and design separation. Most spaces will not be affected but where there are those that are, it is thought that this distinction will be helpful.

Level IV--Functional Group

Due to the changing nature of the functions and activities incorporated into the various Facility Types, some of the Functional Groups are unique to descriptors on the three levels above, while others are repetitious.

For example, in a bachelor housing facility, there would be no "Research" descriptor, and the descriptor "Landscape" will probably never be included under the Level II descriptor, "Interior." On the other hand, it is expected that the descriptor "Utility Areas" will occur under most or all facility types, under the descriptor "Interior" on Level II and under Support/"Services" on Level III.

The Level IV descriptors herein are extremely sensitive to the previous levels and in particular, to the first level, Facility Type. In the future, when a Facility Type is added, it is likely that new Level IV descriptors for that facility will have to be added.

Level VI--Descriptor Repetition

The Level VI, Activity Space, descriptor has been used to permit a single Level V Functional Space descriptor by accounting for the several variations possible in that space that would otherwise demand a separate Functional Space descriptor. Work with the "Interior" segment of the structure leads to the conclusion that repeating a Level VI Activity Space descriptor category where:

1. That Level VI descriptor has previously been established to contain precise, pertinent information and criteria for use with another Level V descriptor category.
2. That Level VI descriptor category is the only category that pertains to another Level V descriptor category. For example, there are a number of offices, distinguished among other ways, by their Activity Space descriptors:

- | | |
|-----------------------------------|--|
| 1. Office, Battalion Commander | Administration work area
Conference area |
| 2. Office, Branch Head | Administration work area |
| 3. Office, Chief of Staff | Administration work area
Conference area |
| 4. Office, Installation Commander | Administration work area
Conference area |
| 5. Office, Regimental Commanders | Administration work area
Conference area |
| 6. Office, Secretarial/Clerical | Clerical/typing area
Machine area
Storage, supplies
Work area |

The most limited of these spaces ("Office, Supervisors" in this case) is solely defined by one Activity Space descriptor, i.e., "Work Area." That descriptor category has therefore been repeated.

Administrative Office Facilities

Figure 2 represents the appropriate levels for Administrative Office Facilities. When an item does not apply, it is shaded in. Note that on Level II, both "Exterior" and "Interior" apply; on Level IV under "Interior Primary Functions," Maintenance and Research do not apply; and on Level IV, "Exterior Primary Functions," Maintenance Research, and Training do not apply.

Table 4 is the complete computer printout of the "Hierarchical Structure" for this facility type.

Bachelor Housing

Figure 3 is a diagram representing the appropriate levels for Bachelor Housing. When an item does not apply, it is shaded in. Note that on Level II, both "Exterior" and "Interior" apply; on Level IV under "Interior Primary Functions," Administration, Assembly, Maintenance, Research, and Training do not apply; and on Level IV, "Exterior Primary Functions," Maintenance, Research, and Training do not apply.

Table 5 is the complete computer printout of the "Hierarchical Structure" for this facility type.

Classroom/Training Facilities

Figure 4 represents the appropriate levels for Classroom/Training Facilities. When an item does not apply, it is shaded in. Note that on Level II, both "Exterior" and "Interior" apply; on Level IV under "Interior Primary Functions," Assembly, Production, Maintenance, and Research do not apply; and on Level IV, "Exterior Primary Functions," Maintenance and Research do not apply.

Table 6 is the complete diagram computer printout of the "Hierarchical Structure" for this facility type.

Research and Development Laboratories

Figure 5 represents the appropriate levels for Research and Development Labs. When an item does not apply, it is shaded in. Note that in Level II, both "Exterior" and "Interior" apply; on Level IV under "Interior Primary Functions," Maintenance and Training do not apply; and on Level IV, "Exterior Primary Functions," Maintenance and Training do not apply.

Table 7 is the complete computer printout of the "Hierarchical Structure" for this facility type.

Shop Maintenance Facilities

Figure 6 represents the appropriate levels for Shop Maintenance Facilities. When an item does not apply, it is shaded in. Note that on Level II, both "Exterior" and "Interior" apply; on Level IV under "Interior Primary Functions," Production, Research, Residence, and Training do not apply; and on Level IV, "Exterior Primary Functions," Research and Training do not apply.

Table 8 is the complete computer printout of the "Hierarchical Structure" for this facility type.

Combination Facilities

The proposed structure presented herein assumes that a programmer who is faced with a combined facility type such as Administrative Classroom Facility will utilize the contents of both facility types to produce a single program.

Combined Spaces

In a similar manner, it is assumed that descriptor categories and their contents, although presented separately from other categories and contents, will combine them where necessary to produce single spaces in response to a project's needs, i.e., create multi-purpose rooms where necessary.

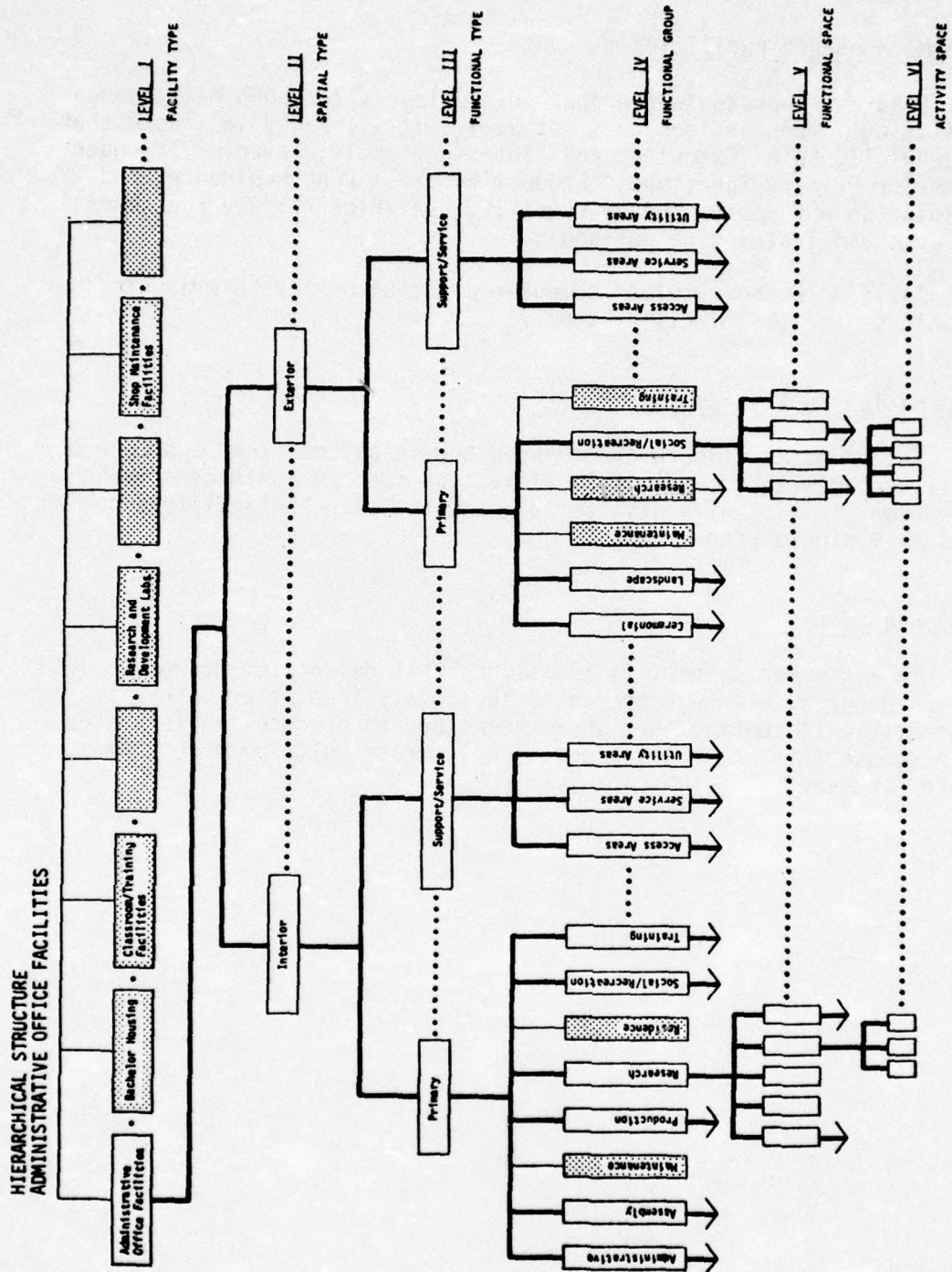


Figure 2. Administrative office facilities hierarchy.

Table 4

Hierarchical Structure for Administrative Office Facilities

FINAL REPORT OF

A PROPOSED HIERARCHICAL STRUCTURE OF FUNCTIONAL SPACES FOR BUILDINGS

LISTED 0-23-74

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
ADMIN OFFICE FACIL	INTERIOR	PRIMARY	ADMINISTRATIVE	CENTRAL FILE CONFERENCE (PRIVATE)	ADMINISTRATION WORK AREA CONFERENCE AREA
				OFFICE, BATTALION COMMANDER	ADMINISTRATION WORK AREA CONFERENCE AREA
				OFFICE, BRANCH HEAD	ADMINISTRATION WORK AREA
				OFFICE, CHIEF OF STAFF	ADMINISTRATION WORK AREA CONFERENCE AREA
				OFFICE, INSTALLATION COMMANDER	ADMINISTRATION WORK AREA CONFERENCE AREA
				OFFICE, REGIMENTAL COMMANDERS	ADMINISTRATION WORK AREA CONFERENCE AREA
				OFFICE, SECRETARIAL/CLERICAL	CLERICAL/TYPING AREA MACHINE AREA STORAGE, SUPPLIES WORK AREA
				OFFICE, SUPERVISORS	WORK AREA
				RECEPTION AREA	DISPLAY AREA RECEPTIONIST/DESK/INFO AREA WAITING AREA
			ASSEMBLY	VAULT	
				AUDITORIUM	SEATING AREA SPEAKERS STATION STORAGE, COAT STORAGE, GENERAL PURPOSE
				BRIEFING	SEATING AREA SPEAKERS STATION STORAGE, COAT STORAGE, GENERAL PURPOSE
				CONFERENCE	DISPLAY AREA STORAGE, COAT STORAGE, GENERAL PURPOSE WORK AREA

FINAL REPORT OF

A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LISTEU 8-23-74

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE.	LEVEL VI ACTIVITY SPACE
ADMIN OFFICE FACIL	INTERIOR	PRIMARY	ASSEMBLY	FILM REVIEW ROOM	AUDIO/VISUAL AREA SEATING AREA STORAGE, COAT
				MISSION PLANNING	PRESENTATION AREA SEATING AREA STORAGE, COAT STORAGE, DOCUMENTS
			PRODUCTION	COMPUTER ROOM	MACHINE AREA STORAGE, PAPER
				DARK ROOM	
				PHOTO LABORATORY	FILM DRYING AREA FILM TOUCH UP AREA LAYOUT AREA PHINT DRYING AREA PHINT MOUNTING STORAGE/CHEM, FILM, PAPER, VIEWING AREA
				REPRODUCTION	MACHINE AREA STORAGE, SUPPLIES WORK AREA
			RESEARCH	CLASSIFIED READING ROOM	CARREL, DRY CARREL, WET CONTROL STATION
				LIBRARY BOOK CIRCULATION	BOOK CIR. AREA CATALOG AREA DUPLICATION AREA REFERENCE AREA
				LIBRARY STACK/READING AREA	CARREL, DRY CARREL, WET PERIODICAL READING AREA
			SOCIAL/RECREATION	VAULT, LIBRARY CLASSIFIED DOC. LOUNGE AREA LUNCH AREA VENDING AREA	
					MACHINE AREA

Table 4 (cont'd)

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LISTED 0-25-74

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
ADMIN OFFICE FACIL	INTERIOR	SUPPORT/SERVICES	SERVICE AREAS	TOILET, WOMEN VAULT, ARMS	TOILET AREA STORAGE, ARMS STORAGE, SPARE PARTS STORAGE, TOOL WORK AREA
			UTILITY AREAS	CEILING CAVITY	DISTRIBUTION AREA, E/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING
				CLOSET, E/E EQUIP. CLOSET, HVAC EQUIP. CLOSET, PLUMBING EQUIP.	
				CRAWL SPACE/UTILITY TUNNEL	ACCESS AREA CONTROL AREA DISTRIBUTION AREA, E/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING
				EQUIP. ROOM	E/E EQUIP. AREA HVAC EQUIP. AREA PLUMBING EQUIP. AREA
				EQUIP. ROOM, ELEVATOR EQUIP. ROOM, TELEPHONE OFFICE, BLDG. ENGINEER	CONTROL MONITORING AREA WORK AREA
				UTILITY PENTHOUSE	E/E EQUIP. HVAC EQUIP. PLUMBING EQUIP.
				UTILITY SHAFT	E/E HVAC PLUMBING
				VAULT, ELECTRICAL FLAG POLL AREA	
EXTERIOR	PRIMARY		CEREMONIAL		

Table 4 (cont'd)

FINAL REPORT OF
A. PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LISTED 8-23-74

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE.	LEVEL VI ACTIVITY SPACE
ADMIN OFFICE FACIL	EXTERIOR	PRIMARY	CEREMONIAL	MONUMENT AREA PARADE FIELD	PARADE AREA REVIEW AREA
			LANDSCAPE AREAS	BARRIER/SCREEN	BARRIER, PHYSICAL ACCESS SCREEN, VISUAL SCREEN+ACOUSTICAL SCREEN+CLIMATIC
				BUILDING SEPARATION	FRESH AIR CIRCULATION NATURAL LIGHT ENTRY
				FUTURE EXPANSION	
				VISTA/SETTING	BUILDING, SITTING LAND USE DEFINITION VISUAL RELIEF
				BREAK AREA	CIRC/CONVERSATION/REST
				COURT YARD	
				EASEMENT	
				ENTRY AREA, PEDESTRIAN	LOBBY, EXTERIOR RAMPS STAIRS
				PARKING, AUTOMOBILE	HANDICAPPED AREA
				PARKING, BICYCLE	
				PARKING, SERVICE/DELIVERY	
				PATHS, BICYCLE	
				ROADWAYS, AUTOMOBILE	
				ROADWAYS, EMERGENCY	
				ROADWAYS, SERVICE/DELIVERY	
				ROADWAYS, TRANSIT	BUS STOP TAXI STANDS TRAFFIC AREA

Table 4 (cont'd)

LISTED 9-23-74

FINAL REPORT OF A PROPOSED HIERARCHICAL STRUCTURE OF FUNCTIONAL SPACES FOR BUILDINGS	LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE,	LEVEL VI ACTIVITY SPACE
ADMIN OFFICE FACIL	EXTERIOR	SUPPORT/SERVICES	ACCESS AREAS	WALKWAYS, PEDESTRIAN	COVERED WALKWAY RAMP STAIRS WALKWAYS	
		SERVICE AREAS		LOADING DOCK		
				STORAGE YARD, EQUIPMENT	STORAGE, BUILDING MAINT EQUIP. STORAGE, SITE MAINT EQUIPMENT	
				STORAGE, WASTE	STORAGE, OIL STORAGE, RUBBISH	
		UTILITY AREAS		DISPOSAL, STORM WATER		
				DISPOSAL, WASTE		
				DIST. SPACE, STORM WATER		
				DISTRIBUTION SPACE, E/E		
				DISTRIBUTION SPACE, GAS		
				DISTRIBUTION SPACE, WASTE		
				DISTRIBUTION SPACE, WATER		
				EQUIP. AREA E/E		
				EQUIP. AREA HVAC		
				EQUIP. AREA PLUMBING		
				STORAGE/SOURCE, WATER		
				STORAGE, FUEL	GAS PLYPOLELM	
				STORAGE, SANITARY WASTE		
				TREATMENT, WASTE	PRIMARY TREATMENT SECONDARY TREATMENT TERTIARY TREATMENT	

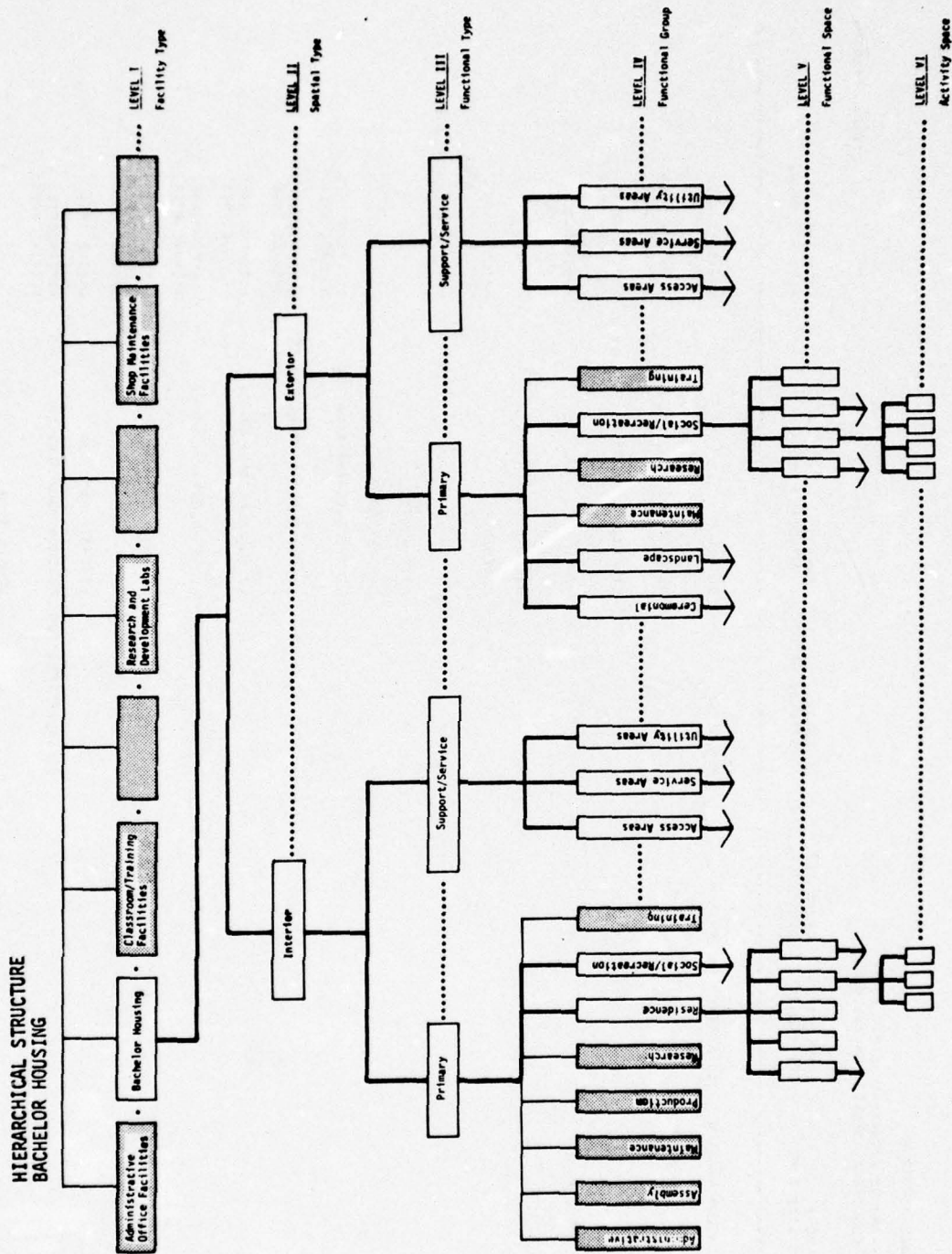


Figure 3. Bachelor housing hierarchy.

Table 5

Hierarchical Structure for Bachelor Housing

LISTED 6-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
BACHELOR HOUSING	INTERIOR	PRIMARY	RESIDENCE	BATHROOM	LAVATORY AREA TOILET AREA
				BEDROOM	SLEEPING AREA STORAGE AREA
				CENTRAL BATHROOM	UNWYING AREA LAVATORY AREA LOCKER AREA SHOWER AREA TOILET AREA
				HALL	
				KITCHEN	EATING AREA FOOD PREP. AREA STORAGE AREA UTENSIL CLEANING AREA
				KITCHENETTE	
				LAUNDRY ROOM	
				LIVING/SLEEPING ANLA, E1	SLEEPING AREA STORAGE AREA
				LIVING/SLEEPING AREA, E2-E4	SLEEPING AREA STORAGE AREA
				LIVING/SLEEPING, E5-E6	SLEEPING AREA STORAGE AREA
				LIVING/SLEEPING, E7-E9	SLEEPING AREA STORAGE AREA
				LIVING/SLEEPING, GRADE 02-	LIVING AREA SLEEPING ANLA STORAGE AREA
			SOCIAL/RECREATION	LIVING, GRADE 03+	LIVING AREA
				KITCHEN SELF SERVICE	KITCHENETTE SEATING AREA
				LOUNGE AREA	

Table 5 (cont'd)

LISTED 8-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
BACHELOR HOUSING	INTERIOR	PRIMARY	SOCIAL/RECREATION	LUNCH AREA	KITCHEN AREA
				RECREATION ROOM	MACHINE AREA
				VENDING AREA	SEATING AREA
		SUPPORT/SERVICES ACCESS AREAS		CORRIDOR	
				ELEVATORS	
				LOBBY	
				STAIRS	
				VESTIBULE	
			SERVICE AREAS	CLOSET, JANITORS	
				INCINERATOR ROOM	
				LINEN ROOM	
				LOCKER ROOM	
				OFFICE, CONTROL	
				REFUSE ROOM	DISPOSAL AREA
				SHOWER ROOM	STORAGE AREA
				STORAGE, BLDG	
				STORAGE, LUMBER	
				STORAGE, PAINT	
				TOILET, MEN	LAVATORY AREA TOILET AREA
				TOILET, WOMEN	LAVATORY AREA REST AREA TOILET AREA
				VAULT, ARMS	STORAGE, ARMS

Table 5 (cont'd)

FINAL REPORT OF

A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LISTED 0-25-74

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
BACHELOR HOUSING	INTERIOR	SUPPORT/SERVICES	SERVICE AREAS	VAULT, ARMS	STORAGE, SPARE PARTS STORAGE, TOOL WORK AREA
			UTILITY AREAS	VAULT, PERSONAL ARMS CEILING CAVITY	DISTRIBUTION AREA, L/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING
				CLOSET, L/E EQUIP. CLOSET, HVAC EQUIP. CLOSET, PLUMBING EQUIP. CRAWL SPACE/UTILITY TUNNEL	ACCESS AREA CONTROL AREA DISTRIBUTION AREA, L/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING
				EQUIP. ROOM	L/E EQUIP. AREA HVAC EQUIP. AREA PLUMBING EQUIP. AREA
				EQUIP. ROOM, ELEVATOR EQUIP. ROOM, TELEPHONE OFFICE, BLOG. ENGINEER	CONTROL MONITORING AREA WORK AREA
				UTILITY PENTHOUSE	L/E EQUIP. HVAC EQUIP. PLUMBING EQUIP.
				UTILITY SHAFT	L/E HVAC PLUMBING
				VAULT, ELECTRICAL FLAG POLE AREA POND/LAY AREA	
EXTERIOR	PRIMARY	CEREMONIAL			

Table 5 (cont'd)

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
BACHELOR HOUSING	EXTERIOR	PRIMARY	CEREMONIAL	PARADE FIELD	PARADE AREA REVIEW AREA
			LANDSCAPE AREAS	BARRIER/SCREEN	BARRIER, PHYSICAL ACCESS SCREEN, VISUAL SCREEN, ACOUSTICAL SCREEN, CLIMATIC
				BUILDING SEPARATION	FRESH AIR CIRCULATION NATURAL LIGHT ENTRY
				FUTURE EXPANSION	
				VISTA/SETTING	BUILDING, SETTING LAND USE DEFINITION VISUAL RELIEF
			SOCIAL/RECREATION	COURT YARD	CIRC/CONVERSATION/REST
				PICNIC AREA	COOKING AREA EATING AREA
				SPORTS FACILITY	BASKETBALL COURT PUTTING GREEN SWIMMING POOL TENNIS COURT VOLLEY BALL COURT
				SPORTS FIELD	BASEBALL FIELD FOOTBALL FIELD HOCKEY FIELD SUCCER FIELD
			SUPPORT/SERVICES ACCESS AREAS	EASEMENT	
				ENTRY AREA, PEDESTRIAN	LOBBY, EXTERIOR RAMPS STAIRS
				PARKING, AUTOMOBILE	
				PARKING, BICYCLE	
				PARKING, SERVICE/DELIVERY	
				PAT'S, BICYCLE	

Table 5 (cont'd)

LISTED 6-23-74

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
BACHELOR HOUSING	EXTERIOR	SUPPORT/SERVICES ACCESS AREAS		ROADWAYS, AUTOMOBILE ROADWAYS, EMERGENCY ROADWAYS, SERVICE/DELIVERY ROADWAYS, TRANSIT	BUS STOP TAXI STANDS TRAFFIC AREA COVERED WALKWAY RAMPS STAIRS WALKWAYS STORAGE, BUILDING MAINT EQUIP. STORAGE, SITE MAINT EQUIPMENT STORAGE, RUBBISH
			SERVICE AREAS	STORAGE YARD, EQUIPMENT STORAGE, WASTE	
			UTILITY AREAS	DISPOSAL, STORM WATER DISPOSAL, WASTE DIST. SPACE, STORM WATER DISTRIBUTION SPACE, E/E DISTRIBUTION SPACE, GAS DISTRIBUTION SPACE, WASTE DISTRIBUTION SPACE, WATER EQUIP. AREA E/E EQUIP. AREA HVAC EQUIP. AREA PLUMBING STORAGE/SOURCE, WATER STORAGE, FUEL STORAGE, SANITARY WASTE	
					GAS PETROLEUM

Table 5 (cont'd)

FINAL REPORT OF A PROPOSED HIERARCHICAL STRUCTURE OF FUNCTIONAL SPACES FOR BUILDINGS		LISTED 8-23-76				
LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE,	LEVEL VI ACTIVITY SPACE	
BACHELOR HOUSING	EXTERIOR	SUPPORT/SERVICES	UTILITY AREAS	TREATMENT, WASTE	PRIMARY TREATMENT SECONDARY TREATMENT TERTIARY TREATMENT	

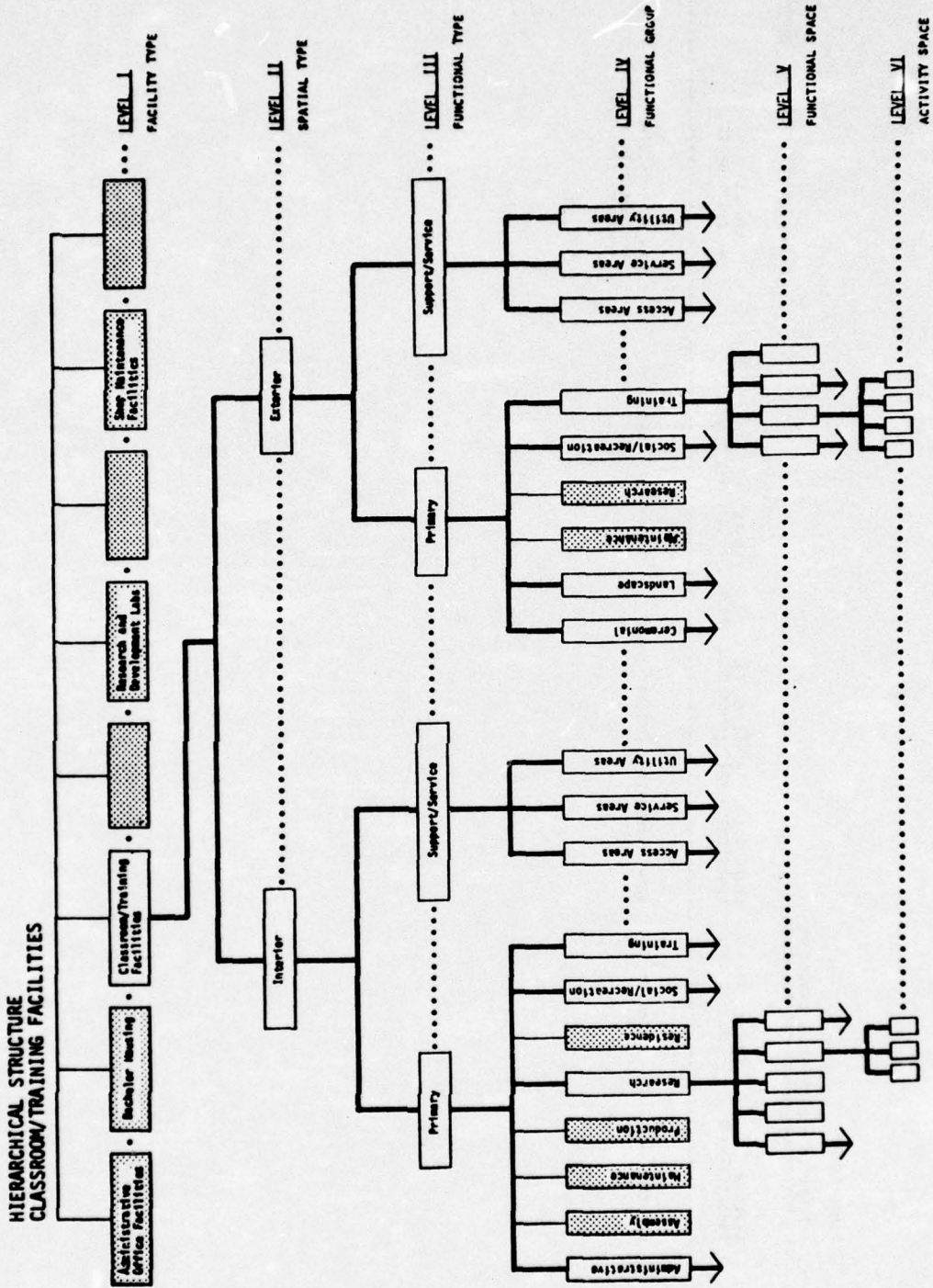


Figure 4. Classroom/training facilities hierarchy.

Table 6

Hierarchical Structure for Classroom/Training Facilities

LISTED 9-23-74

FINAL REPORT OF A PROPOSED HIERARCHICAL STRUCTURE OF FUNCTIONAL SPACES FOR BUILDINGS	LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE,	LEVEL VI ACTIVITY SPACE
	CLASSRM TRNG FACIL	INTERIOR	PRIMARY	ADMINISTRATIVE	CONFERENCE (PRIVATE) OFFICE, BRANCH HEAD OFFICE, PROFESSIONAL AND AUP. OFFICE, SECRETARIAL/CLERICAL	ADMINISTRATION WORK AREA FILE AREA WORK AREA CLERICAL/TYPING AREA GENERAL WORK AREA MACHINE AREA STORAGE, SUPPLIES WORK AREA
				RESEARCH	CLASSIFIED READING ROOM LIBRARY BOOK CIRCULATION	CARREL, DRY CARREL, WET CONTROL STATION BOOK CIN. AREA CATALOG AREA DUPLICATION AREA REFERENCE AREA
				SOCIAL/RECREATION	LIBRARY STACK/READING AREA VAULT, LIBRARY CLASSIFIED DOC. LOUNGE AREA	CARREL, DRY CARREL, WET PERIODICAL READING AREA KITCHENETTE SLATING AREA
				SUPPORT/SERVICES ACCESS AREAS	LOUNGE AREA CORRIDOR ELEVATORS LOBBY STAIRS VESTIBULE	
				MAINTENANCE		

Table 6 (cont'd)

LISTEV 6-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
CLASSRM TRNG FACIL	INTERIOR	SUPPORT/SERVICES	UTILITY AREAS	EQUIP. ROOM	L/E EQUIP. AREA HVAC EQUIP. AREA PLUMBING EQUIP. AREA
				EQUIP. ROOM, ELEVATOR	
				EQUIP. ROOM, TELEPHONE	
				HORIZONTAL SERVICE CAVITY	ACCESS AREA CONTROL AREA DISTRIBUTION AREA, L/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING METERING AREA
				OFFICE, BLDG. ENGINEER	CONTROL MONITORING AREA WORK AREA
				UTILITY PENTHOUSE	L/E EQUIP. HVAC EQUIP. PLUMBING EQUIP.
				UTILITY SHAFT	L/E HVAC PLUMBING
				VAULT, ELECTRICAL	
				FLAG POLE AREA	
				MONUMENT AREA	
EXTERIOR	PRIMARY	LANDSCAPE AREAS	CEREMONIAL	PARADE AREA REVIEW AREA	PARADE AREA REVIEW AREA
				PARADE FIELD	BARRIER, PHYSICAL ACCESS SCREEN, VISUAL SCREEN, ACOUSTICAL SCREEN, CLIMATIC
				BARRIER/SCREEN	FRESH AIR CIRCULATION NATURAL LIGHT ENTRY
				BUILDING SEPARATION	
				FUTURE EXPANSION	
				VISTA/SETTING	BUILDING, SETTING

Table 6 (cont'd)

LISTEN 8-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
CLASSRM TRNG FACIL	EXTERIOR	PRIMARY	LANDSCAPE AREAS	VISTA/SETTING	LAND USE DEFINITION VISUAL RELIEF
			SOCIAL/RECREATION	BREAK AREA	CIRC/CONVERSATION/RLST
		SUPPORT/SERVICES ACCESS AREAS	COURT YARD	EASEMENT	LOBBY, EXTERIOR RAMPS STAIRS
			ENTRY AREA, PEDESTRIAN		HANDICAPPED AREA
			PARKING, AUTOMOBILE		
			PARKING, BICYCLE		
			PARKING, SERVICE/DELIVERY		
			PATHS, BICYCLE		
			ROADWAYS, AUTOMOBILE		
			ROADWAYS, EMERGENCY		
			ROADWAYS, SERVICE/DELIVERY		
			ROADWAYS, TRANSIT		BUS STOP TAXI STANDS TRAFFIC AREA
			WALKWAYS, PEDESTRIAN		COVERED WALKWAY RAMPS STAIRS WALKWAYS
	MAINTENANCE				
	SERVICE AREAS		LOADING DOCK		
			STORAGE YARD, EQUIPMENT		STORAGE, BUILDING MAINT EQUIP, STORAGE, SITE MAINT EQUIPMENT
			STORAGE YARD, MATERIALS		STORAGE, GAS STORAGE, PLIKOLEUM STORAGE, LUMBER

Table 6 (cont'd)

LISTED 8-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
CLASSRM TRNG FACIL	EXTERIOR	SUPPORT/SERVICES	SERVICE AREAS	STORAGE YARD, MATERIALS STORAGE, WASTE	STORAGE, MEDICAL STORAGE, OIL STORAGE, RUBBISH
			UTILITY AREAS	DISPOSAL, STORM WATER DISPOSAL, WASTE DIST. SPACE, STORM WATER DISTRIBUTION SPACE, E/E DISTRIBUTION SPACE, GAS DISTRIBUTION SPACE, WASTE DISTRIBUTION SPACE, WATER EQUIP. AREA E/E EQUIP. AREA HVAC EQUIP. AREA PLUMBING STORAGE/SOURCE, WATER STORAGE, FUEL	
				STORAGE, SANITARY WASTE TREATMENT, WASTE	GAS PETROLEUM PRIMARY TREATMENT SECONDARY TREATMENT TERTIARY TREATMENT

C.E.R.L. REPORT IS COMPLETED.

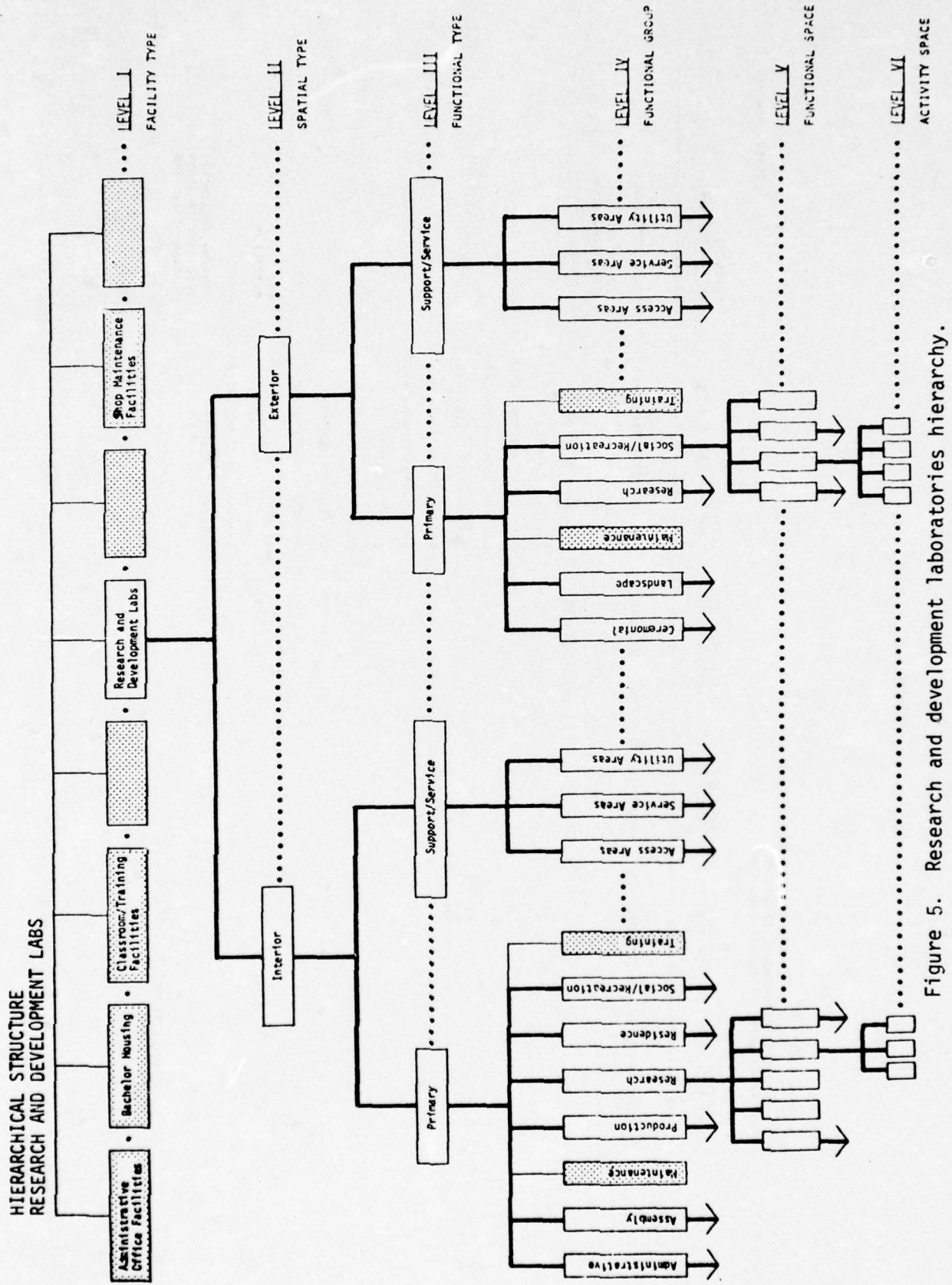


Figure 5. Research and development laboratories hierarchy.

Table 7

Hierarchical Structure for Research and Development Laboratories

LISTEV 0-23-74

FINAL REPORT OF A PROPOSED HIERARCHICAL STRUCTURE OF FUNCTIONAL SPACES FOR BUILDINGS	LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
	ROST LABORATORY	INTERIOR	PRIMARY	ADMINISTRATIVE	CONFERENCE (PRIVATE) OFFICE, RESEARCHER	CLERICAL/TYPING AREA MACHINE AREA STORAGE, SUPPLIES
					OFFICE, SECRETARIAL/CLERICAL	ADMINISTRATION WORK AREA WORK AREA
					OFFICE, SHIPPING/RECEIVING	DISPLAY AREA RECEPTIONIST/DESK/INFO AREA WAITING AREA
				RECEPTION AREA		
				ASSEMBLY	BRIEFING	SLATING AREA SPEAKERS STATION STORAGE, COAT
					CONFERENCE	DISPLAY AREA STORAGE, COAT STORAGE, GENERAL PURPOSE WORK AREA
				PRODUCTION	COMPUTER ROOM	MACHINE AREA STORAGE, PAPER
					DARK ROOM	
					PHOTO LABORATORY	FILM DRYING AREA FILM TOUCH UP AREA LAYOUT AREA PRINT DRYING AREA PRINT YOUTING STORAGE/CH-4, FILM, PAPER, VIEWING AREA
					REPRODUCTION	MACHINE AREA STORAGE, SUPPLIES WORK AREA
				RESEARCH	APPARATUS ROOM BALANCE ROOM	BALANCE AREA PREPARATION AREA

Table 7 (cont'd)

LISTED 8-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE,	LEVEL VI ACTIVITY SPACE
ROST LABORATORY	INTERIOR	PRIMARY	RESEARCH	CENTRIFUGE ROOM CHEMISTRY, CONSTANT TEMP. ROOM CHEMISTRY, ELECTRON MICROSCOPE CHEMISTRY, GENERAL LAB	PREPARATION AREA MICROSCOPE AREA PREPARATION AREA FUME CUPBOARD AREA PREPARATION AREA STORAGE, FLAGENT CAPREL, DRY CAPREL, WET CONTROL STATION
				CLASSIFIED READING ROOM DARK ROOM, LABORATORY DUST FREE ROOM LIBRARY BOOK CIRCULATION	BOOK CIR. AREA CATALOG AREA DUPLICATION AREA REFERENCE AREA CAPREL, DRY CAPREL, WET PERIODICAL READING AREA
				LIBRARY STACK/READING AREA	LIBRARY STACK/READING AREA
				METALLURGY LAB, MELTING SHOP	FURNACE AREA PREPARATION AREA
				METALLURGY LAB, MICROSCOPE RM	MICROSCOPE AREA PREPARATION AREA
				MTRLGY, LAB PREP/POLISH RM	ACID TANK AREA POLISHING AREA PREPARATION AREA
				NCLR PHYS., RADIOACT. CHEM LAB	FUME CUPBOARD AREA PREPARATION AREA STORAGE, RADIOACTIVE CHEMICAL
				NUCLEAN PHYS., REACTOR LAB	DECONTAMINATION AREA PREPARATION AREA REACTOR AREA

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LISTED 0-23-74

Table 7 (cont'd)

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE.	LEVEL VI ACTIVITY SPACE
ROBT LABORATORY	INTERIOR	PRIMARY	RESEARCH	PHYS. CHEM., COLD ROOM	PREPARATION AREA
				PHYS. CHEM., CONSTANT TEMP. RM	PREPARATION AREA
				PHYS. CHEM., ELECT MSCOPE RM	MICROSCOPE AREA PREPARATORY AREA
				PHYS. CHEM., GENERAL LAB	FUME CUPBOARD AREA STORAGE, REAGENT WORK AREA
				PHYSICS, GENERAL LAB	WORK AREA
				PHYSICS, OPTICAL LAB	STORAGE, OPTICS WORK AREA
				SHOP, MODEL	
				SPECTROGRAPHIC LAB.	
				STORAGE, CHEMICAL	
				VAULT, LIBRARY CLASSIFIED DOC.	
				VIBRATION FREE ROOM	
			SOCIAL/RECREATION	LOUNGE AREA	
				LUNCH AREA	
				VENDING AREA	MACHINE AREA SLATING AREA
			SUPPORT/SERVICES ACCESS AREAS	CORRIDOR	
				ELEVATORS	
				LOBBY	
				STAIRS	
				VESTIBULE	
			SERVICE AREAS	CLOSET, JANITORS	
				INCINERATOR ROOM	

Table 7 (cont'd)

LISTED 0-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE,	LEVEL VI ACTIVITY SPACE
ROBT LABORATORY	INTERIOR	SUPPORT/SERVICES SERVICE AREAS	LIBRARY WORK ROOM		
			LOCKER ROOM		
			PROJECTION ROOM	PROJECTION AREA	
			PROJECTION ROOM, REAR SCREEN	PROJECTION AREA STORAGE, VISUAL EQUIPMENT	
			REFUSE ROOM	DISPOSAL AREA STORAGE AREA	
			SHIPPING/RECEIVING ROOM	ADMINISTRATION WORK AREA WORK AREA	
			SHOWER ROOM		
			STORAGE, BLOG		
			STORAGE, LUMBER		
			STORAGE, PAINT		
			TOILET, MEN		LAVATORY AREA TOILET AREA
			TOILET, WOMEN		LAVATORY AREA NEST AREA TOILET AREA
			CEILING CAVITY	UTILITY AREAS	DISTRIBUTION AREA, E/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING
			CLOSET, E/E EQUIP.		
			CLOSET, HVAC EQUIP.		
CLOSET, PLUMBING EQUIP.					
CRAWL SPACE/UTILITY TUNNEL		ACCESS AREA CONTROL AREA DISTRIBUTION AREA, E/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING			

Table 7 (cont'd)

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LISTED 8-23-74

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
RC&T LABORATORY	INTERIOR	SUPPORT/SERVICES	UTILITY AREAS	EQUIP, "CO"	E/E EQUIP. AREA HVAC EQUIP. AREA PLUMBING EQUIP. AREA
				EQUIP. ROOM, ELEVATOR	
				EQUIP. ROOM, TELEPHONE	
				HORIZONTAL SERVICE CAVITY	ACCESS AREA CONTROL AREA DISTRIBUTION AREA, E/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING FILTERING AREA
				OFFICE, BLDG. ENGINEER	CONTROL MONITORING AREA WORK AREA
				UTILITY PENTHOUSE	E/E EQUIP. HVAC EQUIP. PLUMBING EQUIP.
				UTILITY SHAFT	E/E HVAC PLUMBING
				VAULT, ELECTRICAL	
	EXTERIOR	PRIMARY	CEREMONIAL	FLAG POLE AREA	
				MONUMENT AREA	
			LANDSCAPE AREAS	BARRIER/SCHEN	BARRIER, PHYSICAL ACCESS SCREEN, VISUAL SCREEN, ACOUSTICAL SCREEN, CLIMATIC
				BUILDING SEPARATION	FRESH AIR CIRCULATION NATURAL LIGHT ENTRY
				FUTURE EXPANSION	
				VISIA/SETTING	BUILDING, SETTING LAND USE DEFINITION VISUAL RELIEF

Table 7 (cont'd)

FINAL REPORT OF

A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LISTED 8-23-74

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
RC&T LABORATORY	EXTERIOR	PRIMARY	RESEARCH	TESTING AREA, AIM FRAPE	
				TESTING AREA, ARMAMENT	
				TESTING AREA, VEHICLE	
			SOCIAL/RECREATION	BREAK AREA	
				COURT YARD	
				EASEMENT	
		SUPPORT/SERVICES ACCESS AREAS		ENTRY AREA, PEDESTRIAN	CIRC/CONVERSATION/ALST
				PARKING, AUTOMOBILE	LOBBY, EXTERIOR
				PARKING, BICYCLE	RAMPS
				PARKING, SERVICE/DELIVERY	STAIRS
				PATHS, BICYCLE	HANDICAPPED AREA
				ROADWAYS, AUTOMOBILE	
				ROADWAYS, EMERGENCY	
				ROADWAYS, SERVICE/DELIVERY	
				ROADWAYS, TRANSIT	BUS STOP
					TAXI STANDS
					TRAFFIC AREA
					COVERED WALKWAY
					RAMPS
					STAIRS
					WALKWAYS
		SERVICE AREAS		LOADING DOCK	
				STORAGE YARD, EQUIPMENT	STORAGE, BUILDING MAINT EQUIP.
				STORAGE YARD, MATERIALS	STORAGE, SITE MAINT EQUIPMENT
					STORAGE, GAS
					STORAGE, PLT-OLEU*

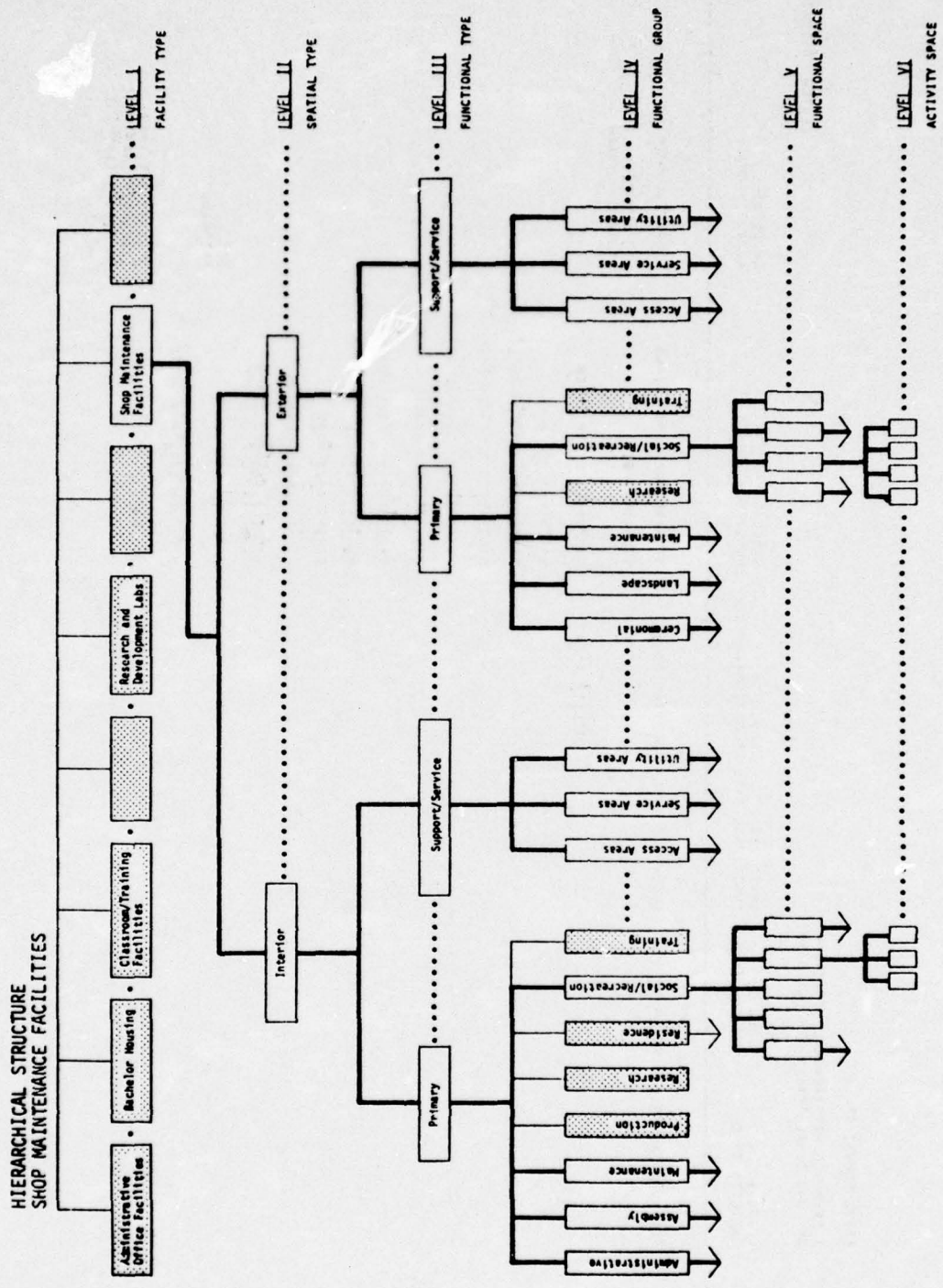


Figure 6. Shop maintenance facilities hierarchy.

Table 8

Hierarchical Structure for Shop Maintenance Facilities

LISTED 8-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
SHOP MAINT FACIL	INTERIOR	PRIMARY	ADMINISTRATIVE	OFFICE, BRANCH HEAD OFFICE, INSPECTION	ADMINISTRATION WORK AREA ADMINISTRATION WORK AREA WORK AREA
				OFFICE, PROFESSIONAL AND ADM.	FILE AREA WORK AREA
				OFFICE, SECRETARIAL/CLERICAL	CLERICAL/TYPING AREA GENERAL WORK AREA FACSIMILE AREA STORAGE, SUPPLIES WORK AREA
			ASSEMBLY	CONFERENCE	STORAGE, COAT WORK AREA
			MAINTENANCE	DEFUSING AREA	
				GREASE RACK AREA	
				INSPECTION RUNWAY VEHICLE	
				PERSONELL LIFT	
				SHOP MOTOR REPAIR AND REBUILD	STORAGE, SPARE PARTS STORAGE, TEST EQUIPMENT WORK AREA
				SHOP, ARMAMENT	STORAGE, SPARE PARTS STORAGE, TOOL WORK AREA
				SHOP, CARPENTRY	STORAGE, LUMBER STORAGE, TOOL WORK AREA
				SHOP, COMMUNICATIONS	STORAGE, ELECTRONIC TEST EQUIP STORAGE, SPARE PARTS STORAGE, TOOL WORK AREA
				SHOP, ELECTRIC	STORAGE, SPARE PARTS STORAGE, TEST EQUIPMENT WORK AREA

Table 8 (cont'd)

LISTED 0-23-74

FINAL REPORT OF A PROPOSED HIERARCHICAL STRUCTURE OF FUNCTIONAL SPACES FOR BUILDINGS	LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
	SHOP PAINT FACIL	INTERIOR	PRIMARY	MAINTENANCE	SHOP, ELECTRONIC SHOP, GENERAL EQUIPMENT	STORAGE, ELEC. TEST EQUIP. STORAGE, TEST EQUIPMENT STORAGE, TOOL WORK AREA
					SHOP, HYDRAULIC	STORAGE, SPARE PARTS WORK AREA
					SHOP, LARGE VEHICLE	MAINT PIT STORAGE, SPARE PARTS STORAGE, TOOL WORK AREA
					SHOP, MACHINE	MACHINE AREA STORAGE, STOCK STORAGE, TOOL WORK AREA
					SHOP, METAL	STORAGE, TOOL WORK AREA
					SHOP, PAINT	PAINTING AREA STORAGE, PAINT AND EQUIPMENT
					SHOP, PAINT AND UOPE	MAINTING AREA STORAGE, PAINT AND EQUIPMENT
					SHOP, PLUMBING	STORAGE, SPARE PARTS STORAGE, TOOL WORK AREA
					SHOP, SHEET METAL	STORAGE, TOOL WORK AREA
					SHOP, SMALL VEHICLE	LIFT AREA, VEHICLE MAINT PIT STORAGE, SPARE PARTS STORAGE, TOOL WORK AREA
					SHOP, WELD AND RADIATOR	STORAGE, WELD EQUIPMENT WORK AREA
					SHOP, WELDING	STORAGE, WELD EQUIP. WORK AREA

Table 8 (cont'd)

LISTEU 6-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
SHOP MAINT FACIL	INTERIOR	PRIMARY	MAINTENANCE	SHOP/AIRCRAFT	STORAGE, TOOL STORAGE, SPARE PARTS WORK AREA
				SPARE PARTS ROOM	ADMINISTRATION WORK AREA, DISPENSING STORAGE, PANTS
				STORAGE, AMMUNITION	
				STORAGE, EXPLOSIVES	
				STORAGE, TOXICS	
				TIRE ROOM	STORAGE, PAINT
				TOOL ROOM	
				WASH RACK	DRY AREA WASH AREA
			SOCIAL/RECREATION	LOUNGE AREA	
				LUNCH AREA	
				VENDING AREA	MACHINE AREA SLATING AREA
			SUPPORT/SERVICES ACCESS AREAS	CORRIDOR	
				LOBBY	
				STAIRS	
				VESTIBULE	
			SERVICE AREAS	CLOSET, JANITORS	
				INCINERATOR ROOM	
				LOCKER ROOM	
				REFUSE ROOM	DISPOSAL AREA STORAGE AREA
				SHIPPING/RECEIVING ROOM	ADMINISTRATION WORK AREA

Table 8 (cont'd)

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE,	LEVEL VI ACTIVITY SPACE
SHOP MAINT FACIL	INTERIOR	SUPPORT/SERVICES	SERVICE AREAS	SHIPPING/RECEIVING ROOM	WORK AREA
				SHOWER ROOM	
				TOILET, MEN	LAVATORY AREA TOILET AREA
				TOILET, WOMEN	LAVATORY AREA REST AREA TOILET AREA
		UTILITY AREAS		CEILING CAVITY	DISTRIBUTION AREA, L/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING
				CRAWL SPACE/UTILITY TUNNEL	ACCESS AREA CONTROL AREA DISTRIBUTION AREA, L/E DISTRIBUTION AREA, HVAC DISTRIBUTION AREA, PLUMBING
				EQUIP. RM., REMOTE	
				EQUIP. ROOM	L/E EQUIP. AREA HVAC EQUIP. AREA PLUMBING EQUIP. AREA
				UTILITY SHAFT	L/E HVAC PLUMBING
	EXTERIOR	PRIMARY	LANDSCAPE AREAS	VAULT, ELECTRICAL BARRIER/SCREEN	BARRIER, PHYSICAL ACCESS SCREEN, VISUAL
				BUILDING SEPARATION	FRESH AIR CIRCULATION NATURAL LIGHT ENTRY
				FUTURE EXPANSION	
				VISTA/SETTING	BUILDING, SETTING LAND USE DEFINITION VISUAL RELIEF
			MAINTENANCE	GREASE TRAP	WACK AREA

Table 8 (cont'd)

LISTED 0-23-74

FINAL REPORT OF
A PROPOSED HIERARCHICAL STRUCTURE
OF FUNCTIONAL SPACES FOR BUILDINGS

LEVEL I FACILITY TYPE	LEVEL II SPATIAL TYPE	LEVEL III FUNCTIONAL TYPE	LEVEL IV FUNCTIONAL GROUP	LEVEL V FUNCTIONAL SPACE	LEVEL VI ACTIVITY SPACE
SHOP PAINT FACIL	EXTERIOR	PRIMARY	MAINTENANCE	GREASE RACK LANDING PAD MAINTENANCE APRON PARKING APRON STORAGE, PARTS TAXIWAY VEHICLE MAINTENANCE AREA WASHING APRON	STORAGE, VEHICLE STORAGE, VEHICLE WORK AREA OIL SEPARATOR AREA VEHICLE LIFT AREA VEHICLE PAINTING AREA VEHICLE WASHING AREA UNYI:G AREA STORAGE, VEHICLE WASHING AREA
			SOCIAL/RECREATION	BREAK AREA EASEMENT ENTRY AREA, PEDESTRIAN PARKING, AUTOMOBILE PARKING, BICYCLE PARKING, SERVICE/DELIVERY ROADWAYS, AUTOMOBILE ROADWAYS, SERVICE/DELIVERY ROADWAYS, TRANSIT	HANDICAPPED AREA MAPPS STAIRS
			SUPPORT/SERVICES ACCESS AREAS		BUS STOP TRAFFIC AREA COVERED WALKWAY MAPPS STAIRS PLANNING

5 CONCLUSIONS AND RECOMMENDATIONS

This report proposes a hierarchical structure of functional spaces for buildings which can organize facility design criteria for quick and easy reference, retrieval, and maintenance.

Corps personnel need quick and ready access to this data--first as an aid to programming a facility and later for facilitation of their review of design and working drawings. A/E contractors need quick and ready access to all data pertinent to their projects in order to develop a responsive design and to produce complete and coordinated contract documents.

Through the use of this structure, both Corps personnel and their A/E contractors will be able to more readily and completely access the large body of design criteria, so that they, in turn, can insure a timely and appropriate response to the need for Department of Defense facilities.

It is assumed that it will be necessary to re-examine Level I and eventually create at least two levels, i.e., a Level 0 and a Level I. The use of the five Facility Type categories throughout this study and their use herein has proved to be no problem. However, it is almost certain that a change at this level will provide many benefits for project programming and will probably prove helpful for integrating contents and structure.

Presently, a number of the facilities programmed and constructed each year by the Corps are constructed to respond to the requirements of previously constructed projects. They are not unique; they are readily recognized as narrowly defined building types. The first step in gathering information and criteria for either in-house or consultant A/E designers is to study recently designed projects or definitive plans. The final structure and its contents must not be more difficult to use than a reference to existing plans. It therefore seems logical that it must be possible to access a similar set of limited data to make this information system practical.

Conversely, there are inevitably unique projects in which it will be invaluable to a programmer to access the entire content of a Facility Class (Level 0). From this information, he/she may pick and choose from a variety of narrowly defined Facility Types to generate his/her program.

By creating a more narrowly selective Level I Facility Type, it will probably be easier to categorize existing data for this and lower levels. The category of Shop Maintenance Facility is extremely broad, and the contents of Level I will be substantially easier to organize if organized under narrower descriptor categories, such as Ammunition Maintenance Shop, Tank Maintenance Shop, Facility Maintenance Shop, etc.

Figure 7 is a graphic example of this concept presented within the format of this report.

Design Criteria

The impact of design criteria on structure and descriptor categories is impressive. The brief example in the Appendix demonstrates beyond initial expectations that it will be extremely valuable to explore the probable contents in greater depth before proceeding. The limited knowledge of the actual proposed content was adequate for generating the proposals in this report, but additional work will require additional knowledge.

Computerization

Parts of this report have utilized computer capabilities to sort, manipulate, quickly update, and print out work. Duplications have been readily identified and gaps filled in. It is recommended that serious consideration be given to the eventual computerization of the contents of any final structure to permit quick, ready, single-source updating, access, and compilation of its data. Computerization of the eventual contents is probably the only feasible way to identify duplicate and conflicting information and criteria, as well as identify areas which require information and criteria.

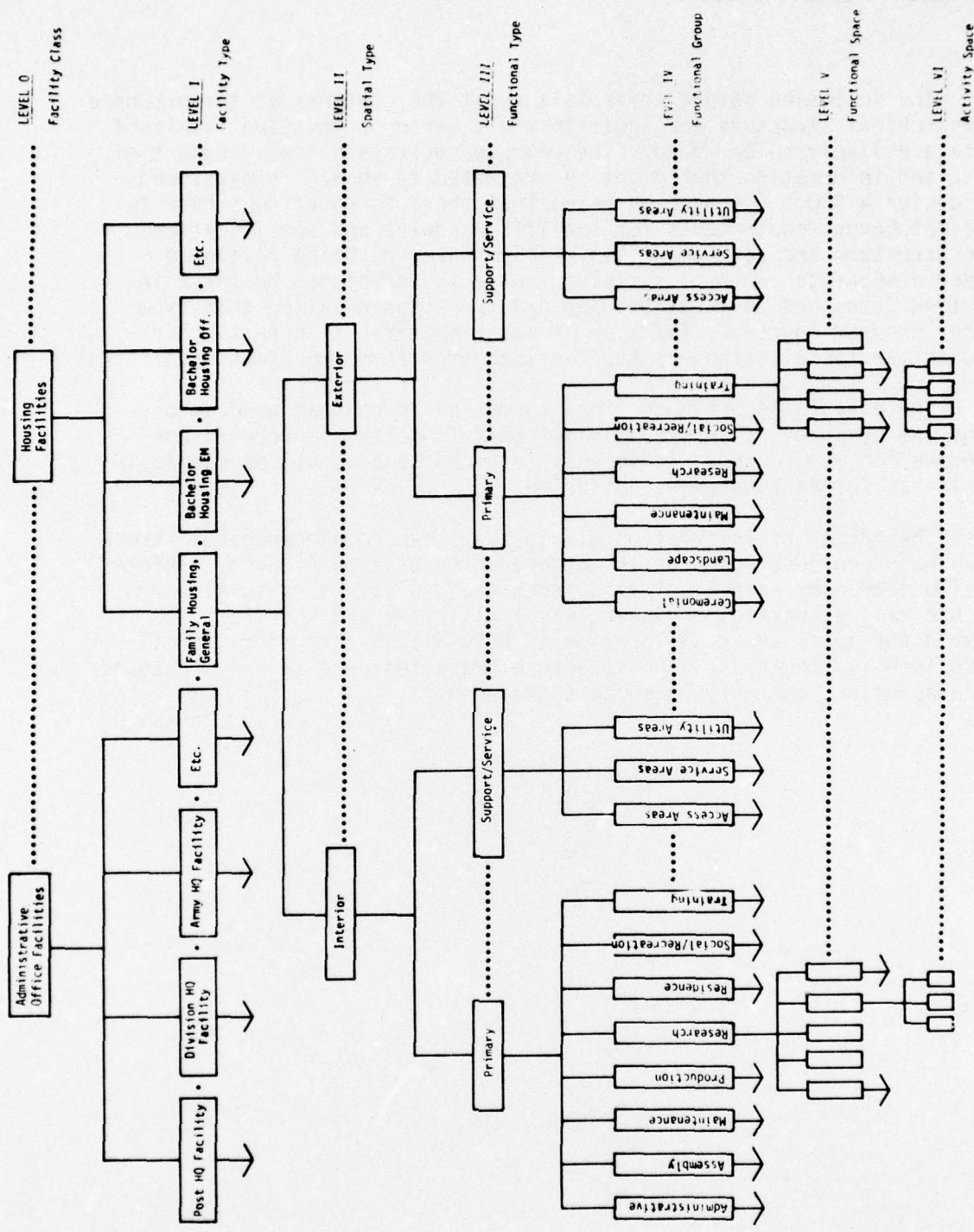


Figure 7. Level 0 example.

APPENDIX: Sample Content

The following sample criteria suggest the contents of the proposed hierarchical structure and indicate where various types and levels of data are likely to be found. The example portrays a cross segment of data and information that might be presented to an A/E commissioned to design a BOQ. (It must be noted that there is no attempt here to present Corps requirements for specific hardware and specifications. The structure and categorization of such data are being developed under a separate contract.) This example was developed by first inserting Corps and DA input on hand and then supplementing that from other program sources. The type of input specific to a particular project or installation was hypothesized from former project data forms.

The example is presented in a format based on that used to present the proposed structure. This format is neither advocated nor opposed for future use. It is only intended to present the sample in a similar format to prevent confusion.

The format of information within the proposed hierarchical structure has been developed for the orderly presentation of data. Information needed by each discipline (architect, civil, structural, mechanical, electrical engineer, etc.) will vary and therefore, a method for quick and easy location of data within this hierarchical structure is important. The structure presented here is *not* presented as a solution, but only to suggest the need.

LEVEL I

FACILITY TYPE

BACHELORS HOUSING

Philosophy:

BOQ's due to economy shall be of large capacity (100 persons or more). They shall be located on sites which allow for a relaxing view.

Use:

The BOQ's shall be used as personal residences of Enlisted officers in grades O2 and below and grades O3 and above.

Relationships:

The BOQ should be located so as to be easily accessible to all installation facilities. It should have direct access to classroom and administration facilities.

LEVEL II

SPATIAL TYPE

ENCLOSED

Philosophy:

The rooms of the BOQ should be arranged on a double loaded corridor in clusters of not less than four units.

Size:

The story height shall not exceed 10'-0". The total building height should be designed to practical minimum taking into account the optimum cost trade offs with structural and mechanical systems.

LEVEL III

FUNCTIONAL TYPE

USER

Philosophy:

The officers using the residence is usually between the age of 22 and 27 years old and views his apartment the same way that a civilian does.

Size:

The user shall consist of officers in Grades O2 and below, and Grades O3 and above.

250 offices shall reside in one complex.

LEVEL IV**FUNCTIONAL GROUP****RESIDENCE****Philosophy:**

The residence should allow for the officers to relax in private whether reading a book, watching television, or listening to his stereo. It also should allow for him to socialize with fellow officers or visiting friends, whether from the facility or not.

Relationship:

The residence should be relatively close to the common lounge space and clothes washing area of the BOQ. Each residence should house no more than two (2) occupants.

Size:

Officers in Grades O2 and below shall have a residence of approximately 330 square feet consisting of a combination living/dining, bath and pullman type kitchen.

Officers in Grades O3 and above shall have a residence of approximately 460 square feet consisting of a living room, bedroom, bathroom and kitchen.

General Design Criteria:

Maximum story height 10'-0"

Interior doors

- a. 2'-8" x 6'-8" minimum
- b. Swing door to have 90° minimum swing.

Windows (including sliding glass doors)

- a. Minimum area 10% of floor area served.
- b. Minimum operable 5% of floor area served.
- c. Maximum area 30% of floor area served.

Structural Criteria:**Design loads****Static or Dead Loads**

All structural elements shall be designed to safely support all dead loads, permanent or temporary, including self weight, partitions (minimum of 10 PSF) roofing, insulation, ceilings, floor covering and mechanical equipment.

LEVEL V**FUNCTIONAL SPACE****LIVING AREA****Philosophy:**

Each living unit shall contain space that is conducive to general living activities, among which are entertaining, reading, writing, listening to music, watching television and relaxing. Unless specifically provided elsewhere in the unit, the above listed activities will be contained in the living unit.

Relationship:

It should be directly accessible to the kitchen, dining area and required exits. It also should be accessible to the sleeping area and bath without passing through any habitable area.

Size:

- a. Minimum width 11 feet 0 inches
- b. Minimum area 160 square feet
- c. Ceiling height minimum 8'-0"
- d. Occupancy two (2) minimum

Mechanical Criteria:

- a. Electric baseboard units shall be provided.

Electrical Criteria:

- a. A switched outlet shall be provided for each living unit.
- b. Receptacles shall be no more than 12 feet apart.
- c. A master TV antenna outlet should be provided.

Lighting Criteria:

If the dining area is included in the living area, provide an overhead switched light.

DINING AREA**Philosophy:**

Each living unit shall contain space for the purpose of dining. This area may be combined with the living room or kitchen, or may possibly be a separate space.

Relationship:

The dining area shall be directly accessible to the kitchen and living area. It should also be accessible to the bathroom without passing through any habitable area.

LEVEL VI**ACTIVITY SPACE****LIVING AREA****CONVERSATION AREA**

A desirable conversation distance is of relatively small size approximately 10 feet in diameter.

STORAGE AREA

Provide 12 lineal feet of shelving for books, records, stereo, TV, etc.

EATING AREA

1 - 42" round table, 4 chairs.
Passage area 24"

STORAGE AREA

Storage Unit 1'-6" x 3'-6"

LEVEL IV**FUNCTIONAL GROUP****Vertical Live Loads**

- a. Roof: 20 PSF
- b. Floors: 40 PSF

Horizontal Load (acting inward or outward)

- a. On exterior walls: 25 PSF
- b. On interior walls or partitions: 10 PSF

Seismic Load

- a. Seismic Zone #2

Atmospheric Environment:**Exterior Wall****"U" Factor**

- a. (without glazing or doors) 0.15 BTU/hr./sq. ft. maximum.
- b. (doors and glazing) 0.56 BTU/hr./sq. ft. maximum

No settlement or compaction of insulation due to vibration.

Vapor penetration: Provide barrier having permeance of 1 perm minimum. ASTM E-26. Locate to allow passage of interior services within controlled environment.

Moisture Penetration: No moisture drawn to interior surface. ASTM-E331.

Air Infiltration: ASTM-E283

- a. 0.06 CFM/Sq. Ft. of exposed wall
- b. 0.5 CFM/Lin. ft. of door frame
- c. 0.5 CFM/Lin. ft. of operable sash perimeter maximum.

Roof/Ceiling

"U" factor 0.07 BTU/hr./sq. ft. maximum

No entrapment of moisture.

Provide vapor barrier in flat or near flat roof construction.

Provide ventilation of attic spaces. Vent area equal to 1/150 minimum of horizontal projection of roof area.

Floor/Ceiling

"U" factor (floor exposed to exterior): Match requirement for exterior wall, Ref. Sub-System II.

No entrapment of moisture.

Heating, Ventilating and Air Conditioning:**Atmospheric Criteria****Heating**

- a. Outside temperature 8 degrees F.
- b. Inside temperature 72 degrees F.

Cooling

- a. Outside temperature 93 degrees F.
- b. Inside temperature 78 degrees F.

LEVEL V**FUNCTIONAL SPACE****Size:**

- a. Minimum area
 - 1. 80 sq. ft. if a separate area
 - 2. 40 sq. ft. if combined with living area
 - 3. 40 sq. ft. if combined with the kitchen area
- b. Ceiling height minimum 8'-0"
- c. Occupancy two (2) minimum

Electrical Criteria:

Duplex outlet for eating apparatus.

Lighting Criteria:

Provide one overhead switched light for dining table.

KITCHEN/KITCHENETTE**Philosophy:**

The basic activities in the kitchen consist of food preparation, serving and cleanup after the meal. The kitchen area shall permit the efficient operation in the performance of these functions. In addition space shall be provided for staples, dinnerware and utensils.

Relationship:

The kitchen area shall be directly accessible to the dining area, living area and required exit. It also shall be accessible to the bathroom without passing through any habitable room.

Size:

- a. Minimum area 120 sq. ft.
- b. Ceiling height minimum 7'-0"
- c. Occupancy two (2) minimum

General Criteria:

Ceiling height minimum 7'-0".

Mechanical Criteria:

There should be intermittent mechanical exhaust for range hoods.

Plumbing Criteria:

If gas cooking is utilized, a gas service should be provided.

Electrical Criteria:

Two appliance circuits should be provided for each kitchen unit.

Outlets will be provided for cooking equipment and shall be individually circuited.

Lighting Criteria:

Fluorescent luminaires should be utilized for a maintained level of 60 foot candles.

Warm white lamps shall be installed in the fixtures.

LEVEL VI**ACTIVITY SPACE****Food Preparation Area:**

Base/Wall Cabinets: 25 Cu. Ft.

Burner Unit: 30" unit with mechanical exhaust.

Oven Unit: 2.7 Cu. Ft. minimum dimension 15".

Refrigeration: W/freezer capacity 8 Cu. Ft.

Sink: Minimum capacity 96 Cu. Ft. Depth 6'-8". Minimum 2-1/2 Lin. Ft. of counter space. Acid resistant porcelain or 18 gauge #304 stainless steel.

Shelving: 15 lin. ft.

Eating Area:

Table w/Chairs: Minimum table dimension 4'-0".

LEVEL IV

FUNCTIONAL GROUP

- Relative Humidity
 - a. Outside W.B. temperature 78
 - b. Inside 50% N.C.
- Outside Air: 75 CFM per sq. ft. minimum.
- Air Changes
 - a. 7.5 per hour minimum.
 - b. 15 per hour maximum.
- Air Movement 50 FPM
- Air filter efficiency: 10% - 15%.
- Design population per BOQ Unit: 2
- Mechanical Services
- Exhaust
 - a. Individual thermostatic control for each BOQ Unit.
- Acoustic Criteria:
 - a. Ambient Noise Level: NC 25-36
 - b. Provide speech privacy between BOQ units.

Electrical/Electronic

Power

Individual load centers will be installed for each unit.

Receptacles will be circuited together.

Lighting will be circuited together.

All wiring in accordance with minimum requirements of the NEC.

Lighting

General

All other lighting will be incandescent with special emphasis on make up and reading areas.

Ample wall toggle switches will be installed for proper control of lighting.

Television

- a. One television reception outlet will be installed for each unit.

Telephone

- a. One telephone outlet will be installed for each unit.

Fire Detection System

Acoustic Environment:

Exterior Wall

Wall (without glazing or doors)
Sound Transmission Class (STC) 42. ASTM-E90.

Wall (with glazing excluding doors)
Sound Transmission Class (STC) 27. ASTM-E90.

LEVEL V

FUNCTIONAL SPACE

BEDROOM AREA(SLEEPING AREA)

Philosophy:

Each living unit shall have a space (open or enclosed) allocated to sleeping and related activities as dressing, personal care, reading and studying. Sufficient space shall be provided for clothes storage.

Relationship:

It shall have direct access to the bathroom area, without passing through any habitable room.

Size:

- a. Minimum width 8'-6"
- b. Minimum area 120 sq. ft. (if enclosed)
- c. Minimum ceiling height 8'

Functional Criteria:

The location of doors, windows and closet shall be planned to facilitate placement of the bed and other furniture.

Placements of the closet near the door in the bedroom minimizes the use of wall space.

Mechanical Criteria:

- a. Provide electric base board heat. 8 lineal feet, a 400 watts/foot.

Electrical Criteria:

- a. Provide one switched outlet.
- b. Provide duplex outlets 12 feet minimum apart.

Lighting Criteria:

- a. Provide a light with pull chain in closet.

Sonic Criteria:

- a. Auditory privacy is required for all bedrooms minimum STC rating of 45.

BATHROOM

Philosophy:

Bathrooms shall be adequate for a water closet, lavatory and tub or shower. Arrangement for fixtures shall provide for the comfortable use of each fixture and permit a minimum 90° door swing.

LEVEL VI

ACTIVITY SPACE

Sleeping Area:

3'-0" x 7'-0" minimum sleeping area/man lounge chair.

Storage Closet:

5'-0" 1in. ft. (rod) hanging space.

5'-0" 1in. ft. (shelf) space.

Fixed or movable.

Fixture Area - Provide the following:

- Water Closet
- Lavatory
- Bath tub and/or shower
- Towel rod
- Paper Dispenser
- Medicine Cabinet
- Towel Storage

LEVEL IV

FUNCTIONAL GROUP

Roof Ceiling

Sound Transmission Class (STC)
Meet requirement for exterior wall. Ref. Sub-System II.

Impact Sound Pressure Level: Meet recommendation curve of F.H.A. Guide No. 750.

Interior Wall

Sound transmission Class (STC) 42 minimum (without doors) ASTM-E90.

Sound Transmission Class (STC) 24. Minimum for doors.

Luminous Environment:

Exterior Wall

Illuminated Environment

- a. Vision through glazing to be undistorted.
- b. Glass shall pass 56% of visible light, minimum.

Roof Ceiling

Illuminated Environment

- a. Ceiling reflection 70% minimum.

Floor Ceiling

Illuminated Environment

- a. Ceiling Reflectance: Ref. Roof/Ceiling Sub-System II.
- b. Floor Reflectance: 35% minimum.

Interior Wall

Illuminated Environment

- a. Glass Rating: Maximum 20. Gardner 60° Glossmeter.

Safety and Convenience:

Exterior Wall

Fire Safety

Fire Containment: ASTM-E119

- a. Load Bearing: Non-combustible
- b. Non-Load Bearing: Non-combustible

Flame Spread: ASTM-E84

- a. Exterior Surface: 200 Maximum.
- b. Interior Surface: Meet requirements for interior partition.
- c. Insulation: 25 maximum.

Smoke Generation: ASTM STP 442

- a. Exterior Surface: 450 maximum optical density.
- b. Interior Surface: Meet requirements for interior partitions.
- c. Insulation: 50 maximum optical density.

LEVEL V

FUNCTIONAL SPACE

If residence space has two occupants, the lavatory shall be in a separate space allowing for the private use of the water closet and tub or shower.

Relationship:

The bathroom shall be directly accessible to the bedroom and/or living/sleeping area without passing through any habitable area.

Size:

- a. Minimum area 35 square feet.
- b. Minimum ceiling height 7 feet.
- c. Occupancy two (2) minimum.

Mechanical Criteria:

- a. There shall be intermittent mechanical exhaust 200 CFM.

Electrical Criteria:

- a. Provide a duplex outlet above sink counter.

Lighting Criteria:

- a. Provide switched overhead light.
- b. Provide switched overhead infra-red drying lamp.

Plumbing Criteria:

- a. Provide mixing valve for shower 140° F. maximum.

HALL/ENTRY AREA

Philosophy:

The hallway and/or entry area shall be a transitioned space between habitable rooms and shall allow for the easy access between these spaces.

Relationship:

The entry area shall be directly accessible the primary required exit and the kitchen and living area.

The hall shall allow access from the bedroom/bath area to the living area and exitway.

LEVEL IV

FUNCTIONAL GROUP

Potential Heat: 8000 VTU for any square foot of wall section. ASTM proceedings 61.

Transmission of fire and smoke from one floor to another to be prevented.

Roof/Ceiling

Fire Safety

Fire Containment: Non-combustible. ASTM-E119.

Flame Spread:

- a. Roofing: Class C or better. ASTM-E108.
- b. Ceiling: 75 maximum. ASTM-E84.
- c. Roof used as walking surface: 75 maximum. ASTM-E84.
- d. Insulation: 25 maximum. ASTM-E84.

Smoke Generation: ASTM STP 422.

- a. Ceiling: Maximum optical density 150.
- b. Insulation: Maximum optical density 50.

Potential Heat: 5,000 BTU maximum for any square foot of roof ceiling section. ASTM Proceedings 61.

Floor/Ceiling

Fire Safety

Fire Containment: Non-combustible ASTM-E119.

Flame Spread: ASTM-E84.

- a. Floor Covering: 200 Maximum.
- b. Ceilings: Match requirement for roof/ceiling Ref. Sub-System III.
- c. Insulation: Match requirement for roof/ceiling. Ref. Sub-System III.

Smoke Generation: ASTM STP422

- a. Floor Covering: Maximum optical density 450.
- b. Ceiling: Match requirement for roof/ceiling. Ref. Sub-System III.
- c. Insulation: Match requirement for roof/ceiling. Ref. Sub-System III.

Potential Heat: 5,000 BTU maximum for any square foot of floor/ceiling section. ASTM Proceedings 61.

Interior Wall

Fire Safety

Fire Containment. ASTM E-119.
a. Load Bearings: Non-combustible.

LEVEL V

FUNCTIONAL SPACE

Size:

- a. Minimum width 3 feet.
- b. Minimum ceiling height 7 feet.

Electrical Criteria:

- a. Provide duplex outlet for cleaning.

Lighting Criteria:

- a. Provide switched overhead lighting fixture if size of space requires one.

LEVEL VI

ACTIVITY SPACE

CERL DISTRIBUTION:

Chief of Engineers
ATTN: DAEN-ASI-L (2)
ATTN: DAEN-FEE-A
ATTN: DAEN-FEM
ATTN: DAEN-FEP
ATTN: DAEN-FESA
ATTN: DAEN-FEZ-A
ATTN: DAEN-MCZ-S
ATTN: DAEN-RDL
ATTN: DAEN-MCE-A
Dept of the Army
WASH DC 20314

Defense Documentation Center
ATTN: TCA (12)
Cameron Station
Alexandria, VA 22314

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