



**US Army Corps  
of Engineers®**  
Engineer Research and  
Development Center

**ERDC/CERL SR-04-17**

**Construction Engineering  
Research Laboratory**

## **Gross Buildable Acres and Facility Conversion**

Richard L. Schneider

July 2004



# **Gross Buildable Acres and Facility Conversion**

Richard L. Schneider

*Construction Engineering Research Laboratory  
PO Box 9005  
Champaign, IL 61826-9005*

## **Final Report**

Further distribution only as directed by the TABS Office or higher authority; 30 July 2004.

Prepared for     U.S. Army Corps of Engineers  
                         Washington, DC 20314-1000

Under             Work Unit #962LBV

**ABSTRACT:** The Army Basing Study (TABS) Group asked the U.S. Army Corps of Engineers (USACE) to look at buildable acres and MILCON requirements and identify any references/rules to help better determine stationing possibilities with buildable acres. The intent of this work is to assist a TABS analyst in assessing whether buildable acres can handle a mission expansion.

**DISCLAIMER:** The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products. All product names and trademarks cited are the property of their respective owners. The findings of this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.  
**DESTROY THIS REPORT WHEN IT IS NO LONGER NEEDED. DO NOT RETURN IT TO THE ORIGINATOR.**

# Contents

List of Figure and Tables .....	v
Conversion Factors .....	vi
Preface.....	vii
<b>1 Introduction .....</b>	<b>1</b>
Background.....	1
Objectives .....	1
Approach .....	1
Technology Transfer .....	2
<b>2 Buildable Acreage Assessment.....</b>	<b>3</b>
Unit Configurations .....	3
Unit/LUC Acreage Footprints .....	5
Facility Requirements .....	7
Land-Use Compatibility.....	10
Buildable Acreage Capacity Assessment .....	12
<i>Step 1—Stationing Action Determination .....</i>	<i>12</i>
<i>Step 2—Stationing Action Footprint .....</i>	<i>13</i>
<i>Step 3—Installation Capability Determination.....</i>	<i>14</i>
<i>Step 3.1—Screen for Sufficient Total Capacity .....</i>	<i>14</i>
<i>Step 3.2—Screen for Sufficient Capacity By LUC .....</i>	<i>14</i>
<i>Step 3.3—Screen for Sufficient Alternative LUC Capacity.....</i>	<i>15</i>
<b>3 Facility Conversion Assessment.....</b>	<b>16</b>
Facility Conversion and Master Planning .....	16
Master Planning Process and Conversion Potential .....	16
Conversion Costs .....	17
<b>Bibliography .....</b>	<b>19</b>
<b>Appendix A: DA Facilities Standardization Program Footprint Facilities.....</b>	<b>22</b>
<b>Appendix B: Master Planning Land Use Categories and TABS Data Call Land Use     Types .....</b>	<b>24</b>
<b>Appendix C: Buildable Acres .....</b>	<b>26</b>

**Appendix D: Unit Footprint Facility Requirements and Potential FCGs/FCCs for Conversion ..... 30**

**Appendix E: TABS Land Use Compatibility Matrix ..... 36**

# List of Figure and Tables

## Figure

C1	Sample buildable acres score .....	29
----	------------------------------------	----

## Tables

2.1	Sample unit configurations and gross requirements for Brigade (UA)—Light .....	3
2.2	Sample unit configurations and gross requirements for Brigade (UA)—Heavy.....	3
2.3	Sample unit configurations and gross requirements for Schools—Small .....	4
2.4	Sample unit configurations and gross requirements for Schools—Large.....	4
2.5	Sample unit configurations and gross requirements for Admin Organization— Small .....	4
2.6	Sample unit configurations and gross requirements for Admin Organization— Large .....	4
2.7	Sample unit configurations and gross requirements for Depot Maintenance .....	5
2.8	Sample unit configurations and gross requirements for Industrial.....	5
2.9	Sample unit configurations and gross requirements for Supply and Storage.....	5
2.10	Unit footprints in acres by LUC—Brigade, Light .....	6
2.11	Unit footprints in acres by LUC—School, Small.....	6
2.12	Unit footprints in acres by LUC—Administrative Organization, Small .....	6
2.13	Unit footprints in acres by LUC—Depot .....	6
2.14	Unit footprints in acres by LUC—Industrial .....	6
2.15	Unit footprints in acres by LUC—Supply and Storage .....	6

## Conversion Factors

Non-SI\* units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
acres	4,046.873	square meters
cubic feet	0.02831685	cubic meters
cubic inches	0.00001638706	cubic meters
degrees (angle)	0.01745329	radians
degrees Fahrenheit	$(5/9) \times (^{\circ}\text{F} - 32)$	degrees Celsius
degrees Fahrenheit	$(5/9) \times (^{\circ}\text{F} - 32) + 273.15$	kelvins
feet	0.3048	meters
gallons (U.S. liquid)	0.003785412	cubic meters
horsepower (550 ft-lb force per second)	745.6999	watts
inches	0.0254	meters
kips per square foot	47.88026	kilopascals
kips per square inch	6.894757	megapascals
miles (U.S. statute)	1.609347	kilometers
pounds (force)	4.448222	newtons
pounds (force) per square inch	0.006894757	megapascals
pounds (mass)	0.4535924	kilograms
square feet	0.09290304	square meters
square miles	2,589,998	square meters
tons (force)	8,896.443	newtons
tons (2,000 pounds, mass)	907.1847	kilograms
yards	0.9144	meters

---

\* *Système International d'Unités* ("International System of Measurement"), commonly known as the "metric system."

## Preface

This study was conducted for the Army Basing Study (TABS) Group under Reimbursable Project No. CFM-G364, Work Unit No. 962LBV, “General COG Technical Support for BRAC 2005 Analysis.” Technical oversight was provided by COL William Tarantino, SAIE-IA.

The work was performed by the Engineering Processes Branch (CF-N) of the Facilities Division (CF), Construction Engineering Research Laboratory (CERL). The Principal Investigator (PI) was Richard L. Schneider. Mr. William Goran serves as the Program Manager for ERDC support of the Army Basing Study. Martin J. Savoie is Chief, CEERD-CF-M, and L. Michael Golish is Operations Chief, CEERD-CF. The Director of CERL is Dr. Alan W. Moore.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC is COL James R. Rowan, and the Director of ERDC is Dr. James R. Houston.



# 1 Introduction

## Background

The Army Basing Study (TABS) Group asked the U.S. Army Corps of Engineers (USACE) to look at buildable acres and MILCON requirements and identify any references/rules to help better determine stationing possibilities with buildable acres. The intent of this work is to assist a TABS analyst in assessing whether buildable acres can handle a mission expansion.

## Objectives

The primary objective of this work was to develop a quick and simple process for the determination of the rough capability for an installation to receive new missions/units with an acceptable level of accuracy, to support TABS analyst initial installation expansion capacity assessments. Where indicated by this preliminary assessment, further investigation will be necessary at the installation level. The “rough” estimate should include an outline of the process, information needed for determination of installation excess capacity, analyses to be accomplished, basic planning factors to be utilized, and references/resources for back-up.

## Approach

- Background data gathering / review:
  - installation real property master planning regulations and guidance documents
  - real estate regulations and guidance documents
  - facilities standards
  - installation data types / availability
  - standard / future proposed unit configurations & facilities requirements
  - planning tools, applications and resources
- Establish /obtain unit configurations
  - sample unit configurations
  - representative facility requirements for sample units (direct and indirect)
  - establish footprint requirements for sample units” / facilities
- Establish buildable area assessment process to address:

- unit configurations and facilities requirements
- unit configuration footprints total acreage and acreage by land use
- unit moves
- capacity assessment
- Establish facility conversion factors:
  - establish conversion potential for required facilities (for unit configurations)
  - establish rough process for conversion cost estimation.

## Technology Transfer

A report will be provided to the Army Basing Study (TABS) Group on Gross Buildable Acres and Facility Conversion. The report will be backed up with a Microsoft® Excel® workbook containing worksheet tabs for:

1. *Organizational Footprints* for stationing action is gross acres
2. *Space Requirements* tables showing the derivation of stationing action footprints
3. worksheet tabs by facility type detailing calculations for key facilities
4. industrial installations and facilities data
5. Conversion Land Use Codes (LUCs), Facility Category Groups (FCGs), and Facility Category Codes (FCCs) presenting appropriate alternative FCGs and FCCs for conversion
6. a Land Use Compatibility Matrix.

Draft slides for training presentations will also be provided.

## 2 Buildable Acreage Assessment

### Unit Configurations

Sample unit configurations were determined by the TABS office, and gross requirements provided: Brigade (UA) (Light & Heavy), Schools (Small & Large), and Admin Organization/Operations (Small & Large). [No sample unit configurations were provided for Depot Maintenance (Small, Medium & Large), Industrial (Small, Medium & Large), and Supply and Storage (S&S) (Small, Medium & Large), rather, footprints for these configurations were derived from data representing facility inventories for industrial type category codes at industrial type installations extracted from Headquarters Executive Information System (HQEIS) and maintenance and supply and storage facility standards].

**Table 2.1. Sample unit configurations and gross requirements for Brigade (UA)—Light.**

SRC	ALO	UA Population 3,311	Facility		UM
06365F000	1	155MM SP Bn Force XXI	HQ & Admin	346,000	SF
07245F100	1	Inf Bn Mech (FXXI)	Org Classroom	23,000	SF
11103F300	1	Initial Bde Sig Co	Avn Maint	26,000	SF
17285F000	2	Div Cav Sqdn (XXI)	Veh Maint	203,000	SF
17375F100	1	Armor Bn (FXXI)	Hardstand	185,000	SY
34393A100	1	MI Co, Sep Bde	Dining Facilities	30,000	SF
63115F600	3	FSB (1x2) FXXI (Pure)	Barracks	1,298	SP
87042F100	1	HHC Armor Bde (XXI)	Fitness Facilities	65,000	SF
			Child Dev Ctrs	30,000	SF
			Chapels	28,000	SF

**Table 2.2. Sample unit configurations and gross requirements for Brigade (UA)—Heavy.**

SRC	ALO	UA Population 3,971	Facility		UM
06365F000	1	155MM SP Bn Force XXI	HQ & Admin	404,000	SF
06367F000	1	155SP Btry, 1x6 Force XXI	Org Classroom	28,000	SF
07245F100	1	Inf Bn Mech (FXXI)	Avn Maint	26,000	SF
07245F100	1	Inf Bn Mech (FXXI)	Veh Maint	211,000	SF
11103F300	1	Initial Bde Sig Co	Hardstand	205,000	SY
17285F000	2	Div Cav Sqdn (XXI)	Dining Facilities	1,574	SP
17375F100	1	Armor Bn (FXXI)	Barracks	1,574	SP
34393A100	1	MI Co, Sep Bde	Fitness Facilities	65,000	SF
63115F600	3	FSB (1x2) FXXI (Pure)	Child Dev Ctrs	32,000	SF
87042F100	1	HHC Armor Bde (XXI)	Chapels	29,000	SF

**Table 2.3. Sample unit configurations and gross requirements for Schools—Small.**

SRC		Facility		UM
I685/Y	Students-NCO Academy Ft Campbell	Gen Instr Bldg	17,000	SF
W3Y8AA	NCO Acad Ft Campbell	HQ & Admin	9,000	SF
		Barracks- perm	8	SP
		Barracks-student	160	SP
		Dining Facilities	168	SP
		Fitness Facilities	28,000	SF

**Table 2.4. Sample unit configurations and gross requirements for Schools—Large.**

SRC		Facility		UM
I071/P	Inf School PCS students	Gen Instr Bldg	420,000	SF
I071/Y	Inf School TDY students	Applied Instr Bldgs	188,000	SF
I809/B	Basic Trainee students	HQ & Admin	796,000	SF
I809/R	Reception station students	Veh Maint	18,000	SF
I809/S	OSUT students	Hardstand	35,000	SY
W0U2NA	USA Inf Center & Ft Benning	Barracks- perm	609	SP
W0U2AA	USA Inf Center & Ft Benning	Dining Facilities	609	SP
W2L5AA	USA Inf School (2,357 SP)			
W2L5NA	USA Inf School (11,221 SP)	AIT/BCT Complex: BN Headquarters w/2 Classrooms Co Ops / Barracks Dining	348,485	SF
		Fitness Facilities	151,000	SF
		Child Dev Ctrs	30,000	SF
		Chapels	89,000	SF

**Table 2.5. Sample unit configurations and gross requirements for Admin Organization—Small.**

SRC		Facility		UM
	CAA at Ft Belvoir – 142 PN			
W3WCAA	CAA	Admin	23,000	SF
W3WCNA	CAA			

**Table 2.6. Sample unit configurations and gross requirements for Admin Organization—Large.**

SRC		Facility		UM
	HQ FORSCOM – Fort McPherson – 970 PN			
W3YBAA	HQ USA FORSCOM	Admin	152,000	SF
W3YBNA	HQ USA FORSCOM	Barracks	10	SP
		Fitness Facilities	28,000	SF
		Child Dev Ctrs	8,000	SF
		Chapels	5,000	SF

**Table 2.7. Sample unit configurations and gross requirements for Depot Maintenance.**

		<b>Installation</b>	<b>UM</b>	<b>Facility</b>	<b>UM</b>
Small	<200,000 SF Total Depot Facilities (Ex. Corpus Christi Army Depot)	200,000	SF		
	Small Depot Maintenance Facility			8,000	SF
Medium	~324,000 SF Total Depot Facilities (Ex. Tobyhanna Army Depot)	324,000	SF		
	Medium Depot Maintenance Facility			38,000	SF
Large	>8,850,000 SF Total Depot Facilities (Ex. Hawthorne Army Depot)	8,850,000	SF		
	Large Depot Maintenance Facility			75,000	SF

**Table 2.8. Sample unit configurations and gross requirements for Industrial.**

		<b>Installation</b>	<b>UM</b>	<b>Facility</b>	<b>UM</b>
Small	~1,500,000 SF Total Industrial Facilities, (Ex. Lake City AAP)	1,500,000	SF	NA	NA
Medium	~3,000,000 SF Total Industrial Facilities (Rock Island Arsenal)	3,000,000	SF	NA	NA
Large	>6,000,000 SF Total Industrial Facilities, Ex. (Red River Depot)	6,000,000	SF	NA	NA

**Table 2.9. Sample unit configurations and gross requirements for Supply and Storage.**

		<b>Installation</b>	<b>UM</b>	<b>Facility</b>	<b>UM</b>
Small	Small Storage GP Inst Facility	NA	NA	40,000	SF
Medium	Medium Storage GP Inst Facility	NA	NA	160,000	SF
Large	Large Storage GP Inst Facility	NA	NA	280,000	SF

## Unit/LUC Acreage Footprints

Unit footprints in acres by Land Use Code (LUC) were determined by estimating the footprints for the various facilities types required for each sample unit configuration. Calculations for footprint estimates varied from facility type to facility type based on the data available. Some were “given,” for example, Chapels, as the standard designs for the facilities included actual site plans and site acreage. Others were estimated by various means, drawing from standard designs, design criteria, and existing examples. Acreage requirements determined for each facility type were totaled for each land use and for the total unit as defined:

**Table 2.10. Unit footprints in acres by LUC—Brigade, Light.**

	Footprint Acres	Brigade, Heavy	Footprint Acres
Total	187	Total	214
Administration LUC	72	Administration LUC	85
Industrial / Airfield Operations LUC	54	Barracks LUC	59
Barracks LUC	50	Industrial / Airfield Operations LUC	54
Community LUC	11	Community LUC	16

**Table 2.11. Unit footprints in acres by LUC—School, Small.**

	Footprint Acres	School, Large	Footprint Acres
Total	18	Total	791
Barracks LUC	15	Barracks LUC	645
Administration LUC	3	Administration LUC	128
		Community LUC	11
		Industrial LUC	7

**Table 2.12. Unit footprints in acres by LUC—Administrative Organization, Small.**

	Footprint Acres	Administrative Organization, Large	Footprint Acres
Total	7	Total	43
Administration LUC	7	Administration LUC	33
		Barracks LUC	6
		Community LUC	4

**Table 2.13. Unit footprints in acres by LUC—Depot.**

		Footprint Acres
Small	Industrial LUC	84
Medium	Industrial LUC	64
Large	Industrial LUC	1,361

**Table 2.14. Unit footprints in acres by LUC—Industrial.**

	Industrial	Footprint Acres
Small	Industrial LUC	344
Medium	Industrial LUC	689
Large	Industrial LUC	1,377

**Table 2.15. Unit footprints in acres by LUC—Supply and Storage.**

		Footprint Acres
Small	Storage GP Inst Facility—Industrial LUC	3
Medium	Storage GP Inst Facility—Industrial LUC	9
Large	Storage GP Inst Facility—Industrial LUC	15

## Facility Requirements

### **Footprint Estimation Calculation Logic**

See Unit Footprint Facility Requirements and Potential FCGs/FCCs for Conversion, Appendix D, for a comparison of UA Footprint Facility Types, TABS Data Call Land Use Categories, and Army Master Planning Land Use Categories, Facility Category Groups (FCGs), and Facility Category Codes (FCCs). Facility footprints include all “primary” space requirements (facility footprint, parking, access roads/drives, and Anti Terrorism/Force Protection (AT/FP) setbacks).

### **HQ & Admin**

**(FCCs 14182 Headquarters Building, Brigade & 14183 Headquarters Building, Battalion)**

Footprint calculated based on the Standard Design Configuration of 10,528 SF w/out Troop Aid; Rough approximation of facility footprint based on a rectangular facility, 12.5% greater in footprint area than an “ideal” square; AT/FP set-back of 82 feet/25 Meters for “primary gathering” facility with parking outside AT/FP perimeter, based on an allowance of 60% of assigned personnel.

### **Admin**

**(FCCs 14182 Headquarters Building, Brigade & 14183 Headquarters Building, Battalion)**

Same as HQ & Admin.

### **Org Classroom**

**(FCC 17119 Organizational Classroom)**

Footprint calculated based on the Standard Design Configuration derived from the Standard Design for Battalion HQ with classroom; Rough approximation of facility footprint based on a rectangular facility, 12.5% greater in footprint area than an “ideal” square; AT/FP set-back of 82 feet/25 Meters for “primary gathering” facility with parking outside AT/FP perimeter, based on an allowance of 38% of assigned instructors.

### **Applied Instr Bldgs**

**(FCC 17119 Organizational Classroom)**

Same as Org Classroom

### **Gen Instr Bldg**

**(FCC 17119 Organizational Classroom)**

Same as Org Classroom

### **Veh Maint**

**(FCC 21410 Vehicle Maintenance Shop)**

Footprint calculated based on site dimensions for Tactical Equipment Maintenance Facility (TEMF) Standard Designs using 7,739 SF & 36,370 SF configurations, facility, site, hardstand, apron plus non-organizational vehicle

parking; Used AT/FP 10 meter standoff for “inhabited” facility in controlled perimeter; Assumed that AT/FP standoff distances would be met within measured site area given organizational vehicle parking and facility access aprons w/in existing site areas with appropriate location of hardstands, organizational vehicle parking and aprons; Non-Organizational vehicle parking outside of AT/FP perimeter, based on an allowance of 38% of assigned personnel or largest shift.

### **Avn Maint**

#### **(FCC 21110 Maintenance Hangar, Aircraft)**

Same as Veh Maint in lieu of Aviation Maintenance Facility Standard Designs.

### **Hardstand**

#### **(FCC 85210 Organizational Vehicle Parking, Surfaced)**

Converted given SY area requirements into acres.

### **Dining Facilities**

#### **(FCC 72210 Dining Facility)**

Footprint calculated based on the Dining Facility Standard Designs for 150-250 PN/13,245 SF, 501-800 PN/27,550 SF and 801-1300 PN / 30257 SF facilities; Assumed single story facility; Rough approximation of facility footprint based on a rectangular facility, 12.5% greater in footprint area than an “ideal” square; AT/FP set-back of 82 feet/25 Meters for “primary gathering” facility with parking outside AT/FP perimeter, based on an allowance of 38% of assigned instructors, 38% of Employees + 8% 1 time seating capacity.

### **Barracks**

#### **(FCC 72111 Unaccompanied Personnel Housing, Enlisted)**

Footprint calculated based on Barracks Standard Design Criteria allowance of 36 M<sup>2</sup>/Soldier (this allowance includes barracks common use and service-type facilities such as laundry rooms, lobbies, maid/janitor rooms and linen closets, electrical and communications closets, rest rooms, vending areas, etc., for a “high rise” configuration). Assumed a 300 PN Capacity 3-story barracks; Rough approximation of facility footprint based on a rectangular facility, 12.5% greater in footprint area than an “ideal” square; AT/FP set-back of 82 feet/25 Meters for “primary gathering” facility with parking outside AT/FP perimeter, based on an allowance of 70% of maximum utilization (Barracks are usually planned by complex to include Battalion Headquarters, Company Operations, Dining and Non-Organizational Vehicle Parking; Parking is “shared” between these facilities, with stalls dependant on location; authorizations increase for UOPH/unaccompanied Officer Personnel Housing to 100% and decrease for trainee barracks to 10% parking for the entire complex.

### **Barracks- Perm**

#### **(FCC 72111 Unaccompanied Personnel Housing, Enlisted)**

Same as Barracks.

### **Barracks-Student**

#### **(FCC 72181 Basic Training Barracks Facilities)**

Standard design currently in development is for a 3-Story Combat Trainee (BCT) / One Station Unit Trainee (OSUT) Barracks; Facilities are to be planned/sited by complex; The complex includes five Combined Company Operations Facilities (COF) / Trainee Barracks Facilities, one Battalion Headquarters Facility and One Dining Facility, with an on site running track & PT areas; The draft standard is for a site area of 20 to 35 acres, depending on the site configuration; maximum of 35 acres assumed for planning purposes/development of foot-print; the site area includes 162 shared parking spaces and all AT/FP setbacks.

### **Barracks-BT**

#### **(FCC 72181 Basic Training Barracks Facilities)**

Same as Barracks-Student

### **Fitness Facilities**

#### **(FCC 74028 Fitness Facilities)**

Footprint calculated based on the Physical Fitness Facilities (PFF) Standard Designs for X-Small (27,771 SF) and Medium (64,799 SF) Facilities; Current standards are criteria based without site area sizes; evaluated old standards which contained site areas; revised site areas to allow AT/FP set back; AT/FP set-back of 82 feet/25 Meters for "primary gathering" facility with parking outside AT/FP perimeter, based on an allowance of 60% of maximum capacity; then derived a building footprint multiplier (ratio of facility gross area to site gross area) assuming similar facility functionality; and extrapolated new multipliers from those calculated for old standards.

### **Child Dev Ctrs**

#### **(FCC 74014 Child Development Centers)**

Footprint calculated based on the Child Development Centers (CDC) Facilities (PFF) Standard Designs for 99 Child (8,230 SF) and 198 Child (15,400 SF) Facilities; Current standards are definitive, but not current to AT/FP requirements; evaluated old standards which contained site areas; revised site areas to allow AT/FP set back; AT/FP set-back of 82 feet/25 Meters for "primary gathering" facility with parking outside AT/FP perimeter, based on an allowance of 1 Stall/4 children & 100% of Staff; assumed all outdoor play areas to be considered "primary gathering" spaces for estimation of AT/FP setback; then derived a building footprint multiplier (ratio of facility gross area to site gross area).

### **Chapels**

#### **(FCC 73017 Chapel)**

Obtained site area requirements from the Corps of Engineers Center of Expertise for Chapels from current standard designs; standards have been recently updated and include AT/FP setbacks.

### **Industrial**

#### **(FCGs F22400 Tank/Automotive Production Facilities & F22600 Ammunition Production Facilities)**

The commercial industrial site planning convention is that 50 acres is the minimum practical size for an industrial site. Many companies consider the minimum site size to be 10 square feet of land for each square foot of building area. This rule of thumb is recommended for planning purposes in concert with the typical installation footprints determined from a review of Army industrial sites. It is a conservative estimate when compared with the facility footprint multipliers calculated for other facility types which ranged from a high of 19.4 X for child care centers with large outdoor play area and AT/FP setbacks and a low of 4.2 X for fitness centers. Footprints were estimated in acres for small, medium and large facilities installations, not UAs.

### **Depot Maintenance**

#### **(FCGs F21440 Depot Maintenance/Rebuild Shops, F21500 Depot Weapons Maintenance Shops, F21600 Depot Ammunition Maintenance Facilities & F21700 Communications /Electronics Repair Shops, Depot)**

Depot maintenance and installation maintenance facilities can be considered the same for planning purposes. Depot facilities are larger in that they perform consolidated maintenance functions, at depot installations. Site footprint requirements are recommended to be calculated on the basis of the facility requirements for the unit moves using foot print multipliers for the TEMF facilities [Site area in SF = 18.4 X Bldg. Area in SF for a small facility, ~8,000 SF; 8.7 X for a medium sized facility, ~38,000 SF ; and 6.7 X for a large facility, ~75,000 SF]. The larger the facility, the more efficient the utilization of site area is. For facilities larger than 7fK SF, the maximum size standard design, the multiplier may be extrapolated. As for the TEMF footprints, these areas include facility, site, hardstand, apron, non-organizational vehicle parking and AT/FP 10 meter standoff for "inhabited" facility in controlled perimeter. Footprints were estimated in acres for small, medium and large facilities, and small, medium and large installations, not UAs.

### **General Purpose Warehouse**

#### **(FCC 44220 General Purpose Storage Building, Installation)**

Footprint calculated based on old standards, facilities incrementally sized in bay-widths, from 200 X 200 ft or 40,000 SF up to 200 X 1400 ft or 280,000 SF; Selected small, medium and large facility and established footprint based on loading dock access on both sides of a facility. Footprints developed for sample facility sizes, not UAs.

## **Land-Use Compatibility**

Unit Facility Types were matched to acceptable land uses of "primary," "secondary" and "alternative" using the land definitions of the TABS data call. While there is not a 1:1 correspondence between defined Army master planning and TABS data

call land use categories, in definition or nomenclature, there is a match for the land uses needed for unit footprints. For the comparison, see Appendix B. It should be noted that there is no Army master planning land use equivalent for the data call “Waterfront Operations” land use, however, there are no unit footprint facilities required in this data call land use. Similarly, there is a distinct difference between the Army master planning “Open Space” and the data call “Undetermined Use” land uses. In the master planning sense, “open space” is preserved as open space for aesthetic, quality of life, and “buffer” purposes.

Develop a simple and quick process for the determination of the rough capability for an installation to receive new missions/units with an acceptable level of accuracy, to support TABS analyst initial installation expansion capacity assessments.

For the purposes of TABS analysis, some LUCs have been combined into a single LUC where similar or compatible land. This will add a more rapid determination of installation expansion capability. This is done with the caveat, however, that installation land uses are determined based on local facilities and land use compatibilities, functional relationships, land constraints, transportation and utilities networks, etc. Actual capabilities and conversion potential can only be determined on the site. With exceptions, most can be converted to another land use, but based on site-specific adjacencies and constraints than on current designations. While “Airfield Operations” might be rolled into the “Industrial” LUC, as the predominant facility type is a maintenance or storage type facility, albeit for aircraft, it may ultimately be more feasible to convert other land uses to “Industrial” based on location and adjacencies. For the purposes of these analyses, and the established facilities footprints, only four primary land use codes are required, Administrative, Barracks, Industrial, and Community:

- All training facilities have been grouped under “Barracks” land use in lieu of being classified as “Training Area/Ranges.” The predominant requirement for these facilities are at training installations. In addition, the facility standards used to develop the UA footprints were predominantly Battalion Headquarters facilities with training classrooms located in “Barracks” LUC. Stand alone General Instruction Buildings are a secondary requirement and could be alternatively located in “Barracks,” “Administrative” or “Training Area/Ranges” land uses;
- All airfield facilities have been grouped under “Industrial” land use in lieu of being classified as “Airfield Operations.” Airfield facilities are predominantly maintenance or storage facilities, albeit, located adjacent to airfields;
- While there are no medical facilities requirements in defined footprints, “Medical” LUC and “Community” LUCs are to be considered together in determination of “Community” LUC residual capacity. These facilities and land uses are similar in function and generally centrally located on the installa-

tion for ease in serving the entire installation. Similarly, “Administrative” requirements may be met by “Medical” LUC.

- See Appendix E, for a complete Land-Use Compatibility Matrix. This matrix is based on the Army [Master Planning Instructions \(MPI\)](#), 9 July 1993, however, it uses the defined TABS LUCs (Appendix B). Alternative Land Uses for TABS requirements are as follows in order of preference (other compatibilities are identified at Appendix E, however, discounted given conflicting requirements, ex. Barracks LUC is an alternative LUC for Administrative, however, Barracks is the predominant LUC required) :
  - Administrative—Undetermined, Community, Medical, and Outdoor Recreation.
  - Barracks—Undetermined, Community, Medical, and Outdoor Recreation.
  - Industrial—Undetermined, Airfield Operations, and Waterfront.Q30: Engineering => Buildable Acres
  - Community—Undetermined, Medical, and Outdoor Recreation.

## Buildable Acreage Capacity Assessment

The building acreage capacity assessment is a simple iterative process which first establishes the Unit of Action for a given scenario, the gross facility footprint required for that unit of action, in total and by LUC, and a determination of an installations capability to receive the unit of action.

### ***Step 1—Stationing Action Determination***

All capacity assessment will be based on the facility requirements and gross acreage needed for a given stationing action. That action will either be made up of the actual sample unit, be a grouping of actual sample unit(s) or where the stationing action varies from the set examples, a modified stationing action will be established for the purpose of determining the gross acreage required [Sample unit configurations and footprints are provided in Tables 2.1-2.9 above, and on the [TABS Buildable Acres Analysis 040519.xls](#) spreadsheet, “Organizational Footprints” Tab].

### Establish Stationing Action Units

- List all stationing action units in the scenario by types, number, and size;
  - Brigade (Light, Heavy)
  - School (Large, Small)
  - Administrative Organization (Large, Small)
  - Industrial (Large, Medium, Small)
  - Depot (Large, Medium, Small)
  - Supply & Storage (Large, Medium, Small)

- Determine match or variance of the stationing action units from the sample units [tables 2.1-2.9, and TABS spreadsheet]
  - Calculate the % variance of each stationing action unit in strength from the size of the sample unit, plus or minus;

### **Step 2—Stationing Action Footprint**

Once the stationing scenario has been established, the gross facility footprint can be calculated for that stationing scenario. The gross facility footprint is simply a sum of the footprints for all the units it contains as a total of all LUCs and by LUC. These gross facility footprints are either taken directly from the Unit/LUC Acreage Footprints (Tables 2.10-2.15 above, and *TABS Buildable Acres Analysis 040519.xls* spreadsheet, “Organizational Footprints” Tab) where there is a 1:1 match with sample units or derived from them when the actual units in the scenario vary from the sample units.

- Determine stationing action gross facility footprint for the defined stationing scenario of step one:
  - Determine the gross facility footprint in acres for each scenario unit [Tables 2.10-2.15, and TABS spreadsheet];
    - \* Where there is a 1:1 match between the sample units and the stationing action units, use the gross facility footprint in acres for the sample units;
    - \* Where actual scenario units vary from the sample units [Tables 2.1-2.9, and TABS spreadsheet] the gross facility footprint for that unit must be increased or decreased by the percent variance determined in step one above for that unit (by total and LUC). For example, if the stationing action has an Administrative Unit similar in staffing size but 15% larger than the staffing of the sample Small Administrative Unit [Table 2.5] the gross facility footprint for the sample unit would be increased by 15% to arrive at the required gross footprint in acres for that unit.\*\*
- Sum up all the gross facility footprints in acres for all units in the defined stationing scenario (by total and LUC).

\*\* It is understood that this process departs from the means by which the sample footprints were established. Footprints for the units were established in part on the basis of incremental sizes of standard facilities. This is particularly true for dining facilities and physical fitness centers, which are sized in increments according to the population served. This process will not result in a detailed estimate of the required acreage, however, it is considered to be accurate enough for gross planning purposes.

### ***Step 3—Installation Capability Determination***

Once the Unit of Action footprint is determined, the next step is to compare the UA area requirement in acres with the available unconstrained buildable acreage at each installation. A spreadsheet has been prepared compiling the results of Data Call Question 30 [*Q30 Q198 – Buildable Acres.040510.xls*], listing the “Buildable Acres” in total for the entire installation, and by the eleven TABS data call land uses (Appendix B). A more complete definition of “Buildable Acres “ may be found in Appendix C or in the Buildable Acres Spreadsheet; however, a brief definition follows:

Buildable acres are land acres(s) that are not already being used and are available to support new construction. A buildable acre must be free of environmental constraints to its use, e.g., historical use restrictions, contamination, wetlands, incompatible encroachment, and man-made constraints such as ESQD arcs, airfield safety zones, AT/FP setbacks, etc.

The screening process will first look at the installation level to determine if all moves are possible, then it will screen at the land use level and finally, where there is insufficient capacity at the land use level, alternative land uses will be considered in determination of excess capacity.

#### ***Step 3.1—Screen for Sufficient Total Capacity***

Installation unconstrained buildable acreage contained in the Q30 spreadsheet can be sorted in multiple ways to support capacity assessment, but the first sort must be by total unconstrained buildable acreage. All installations falling below sufficient capacity to accommodate the total minimum UA scenario acreage requirement may be deleted from further consideration. Unit footprints are then compared with the total unconstrained buildable acreage. All installations with equal to or greater capacity pass the screening for further consideration.

#### ***Step 3.2—Screen for Sufficient Capacity By LUC***

Further sorts may be accomplished by LUC as needed to determine candidates and ranking for UA moves by primary and secondary LUC requirements. For example, predominant requirement for sample UAs is Barracks LUC, and the second is for Administrative LUC. Sorting on unconstrained buildable acreage for these LUCs immediately displays installations with sufficient overall capacities by LUC. All installations with capacities equal to or in excess of requirements by land use receive further consideration. In addition they may be ranked by capacity in excess of requirements by LUC. These installations then need no further scrutiny.

### ***Step 3.3—Screen for Sufficient Alternative LUC Capacity***

Where Total Capacity is Sufficient, but One or More LUC Capacities is Insufficient, further evaluation of installation capacity is needed. For each LUC where capacity is insufficient, it will be necessary to evaluate the capacities in alternative LUCs to determine the feasibility of a unit move. Alternatives for each land use should be evaluated as follows in order of priority (See also Appendix E, and *TABS Buildable Acres Analysis 040519.xls* spreadsheet, “LU Compatibility Tab”):

Administrative—Requirements may be met by any of “Undetermined,” “Community,” “Medical,” or “Outdoor Recreation” land uses. Barracks LUC is also an alternative, however, this LUC should only be considered last since, UA footprint Barracks and Administrative requirements are predominant and of equal importance.

Barracks—Undetermined, Community, Medical, or Outdoor Recreation. Administrative LUC is also an alternative, however, this LUC should only be considered last since, UA footprint Barracks and Administrative requirements are predominant and of equal importance.

Industrial—Undetermined, Airfield Operations, or Waterfront.

Community—Undetermined, Medical, and Outdoor Recreation.

## 3 Facility Conversion Assessment

### Facility Conversion and Master Planning

A principle tenet of the Army master planning real property investment strategy is to maximize facilities utilization. The principle, which strives to achieve the best allocation of existing facilities, and infrastructure, is based on “non-structural alternative solutions,” e.g. those that do not require new construction, the foremost being the conversion of existing facilities to meet requirements. New construction represents the “last resort” after alternatives such as reassignment, conversion, rehabilitation, and lease, have been examined. When conversion is planned as an option, planned conversions are contained in the installation Capital Investment Strategy (CIS).

Facility conversions must provide a complete and usable facility sized according to approved space planning criteria, to meet a demonstrated shortfall. Conversions are only permitted when a facility to be converted is determined to be in excess of valid requirements and compatible with the existing or future RPMP and inclusive Land Use Plan. Conversions result in a change of the design use (category code) and documented in the Real Property Inventory (RPI) even if the actual structure is not modified. In general, there are no restrictions on the facility types that may be converted; however, approval authorities vary by facility type. Installation commanders may approve facility conversions from design/current use for any purpose. Complete restrictions and approval authorities are listed in AR 405-70, subparagraph 3-6.d.

### Master Planning Process and Conversion Potential

By definition, facility “conversion” is any change to interior or exterior facility arrangements so that the facility may be used for a new purpose. This includes installed equipment made a part of the existing facility. Conversion is by definition a “construction” activity. Conversion may, however, be simply require reclassification under a new facility category code. Conversion by reclassification versus through major facility reconfiguration or rehabilitation to accommodate new functions is dependant on an ability to match facility functional requirements to an installation’s current facilities portfolio. The basic questions that the planner asks are:

- What are the excess facilities by Facility Category Group (FCG) and Facility Category Code (FCC) in the target Land Use Category (LUC) and site location, ex. Facilities Administrative (FCG F60000), Administrative Building, General Purpose (FCC 61050), and Administrative (LUC)?
- Of those facilities in excess, which in the same FCG are of sufficient capacity to meet requirements?
- Of those not in the same FCG, which have characteristics allowing the least cost conversion to meet new requirements.

In general, the optimum is to select facilities for “conversion” of the same category code (FCC) or from the same or from the same facility category group (FCG). These facilities will share the same overall characteristics and restrict conversion cost to a minimum. In selecting potential facilities for conversion, it will not always be possible to remain within the FCG. If excess facilities are not available in the appropriate FCG, then selection should be made from a “family” of related FCGs with facilities sharing the same general characteristics. Potential FCGs for conversion listed based on shared characteristics, are listed in Appendix D. Lastly, Architect-Engineers like to believe that any facility type may be converted to another facility type, and depending on the function, that may be true, however, the limiting factor will be the cost for conversion.

## Conversion Costs

Facility conversions are treated as “maintenance and repair” projects and the maximum cost is governed by regulatory limit. A comparison must be made between the costs for conversion (total or repair plus alteration cost) with the replacement value for a new facility. Conversion costs may not exceed 50 percent of the replacement value in accordance with AR 420–10. (See DA Pam 420-11, paragraph 3-4).

There are no rules of thumb for estimation rehabilitation-renovation costs. Cost estimates for the purpose of programming military construction projects, more specifically, the estimation of alteration projects, is accomplished using detailed cost estimation procedures on a facility-by-facility and project-by-project basis. The process is detailed in TM-5-800-4, *Programming Cost Estimates For Military Construction*. Alteration projects are basically estimated as a percentage of the cost/SF for the construction of a new facility, taking into account a range of adjustment variables (TM-5-800-4, paragraph 12). Facilities Unit Costs are updated regularly by the Headquarters, U.S. Army Corps of Engineers (Amitava Ghosh, CECW-EI, 202-761-7503 or DSN-763-5545; FAX 202-761-0623; and email: [amitava.ghosh@usace.army.mil](mailto:amitava.ghosh@usace.army.mil)), and published on the PAX System and in EIRS Bulletins (Engineering Improvement Recommendation System).

In selection of potential facilities for conversion in a planning process, it is not possible to evaluate facilities and select them through cost estimation on a case-by-case basis. Assumptions have to be made. Simply, the more a required facility varies from the “design category code” the more costly the conversion cost and the likelihood that the 50% regulatory limit will be exceeded. The “Potential FCGs for conversion” listed in Appendix D, were selected only through review of facility types contained in DA Pam 415-28, based on a presumption of their similarities. Those excluded are assumed to be sufficiently dissimilar such that while conversion may be possible, conversion cost would exceed the 50% regulatory limit.

For the purposes of the TABS screening process, to confirm the above assumptions on cost for conversion, or to consider other excess facilities for conversion, Installation Status Report (ISR) cost data is to be utilized. Simply, conversion cost will be estimated as the cost to “upgrade” a facility from an ISR status as “Red,” to an ISR status of “Green.”

## Bibliography

[Army Regulation \(AR\) 210–20](#), Installations, *Master Planning for Army Installations*, 30 July 1993.

Army Regulation (AR) 210-23, Installations, Master Planning for Army Installations, *Emergency Expansion Capability*, 15 March 1976 (Rescinded).

[Army Regulation \(AR\) 405–45](#), Real Estate, *Real Property Inventory Management*, 30 June 2000.

[Army Regulation \(AR\) 405–70](#), Real Property, *Utilization of Real Property*, 15 September 1993.

[Army Regulation \(AR\) 415-28](#), Construction, *Real Property Category Codes*, 10 October 1996.

[Army Regulation \(AR\) 420–10](#), Facilities Engineering, *Management of Installation Directorates of Public Works*, 15 April 1997.

[Department of the Army Pamphlet \(DA Pam\) 415–3](#), Construction, *Economic Analysis: Description and Methods*, 10 August 1992.

[Department of the Army Pamphlet \(DA Pam\) 415-28](#), Construction, *Guide to Army Real Property Category Codes*, 11 February 2000.

[Department of the Army Pamphlet \(DA Pam\) 420-10](#), Facilities Engineering, *Space Management Guide*, 05 February 1987.

[Department of the Army Pamphlet \(DA Pam\) 420–11](#), Facilities Engineering, *Project Definition and Work Classification*, 07 October 1994.

[Department of the Army Technical Manual \(TM\) 5-800-4](#), *Programming Cost Estimates For Military Construction*, 24 May 1994.

[Master Planning Instructions \(MPI\)](#), 9 July 1993.

Technical Bulletin Engineering (TB ENG), *Installation Expansion Capability Guide*, January 1976 (Rescinded).

[Technical Instructions \(TI\) 800-01](#), *Design Criteria*, 20 July 1998.

[Unified Facilities Criteria \(UFC\) 3-701-03](#), *DoD Facilities Pricing Guide, Version 5*, February 2003.

[Unified Facilities Criteria \(UFC\) 4-010-01](#), *DoD Minimum Antiterrorism Standards for Buildings*, 31 July 2002.

**Standard Design Criteria**, *General Instruction Building*, 31 October 2003, U.S. Army Corps of Engineers (Norfolk District).

*Company Operations Facility Standard Design*, 21 January 2004.

*Brigade and Battalion Headquarters Standard Design*, 11 September 2001.

*Brigade and Battalion Headquarters One Story Battalion Headquarters without Classrooms Standard Design*, 11 September 2001.

*Brigade and Battalion Headquarters One Story Battalion Headquarters with Classrooms Standard Design*, 11 September 2001.

*Brigade and Battalion Headquarters Two Story Battalion Headquarters with Classrooms Standard Design*, 11 September 2001.

*Tactical Equipment Maintenance Facilities (TOE and TDA) Standard Design*, July 1996.

*Enlisted Personnel Dining Facility (150-250) Person Capacity) Standard Definitive Design*, October 2000.

*Enlisted Personnel Dining Facility (251-500) Person Capacity) Standard Definitive Design*, October 2000.

*Enlisted Personnel Dining Facility (501-800) Person Capacity) Standard Definitive Design*, 25 October 1999.

*Enlisted Personnel Dining Facility (801-1300) Person A La Carte) Standard Definitive Design*, 25 October 1999.

**ACSIM/CEMP DAIM-ZA Memorandum**, 01 May 2003, Subject: *Revised Barracks Construction Criteria*.

**VCSA Memorandum**, 11 July 2002, Subject: *New Barracks Construction Criteria*.

[Unified Facilities Criteria \(UFC\) 4-721-11.1](#), *Unaccompanied Enlisted Personnel Housing (UEPH) Complexes*, [Volume I](#)—All Chapters, Appendices A and B, and [Volume 2](#): *Model Request for Proposals*, 26 November 2001.

*U.S. Army Physical Fitness Facilities, Technical Criteria*, October 2003.

*Child Development Center, 60 Children, Standard Design Package*, March 1995.

*Child Development Center, 99 Children, Standard Design Package, March 1995.*

*Child Development Center, 122 Children, Standard Design Package, March 1995.*

*Child Development Center, 145 Children, Standard Design Package, March 1995.*

*Child Development Center, 198 Children, Standard Design Package, March 1995.*

*Child Development Center, 244 Children, Standard Design Package, March 1995.*

*Child Development Center, 303 Children, Standard Design Package, March 1995.*

[FPS \(Facility Planning System\)](#)

[Army Criteria Tracking System \(ACTS\)](#)

[Real Property Planning and Analysis System \(RPLANS\)](#)

[ProjNet](#)

## Appendix A: DA Facilities Standardization Program Footprint Facilities

### Brigade/Battalion Headquarters & Two Story Battalion Headquarters

U.S. Army Engineer District, Sacramento  
ATTN: CESPK-ED-M (Mr. Shig Fujitani), 1325 J Street, Sacramento, CA 95814  
Telephone: 916-5577412  
Email: [Shigeru.Fujitani@spk.usace.army.mil](mailto:Shigeru.Fujitani@spk.usace.army.mil)

### Classroom 21, General Instruction Buildings (GIBs) & Enlisted Personnel Dining Facilities

U.S. Army Engineer District, Norfolk  
ATTN: CENAO-TS-EA/TS-E (Mr. Terry Deglandon/Mr. Pete Reilly), 803 Front Street,  
Norfolk, VA 23510  
Telephone: 757-441-7702/7698  
Email: [Terry.L.Deglandon@nao02.usace.army.mil](mailto:Terry.L.Deglandon@nao02.usace.army.mil)  
Email: [Peter.G.Reilly@nao02.usace.army.mil](mailto:Peter.G.Reilly@nao02.usace.army.mil)

### Tactical Equipment Maintenance Facilities (TEMF), Company Operations Facilities, & Unaccompanied Enlisted Personnel Housing (UEPH)

U.S. Army Engineer District Savannah  
ATTN: CESAS-EN-E (Mr. Tom Brockbank), P.O. Box 889, Savannah, GA 31402  
Telephone: 912-652-5212  
Email: [Thomas.R.Brockbank@sas02.usace.army.mil](mailto:Thomas.R.Brockbank@sas02.usace.army.mil)

### Advanced Individual Training (AIT) Barracks Basic, Combat Trainee (BCT)/One Station Unit Trainee (OSUT) Barracks, Unaccompanied Officer Quarters, and Unaccompanied Officer Quarters, Transient

U.S. Army Engineer District, Tulsa  
ATTN: CESWT-EC-D (Ms. Sandi Egan), 1645 S. 101st East Avenue, Tulsa, OK 74128  
Telephone: 918-669-7033  
Email: [Sandra.Egan@swt02.usace.army.mil](mailto:Sandra.Egan@swt02.usace.army.mil)

### Physical Fitness Facilities (PFF), and Child Development Centers (CDCs)

U.S. Army Engineering and Support Center, Huntsville  
Attn: CEHNC-ED-CS-A (Mr. Jay Clark / Mr. Marcus Searles), P.O. Box 1600, Huntsville,  
AL 35807-4301  
Telephone: 256-895-1673/1672  
Email: [James.T.Clark@hnd01.usace.army.mil](mailto:James.T.Clark@hnd01.usace.army.mil)  
Email: [Marcus.J.Searles@hnd01.usace.army.mil](mailto:Marcus.J.Searles@hnd01.usace.army.mil)

Army Chapels, Chapel Family Life Centers, Religious Education Facilities, and Small Site Chapels  
U.S. Army Engineer District, Omaha  
ATTN: CENWO-ED-DG/PM-M (Mr. Rich Lewis / Mr. Bill Rafferty), 215 North 17th Street,  
Omaha, NE 68102  
Telephone: 402-221-4552/4434  
Email: [Richard.R.Lewis@nwo02.usace.army.mil](mailto:Richard.R.Lewis@nwo02.usace.army.mil)  
Email: [WilliamE.Rafferty@nwo02.usace.army.mil](mailto:WilliamE.Rafferty@nwo02.usace.army.mil)

Central Issue Facility and General Purpose Warehouse  
U.S Army Engineer District, Seattle  
ATTN: CENWS-EC-DB-AS (Mr. John Maciejewski), 4735 E. Marginal Way, Seattle, WA  
98124  
Telephone: 206-764-3444  
Email: [John.J.Maciejewski@nws02.usace.army.mil](mailto:John.J.Maciejewski@nws02.usace.army.mil)

## Appendix B: Master Planning Land Use Categories and TABS Data Call Land Use Types

TAB Data Call	Master Planning Instruction (MPI)
Airfield Operations – includes acreage that is appropriate for airfield pavements and lighting, air operations facilities, and supporting facilities such as aircraft maintenance hangars and shops.	Airfield. Includes landing and takeoff areas, aircraft maintenance areas, airfield operations and training facilities, and navigational and traffic aids.
Industrial – includes acreage that is appropriate for central utility plants, equipment/vehicle maintenance and production, supply and storage, and industrial type RDT&E facilities.	Maintenance. Facilities and shops for maintenance and repair of all types of Army equipment found at three organizational levels
	Industrial. This category includes activities for manufacturing Army equipment and materiel, utility plants and waste disposal facilities.
	Supply/Storage. Depot, terminal, and bulk-type storage for all classes of Army supply.
Administrative – includes acreage that is appropriate for headquarters and general office buildings, classroom training, and laboratories.	Administration. Headquarters and office buildings to accommodate offices, professional and technical activities, records, files and administrative supplies.
Training Area/Ranges – includes acreage that is appropriate for individual and unit training and range facilities, maneuver land, and weapon impact areas. Also includes acreage for RDT&E range operations.	Training/Ranges. Much like any large organization, the Army has academic training programs for entry level and continuing education. Unlike most organizations, the Army requires massive land areas to achieve and maintain soldier and unit proficiency in fire and movement/maneuver. While academic training can be integrated into the land use pattern of the built-up area, fire and maneuver training must occur a significant distance away from other installation and off-post land uses.
Barracks – includes acreage that is appropriate for unaccompanied personnel housing, dining, and associated supporting facilities.	Unaccompanied Personnel Housing (UPH). This category consists of unaccompanied enlisted barracks and officer personnel quarters, and includes dining, administration, supply, outdoor recreation, and community retail and service facilities.
Community – includes acreage appropriate for base supporting organizations such as exchanges, commissaries, security police, education facilities, etc.	Community Facilities. Commercial and service facilities, the same as are associated with towns in the civilian community.
Medical – includes acreage appropriate for medical, hospital and dental clinic uses.	Medical. Facilities providing for both inpatient and outpatient medical and dental care for active duty and retired personnel. This category may include veterinary and Red Cross facilities.
Outdoor Recreation – includes acreage appropriate for outdoor recreation such as ball fields, running tracks, and golf courses.	Outdoor Recreation. Outdoor athletic and recreational facilities of all types and intensities of use are included in this category.

TAB Data Call	Master Planning Instruction (MPI)
Family Housing – includes acreage that is appropriate for family dwellings, dependent schools, and associated supporting facilities.	Family Housing. Facilities to house military families, along with support and recreational facilities.
	Open Space. Safety clearances, security areas, utility easements, water areas, wetlands, conservation areas, forest stands, and grazing areas. The primary facility category groups associated with this land use are 91000 – Land.
Waterfront Operations – includes acreage that is appropriate for pier/wharf operations, ship maintenance or production, and associated supporting facilities.	
Undetermined Use – includes ONLY acreage for which there is no other primary use and for which any use may be appropriate	

## Appendix C: Buildable Acres

As of: 26 Jul 04

1. **DEFINITION:** The gross number of buildable acres on an installation based on eleven different land use categories.
2. **PURPOSE:** Measures the degree of internal expansion available on an installation. This attribute demonstrates the degree to which an installation may expand given current physical, building, and land use constraints.
3. **SOURCE:** Installation Capacity Data Call, DoD Question #30
4. **METHODOLOGY:**
  - a. *Background*
    - i. Buildable acres are land acres that are not already being used and are available to support new construction. A buildable acre must be free of environmental constraints (e.g., historical use restrictions, contamination, wetlands, incompatible encroachment, and man-made constraints such as ESQD arcs, airfield safety zones, AT/FP setbacks, etc.). Any facility to be constructed within buildable acreage must be "land use" compatible with location being considered (e.g., a playground is compatible with a family housing area and a vehicle maintenance facility is compatible with an industrial area).
    - ii. Installations are generally required to have a current master plan/RSIP on hand to guide the orderly growth of the installation. Based on the master plan/RSIP, installations are to provide separate acre totals available for expansion for each of the eleven uses listed below. Each installation will report the total buildable acres by land use, and the number of land parcels. (A parcel has a distinct/contiguous perimeter.)
  - b. *Method*
    - i. Each installation reports their buildable acres available for the following categories of land use.
      - A. Administrative - includes acreage that is appropriate for headquarters and general office buildings, training classrooms, and laboratories.
      - B. Airfield Operations - includes acreage that is appropriate for airfield

pavements and lighting, air operations facilities, and supporting facilities such as aircraft maintenance hangars and shops.

C. Barracks - includes acreage that is appropriate for unaccompanied personnel housing, dining, and associated supporting facilities.

D. Community - includes acreage appropriate for base-supporting organizations such as exchanges, commissaries, security police, education facilities, etc.

E. Family Housing - includes acreage that is appropriate for family dwellings, dependent schools, and associated supporting facilities.

F. Industrial - includes acreage that is appropriate for central utility plants, equipment/vehicle maintenance and production, supply and storage, and industrial type RDT&E facilities.

G. Medical - includes acreage appropriate for medical, hospital, and dental clinic uses.

H. Outdoor Recreation - includes acreage appropriate for outdoor recreation such as ball fields, running tracks, and golf courses.

I. Training Area/Ranges - includes acreage that is appropriate for individual and unit training and range facilities, maneuver land, and weapon-impact areas. Also includes acreage for RDT&E range operations.

J. Waterfront Operations - includes acreage that is appropriate for pier/wharf operations, ship maintenance or production, and associated supporting facilities.

K. Undetermined Use - includes ONLY acreage for which there is no other primary use and for which any use may be appropriate.

- ii. TABS combined the installation's data defined above in 4.b.i, excluding 4.b.i.I. "Training Area/Ranges." Training area and range acres are not used in calculating military value here, as training areas are typically separate and distinct from other areas, and their military value is captured in other attributes. TABS then calculated the military value of buildable acres using the equation in paragraph #8.

## 5. QUESTIONS THAT DEFINE DATA:

- a. Installation Capacity Data Call, DoD Question #30 states: "Complete the following table for all land owned or controlled by the base according to the land uses listed. "Controlled" includes land/property used by DoD under lease, license, permit, etc in excess of 10 years. DO NOT include easements as either owned or controlled. Include the main installation, ranges, auxiliary fields, and all outlying sites. Designate ranges, auxiliary fields, and outlying sites separately by name

and real property nomenclature (as appropriate). List each acre with its primary land use only and do not include any acre in more than one land use. Do not include developed land defined as those areas that are built-up (i.e., it consists of facilities and pavements). Do not include constrained land defined as those areas encompassing wetlands, flood plains, contaminated sites, RCRA/CERCLA contaminate sites, endangered species habitats, ESQD arcs, radiation safety zones, antenna field of view (or line of sight) clear zones, AT/FP setbacks and APZs."

- b. The table referenced in DoD Question #30 contains columns defined by elements A thru K from paragraph #4 above and rows for each named site/real property. The data for this attribute is taken from columns A thru H and J thru K.

**6. REFERENCES:** AR 210-20, Master Planning for Army Installations, dated 30 July 1993.

**7. UNIT OF MEASURE:** Acres

**8. EQUATION:**

$$\text{Gross Buildable Acres (GBA) Score} = A + B + C + D + E + F + G + H + J + K$$

**9. MODEL REQUIREMENTS:**

a. Model Input

- i. MVA calculates the GBA Score, the input data are: A, B, C, D, E, F, G, H, J, K.
- ii. Buildable acres are equally weighted.

b. Value Function

- i. The value function uses a single equation that measures the returns to scale of the attribute's score and returns the value of an installation's facilities. The curvature of the function is determined by TABS and coordinated by U.S. Army Corps of Engineers.
- ii. The Maximum value of 10 will be given to the installation with the highest number of GBA.
- iii. The Minimum value of 0 will be given to the installation with the lowest number of GBA.
- iv. Leases do not receive value for this attribute.

c. Assessment

This value function was assessed using the Midpoint Method, resulting in the curve below.

d. Model Output

- i. The value function provides the military value of the installation with regards to the Gross Buildable Acres score as measured by the number of buildable acres across the land use types described above.
- ii. Scores are normalized on a scale of zero to ten based on the value function.
- iii. This value function shows a concave curve, which equates to increasing returns to scale with diminishing marginal values. When acreage exceeds 2000 buildable acres, the military value tapers off at an increasing rate, as this approximates the ability to station numerous heavy brigades; beyond this point, significant additional constraints will limit the installation's ability to absorb forces.

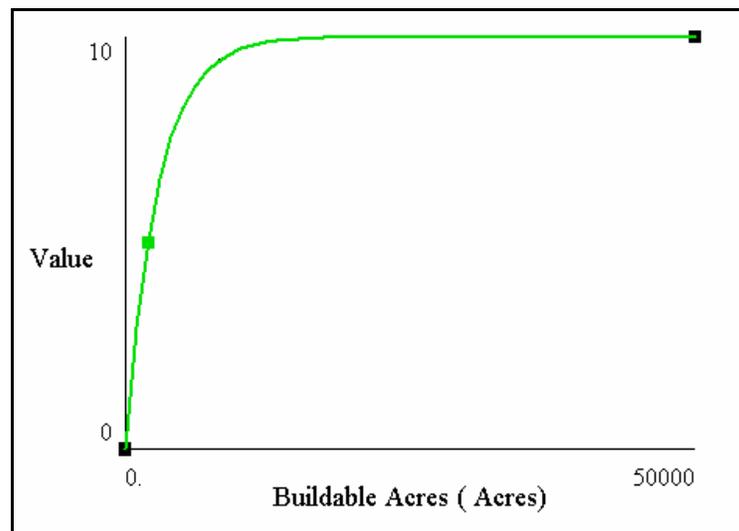


Figure C1. Sample buildable acres score.

## Appendix D: Unit Footprint Facility Requirements and Potential FCGs/FCCs for Conversion

### Notes:

**Stationing Action Required Facility Types**—Facilities required for the sample stationing action;

**Data Call LUC**—Applicable Data Call Land Use Code for the Stationing Action Required Facility Types;

**LUC (Primary, Secondary & Alternative)**—Equivalent MPI (Army Master Planning) Land Use Codes;

14183	BN HQ Bldg
-------	------------

 -- Facility Category Code and Title for sample stationing action facility;

All FCGs and FCCs listed under “Recommended FCGs & FCCs,” are assumed to be convertible at less than 50% of the new construction cost for the required stationing action facility category code given their similarity of characteristics and function, determined solely on the basis of FCG and FCC assignment.

Unit Costs are taken from “Facilities Unit Costs – Military Construction, PAX Newsletter No. 3.2.2 – 09 January 2004. These costs reflect an escalation factor valid to 01 October 2006. Where Unit Costs were not listed in this resource for specific FCCs, they were derived through comparison with unit cost data from Unified Facilities Criteria (UFC) 3-701-03, *DoD Facilities Pricing Guide*, Version 5, February 2003, as noted following:

\$142.00	SF
----------	----

 -- Unit Cost assigned from equivalent FCC established by comparison of UFC FACs and DA Pam FCCs. Example: FCC 61070 = FAC 6100, so the unit cost for FCC 61050 was assigned to FCC 61070;

\$142.00	SF
----------	----

 -- Unit Cost assigned from comparison of FAC Unit Costs. Example: FAC Unit Costs for 6100 and 1431 were equal, so FCC Unit cost of \$142/SF assigned to FCC 15610;

\$142.00	SF
----------	----

 -- FCC Unit Costs estimated based on inflating FAC unit costs by a factor of 5.91%. Percentage inflation based on inflation cost for similar facilities. Facility types evaluated: 21410, 21407, 21910, 21610, 21435 & 21632.

Unit Footprint Facility Requirements and Potential FCGs/FCCs for Conversion										
TABS		Recommended LUCs, FCGs, and FCCs								
Stationing Action Rqd Facility Types	Data Call LUC	Land Use Code (LUC)			Real Property Management, DA PAM 415-28				Unit Cost	
		Primary	Secondary	Alternative	Facility Category Group (FCG)	Facility Category Code (FCC)	\$/UM	UM		
HQ & Admin Admin	Administrative	Administrative			F14182	Headquarters Buildings, Brigade	14182	BDE HQ Bldg	\$160.00	SF
					F14183	Headquarters Buildings, Battalion	14183	BN HQ Bldg	\$153.00	SF
					F14110	Operations Buildings, Airfield	14110	Afld Ops Bldg	\$221.00	SF
					F14112	Aviation Unit Operations Buildings	14112	Avn Unit Ops	\$155.00	SF
					F14114	CIDC Facilities	14114	CIDC Fld Ops Bd	\$146.00	SF
					F14185	Headquarters Buildings, Company	14185	Co HQ Bldg	\$145.00	SF
					F15600	Cargo Handling Buildings	15610	Cargo Handg Fac	\$142.00	SF
					F60000	Administrative Facilities	61050	Admin Gen Purp	\$142.00	SF
							61070	Red Cross Bldg	\$142.00	SF
							61075	Courtroom	\$142.00	SF
		F74033	Community Service Centers	74033	ACS Ctr	\$147.00	SF			
Org Classroom Gen Instr Bldg Applied Instr Bldgs	Barracks Training Area /Ranges	Barracks	Administrative	Training Area /Ranges	F17119	Organizational Classroom	17119	Org Classroom	\$129.00	SF
					F17115	Band Training Facilities	17115	Band Train Bldg	\$129.00	SF
					F17120	General Instruction Buildings	17120	Gen Inst Bldg	\$158.00	SF
					F17131	Compact Item Repair Instructional Facilities	17131	Comp Rep Inst	\$122.00	SF
					F17132	General Item Repair Instructional Facilities	17132	Gen Rep Inst	\$114.00	SF
					F17133	Vehicle Maintenance Instructional Buildings	17133	Veh Maint Inst	\$147.00	SF
					F17134	Aircraft Maintenance Instructional Buildings	17134	Acft Maint Inst	\$200.00	SF
					F17135	Laboratory Instructional Buildings	17135	Lab Inst	\$193.00	SF
					F17136	Automation-Aided Instructional Buildings	17136	Auto-Aid Inst	\$178.00	SF
					F17137	Material Handling Instructional Buildings	17137	Mat Hndl Inst	\$82.00	SF
					F17138	Limited Use Instructional Buildings	17138	Limit Use Inst	\$82.00	SF
					F17140	Training Centers-Reserves	17140	USAR Ctr	\$140.00	SF
					F17142	Training Centers-ARNG/USAR	17142	ARNG/USAR Ctr	\$140.00	SF
					F17180	Training Centers-National Guard	17180	ARNG Armory	\$140.00	SF
Veh Maint	Industrial	Industrial			F21410	Vehicle Maintenance Shops	21410	Veh Maint Shop	\$152.00	SF
							21411	Repair Bays	\$152.00	SF
							21412	Maint Storage	\$152.00	SF
							21414	Gen Item Repair	\$152.00	SF
							21415	Comp Item Rep	\$152.00	SF
							21416	Msl Maint Fac	\$152.00	SF
							21417	Veh Pnt/Prep Sh	\$152.00	SF
					F21110	Aircraft Maintenance Facilities	21110	Ac Maint Hgr	\$172.00	SF
							21114	Ac Maint Bay	\$172.00	SF
							21116	Hgr Shop Space	\$172.00	SF
							21117	Avion Mnt Shp I	\$172.00	SF
							21120	Ac Comp Maint	\$129.00	SF
							21130	Ac Paint Shop	\$237.00	SF
							21140	Ac Eng Tst Fac	\$146.00	SF
					F21407	National Guard Maintenance Facilities	21407	ARNG Veh Maint	\$146.00	SF
					F21409	Army Reserve Maintenance Facilities	21409	USAR Veh Maint	\$146.00	SF
					F21885	Vehicle Maintenance DOL/DPW	21835	Repair Bays DOL	\$120.00	SF
							21855	Veh Pnt/Prp DOL	\$120.00	SF
							21882	Gen Itm Rep DOL	\$120.00	SF
							21885	Mnt Gen Purp	\$120.00	SF
		21887	Com Itm Rep DOL	\$120.00	SF					
F21900	Installation Maintenance/Repair Facilities	21910	Eng/Housing Mnt	\$114.00	SF					
		21925	Engr Maint Fac	\$114.00	SF					
F73010	Fire and Rescue Facilities	73010	Fire Station	\$172.00	SF					

Unit Footprint Facility Requirements and Potential FCGs/FCCs for Conversion										
TABS		Recommended LUCs, FCGs, and FCCs								
Stationing Action Rqd Facility Types	Data Call LUC	Land Use Code (LUC)			Real Property Management, DA PAM 415-28				Unit Cost	
		Primary	Secondary	Alternative	Facility Category Group (FCG)	Facility Category Code (FCC)	\$/UM	UM		
Hardstand	Industrial	Industrial			F85210	Parking-Organizational	85210	Org Park Surf	\$48.00	SY
							85211	Org Park Unsurf	\$7.00	SY
					F85215	Parking-Nonorganizational	85215	Nonorg Pk Surfa	\$48.00	SY
							85216	Nonorg Pk Unsur	\$7.00	SY
					F11310	Parking, Fixed Wing Aircraft	11310	FW Pk Aprn Surf	\$97.00	SY
							11311	FW Pk Aprn Uns	\$7.00	SY
					F11320	Parking, Rotary Wing Aircraft	11320	RW Pk Aprn Surf	\$97.00	SY
							11321	RW Pk Aprn Uns	\$7.00	SY
					F11330	Maintenance Aprons, Aircraft	11330	Ac Mnt Apr Surf	\$97.00	SY
							11331	Ac Mnt Apr Uns	\$7.00	SY
F11340	Access Aprons, Hangar	11340	Hgr Acc Apr Sur	\$97.00	SY					
		11341	Hgr Acc Apr Uns	\$7.00	SY					
F11350	Holding Aprons, Aircraft	11350	Ac Hld Aprn Sur	\$97.00	SY					
		11351	Ac Hld Aprn Uns	\$7.00	SY					
F11370	Wash Aprons, Aircraft	11370	Ac Wsh Aprn Sur	\$97.00	SY					
		11371	Ac Wsh Aprn Uns	\$7.00	SY					
F11380	Loading Aprons, Aircraft	11380	Ac Ld Aprn Surf	\$97.00	SY					
		11383	Ac Ld Aprn Uns	\$7.00	SY					
Avn Maint	Airfield Operations	Industrial			F21110	Aircraft Maintenance Facilities	21110	Ac Maint Hgr	\$172.00	SF
							21114	Ac Maint Bay	\$172.00	SF
							21116	Hgr Shop Space	\$172.00	SF
							21117	Avion Mnt Shp I	\$172.00	SF
							21120	Ac Comp Maint	\$129.00	SF
							21130	Ac Paint Shop	\$237.00	SF
							21140	Ac Eng Tst Fac	\$146.00	SF
Barracks- Perm	Barracks	Barracks	Administrative		F72100	Unaccompanied Personnel Housing, Enlisted Facilities	72111	Enlisted UPH	\$153.00	SF
					F72120	Unaccompanied Personnel Housing, Enlisted Transient	72120	Transient UPH	\$150.00	SF
					F72170	Unaccompanied Personnel Housing, SR NCO Facilities	72170	UPH Sr NCO	\$150.00	SF
					F72400	Unaccompanied Personnel Housing, Officer Facilities	72410	UOQ Military	\$150.00	SF
					F72411	Unaccompanied Personnel Housing, Transient Officer Facilities	72411	UOQ Transient	\$150.00	SF
					F72412	Annual Training Officers Quarters	72412	AT Off Qtrs	\$150.00	SF
					F74032	Guest House Facilities	74032	Guest House	\$143.00	SF
Barracks- Student Barracks-BT	Barracks	Barracks	Administrative		F72181	Basic Training Barracks Facilities	72181	Trainee Bks	\$136.00	SF
					F72114	Annual Training/Mobilization Barracks Facilities	72114	AT Enl Barracks	\$136.00	SF
							72115	Mob Enl Brks	\$136.00	SF
					F72121	Enlisted UPH, Student	72121	Trans UPH AIT	\$153.00	SF
		72122	Trans UPH AST	\$153.00	SF					
Dining Facilities	Barracks	Barracks			F72200	UPH Dining Facilities	72210	Dining Facility	\$248.00	SF
							74046	Consol Open Din	\$231.00	SF
					F74046	Open Dining Facilities	74047	Enl Open Dining	\$231.00	SF
							74048	Off Open Dining	\$231.00	SF
Fitness Facilities	Barracks	Barracks	Community		F74028	Fitness Facilities	74028	Phys Fit Ctr	\$167.00	SF

Unit Footprint Facility Requirements and Potential FCGs/FCCs for Conversion											
TABS		Recommended LUCs, FCGs, and FCCs									
Stationing Action Rqd Facility Types	Data Call LUC	Land Use Code (LUC)			Real Property Management, DA PAM 415-28				Unit Cost		
		Primary	Secondary	Alternative	Facility Category Group (FCG)		Facility Category Code (FCC)		\$/UM	UM	
Chapels	Barracks	Barracks	Community		F73017	Religious Facilities	73017	Chapel	\$174.00	SF	
							73018	Relig Ed Fac	\$142.00	SF	
							73019	Fam Life Ctr	\$142.00	SF	
Child Dev Ctrs	Community	Community			F74014	Child Development Centers	74014	Child Dev Ctr	\$169.00	SF	
General Purpose Warehouse	Industrial	Industrial			F44210	Enclosed Storage, Installation	44220	Storage Gp Inst	\$87.00	SF	
							44271	Hsg Furn Str	\$87.00	SF	
							44288	Inst Str Other	\$87.00	SF	
						F14133	Storage Support Facilities	14133	Ship/Recv Fac	\$87.00	SF
								14140	Care/Pres Shop	\$87.00	SF
								14150	Box/Crate Shop	\$87.00	SF
						F44224	Organizational Storage	44224	Org Str Bldg	\$73.00	SF
								F44228	Hazardous Storage, Installation	44228	Haz Mat Str Ins
						44240	Flam Mat Str In			\$118.00	SF
						44260	Radioact Wh Ins			\$118.00	SF
						F44230	Humidity Controlled Storage, Installation	44230	Cont Hum Wh In	\$81.00	SF
						F21800	DOL/Procured Items & Equipment Maintenance Shops	21840	RR EQ/EN Maint	\$114.00	SF
								21850	Battery Shop	\$114.00	SF
								21872	QA/CAL Gen Purp	\$114.00	SF
								21879	Proc Maint Fac	\$114.00	SF
						F44100	Enclosed Storage, Depot	21881	ABN EQ/Para Rep	\$163.00	SF
44110	Storage Gp Dep	\$87.00	SF								
44182	Veh St Bd Dep	\$87.00	SF								
F44130	Humidity Controlled Storage, Depot	44130	Cont Hum Wh Dep	\$81.00	SF						
F44135	Hazardous Storage, Depot	44135	Haz Mat Str Dep	\$123.00	SF						
		44150	Flam Mat Str D	\$118.00	SF						
		44160	Radioact Wh Dep	\$118.00	SF						

Unit Footprint Facility Requirements and Potential FCGs/FCCs for Conversion												
TABS		Recommended LUCs, FCGs, and FCCs						Unit Cost				
Stationing Action Rqd Facility Types	Data Call LUC	Land Use Code (LUC)			Real Property Management, DA PAM 415-28				\$/UM	UM		
		Primary	Secondary	Alternative	Facility Category Group (FCG)	Facility Category Code (FCC)						
Industrial	Industrial	Industrial				Aircraft Production Facilities	22110	Ac Eng Assem Pt	\$157.00	SF		
							22120	Airframe Assem	\$157.00	SF		
							22122	Actf QA/CAL Fac	\$157.00	SF		
							F22200	Guided Missile Production Facilities	22210	Gm Assem Pt	\$175.00	SF
									22220	Gm Hand/Lch Pt	\$175.00	SF
									22228	Msl QA/CAL Fac	\$175.00	SF
							F22400	Tank/Automotive Production Facilities	22410	Cbt Veh Assem	\$175.00	SF
									22412	Eng Test Fac	\$91.00	SF
									22416	Heat Treat Shop	\$91.00	SF
									22422	Plating Shop	\$91.00	SF
									22430	Machine Shop	\$91.00	SF
									22434	T/A QA/CAL Fac	\$91.00	SF
							F22500	Weapons Production Facilities	22510	Sm Arms Plant	\$91.00	SF
									22520	Light Gun Plant	\$91.00	SF
									22525	Forge Shop	\$91.00	SF
									22530	Heavy Gun Plant	\$91.00	SF
									22532	Foundry	\$91.00	SF
									22535	Welding Shop	\$91.00	SF
									22537	Mach Shop Weap	\$91.00	SF
							F22600	Ammunition Production Facilities	22548	Wpn QA/CAL Prod	\$91.00	SF
									22610	Bag Chg Fil Pt	\$155.00	SF
									22612	Acid Mfg Plant	\$155.00	SF
									22614	Ld Azide Mfg Pt	\$155.00	SF
									22616	Explos Mfg Pt	\$155.00	SF
									22618	Cbr Plant	\$155.00	SF
									22620	Case Ohaul & Tk	\$155.00	SF
									22622	Pyro Production	\$155.00	SF
									22624	Mtl Parts Prod	\$155.00	SF
									22625	Sm Cal Ld <40mm	\$155.00	SF
									22626	Bomb He Fil Pt	\$155.00	SF
									22628	Mtl Parts Ld Pt	\$155.00	SF
									22630	Ld Pt 40-75mm	\$155.00	SF
									22632	Ammo Foundry	\$155.00	SF
22635	Ld Pt 76-120mm	\$155.00	SF									
22638	Ammo Qa/Cal Pro	\$155.00	SF									
22640	Ld Pt >120mm	\$155.00	SF									
22645	Lg Rkt Mtr Ld	\$155.00	SF									
22650	Md Rkt Mtr Ld	\$155.00	SF									
22655	Cast He Fil Pt	\$155.00	SF									
22660	Sp Weap Plant	\$155.00	SF									
22665	Ammo Washout	\$155.00	SF									
22670	Case Fil Plant	\$155.00	SF									
22680	Propellant Pt	\$155.00	SF									
F22800	Miscellaneous Production Facilities	22810	Lth/Tex/Clth Pt	\$162.00	SF							

Unit Footprint Facility Requirements and Potential FCGs/FCCs for Conversion										
TABS		Recommended LUCs, FCGs, and FCCs								
Stationing Action Rqd Facility Types	Data Call LUC	Land Use Code (LUC)			Real Property Management, DA PAM 415-28				Unit Cost	
		Primary	Secondary	Alternative	Facility Category Group (FCG)	Facility Category Code (FCC)	\$/UM	UM		
Depot Maintenance	Industrial	Industrial			F14129	Training Aids Spt Center	14129	Tng Aids Ctr	\$121.00	SF
					F21210	Guided Missile Maintenance Facilities, Depot Level	21210	Gm Mnt Fac Dep	\$163.00	SF
							21220	Gm Lch Eq Dep	\$163.00	SF
					F21440	Depot Maintenance/Rebuild Shops	21435	Maj End Itm Reb	\$152.00	SF
							21440	Comp Reb Dep	\$152.00	SF
							21441	Veh Mnt Fac, Dep	\$152.00	SF
							21445	T/A Pts Str Dep	\$152.00	SF
							21458	Strm Cln Bld Dep	\$152.00	SF
							21462	Strm Cln Fac Dep	\$152.00	SF
							21465	Drum Recon Plt	\$152.00	SF
					F21500	Depot Weapons Maintenance Shops	21510	Sm Arms Rep Dep	\$133.00	SF
							21512	Weap Demil Dep	\$913.00	SF
							21520	Lt Gun Depot	\$133.00	SF
							21522	Wpn Qa/Cal Dep	\$133.00	SF
							21530	Hvy Gun Depot	\$133.00	SF
							21540	Sp Weap Depot	\$204.00	SF
							21545	Wpns Repair fac	\$133.00	SF
					F21600	Depot Ammunition Maintenance Facilities	21610	Ammo Reno Depot	\$134.00	SF
							21612	Ammo Surv Dep	\$151.00	SF
							21620	Rkt Ohaul Depot	\$151.00	SF
							21622	Exp Rec/Ser Dep	\$151.00	SF
							21632	Ammo Demo Fac	\$151.00	SF
							21640	Dun Bldg Depot	\$151.00	SF
							21642	Comp Clean Dep	\$151.00	SF
							21650	Ammo Qa/Cal Dep	\$151.00	SF
					F21700	Communications /Electronics Repair Shops, Depot	21660	Ammo Mnt Fac	\$151.00	SF
							21840	RR EQ/EN Maint	\$151.00	SF
							21850	Battery Shop	\$114.00	SF
							21872	QA/CAL Gen Purp	\$114.00	SF
							21879	Proc Maint Fac	\$114.00	SF
					F21800	DOL/Procured Items & Equipment Maintenance Shops	21881	ABN EQ/Para Rep	\$114.00	SF
							21840	RR EQ/EN Maint	\$114.00	SF
21850	Battery Shop	\$114.00	SF							
21872	QA/CAL Gen Purp	\$114.00	SF							
21879	Proc Maint Fac	\$114.00	SF							
					21881	ABN EQ/Para Rep	\$114.00	SF		

# Appendix E: TABS Land Use Compatibility Matrix

Land uses are listed in order of magnitude required for TABS UA footprints.	TABS LUC	Administrative	Barracks	Community	Medical	Industrial	Airfield Operations	Family Housing	Outdoor Recreation	Training Area/Ranges	Waterfront Operations	Undetermined Use
		Headquarters and general office buildings, classroom training, and laboratories.	Administrative									
Unaccompanied personnel housing, dining, and associated supporting facilities.	Barracks											
Base supporting organizations such as exchanges, commissaries, security police, education facilities, etc.	Community											
Medical, hospital and dental clinic uses.	Medical											
Central utility plants, equipment/vehicle maintenance and production, supply and storage, and industrial type RDT&E facilities.	Industrial											
Airfield pavements and lighting, air operations facilities, and supporting facilities such as aircraft maintenance hangars and shops.	Airfield Operations											
Family dwellings, dependent schools, and associated supporting facilities.	Family Housing											
Outdoor recreation such as ball fields, running tracks, and golf courses.	Outdoor Recreation											
Individual and unit training and range facilities, maneuver land, and weapon impact areas. Also includes acreage for RDT&E range operations.	Training Area/Ranges											
Pier/wharf operations, ship maintenance or production, and associated supporting facilities.	Waterfront Operations											
No other primary use and for which any use may be appropriate	Undetermined Use											

Positive Compatibility Relationship



Neutral Compatibility Relationship



Negative Compatibility Relationship



