

UNIFIED FACILITIES CRITERIA (UFC)

INSTALLATION MASTER PLANNING



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U.S. ARMY CORPS OF ENGINEERS (Preparing Activity)

NAVAL FACILITIES ENGINEERING COMMAND

AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

Record of Changes (changes are indicated by \1\ ... /1/)

Change No.	Date	Location
<u>1</u>	<u>28 Nov 2018</u>	<u>Updated paragraph 3-5.6.2.3 to add National Academies of Sciences as a source.</u>
<u>2</u>	<u>25 Oct 2019</u>	<u>Updated paragraph 1-6 to refer to Appendices C and D.</u> <u>Added paragraph 2-2.17.</u> <u>Updated paragraph 2-5.2.</u> <u>Deleted paragraphs 2-5.2.2, 2-5.2.3, 2-5.2.4 and Table 2-1.</u> <u>Updated paragraph 3-5.4 to read “underlined” in lieu of “italicized” and underlined text in subparagraphs a and b.</u> <u>Corrected grammatical errors in paragraphs 4-4, B-1.5 and Glossary.</u> <u>Updated titles of training classes in Appendix F.</u>

This UFC supersedes UFC 2-000-02AN, dated 1 March 2005.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with [USD \(AT&L\) Memorandum](#) dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA.) Therefore, the acquisition team must ensure compliance with the most stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Center for Engineering and the Environment (AFCEE) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: [Criteria Change Request](#). The form is also accessible from the Internet sites listed below.

UFC are effective upon issuance and are distributed only in electronic media from the following source:

- Whole Building Design Guide web site <http://dod.wbdg.org/>.

Hard copies of UFC printed from electronic media should be checked against the current electronic version prior to use to ensure that they are current.

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FOREWORD (continued)

This specific document is also issued under the authority of DOD Instruction Number 4165.70 (Real Property Management), which establishes the requirement for installation master plans.

This document applies to the Office of the Secretary of Defense (OSD); the Military Departments (including their National Guard and Reserve Components); the Chairman, Joint Chiefs of Staff and Joint Staff; the Combatant Commands; the Office of the Inspector General of the Department of Defense; the Defense Agencies; the Department of Defense Field Activities; and all other organizational entities within the Department of Defense hereafter referred to collectively as “the DOD Components.”

The standards established by this document are minimums set for DOD. Each DOD Component may set more stringent standards to meet the specific needs in its area of responsibility.

Any changes, updates, or amendments to this particular UFC must have the approval of the DoD Engineering Senior Executive Panel (ESEP).

This document is effective immediately and is mandatory for use by all the DOD Components.

UNIFIED FACILITIES CRITERIA (UFC)

DOCUMENT SUMMARY SHEET

Document: UFC 2-100-01

Subject: Installation Master Planning

Superseding: UFC 2-000-02AN, dated 1 March 2005

Document Description and Need for new UFC or Description of Changes for revised UFC: This document is a wholesale change from the previous version, which was based on Technical Manual TM 5-803-1, dated 13 June 1986.

- Purpose: The purpose of this change is to incorporate current approaches to master planning.
- Application: This UFC is applicable to master planning at all military installations.
- Need: This UFC is needed to guide the application of consistent planning processes and the development of consistent planning products across the DOD.
- Reasons for Change of revised UFC: The previous UFC was based on out-dated material from 1986 and did not address the array of issues that face planners today.

Impact: The following direct benefits, both positive and negative, will result from publication of this UFC.

- Initial costs: when applied at DOD installations, initial costs may be lower due to synergies found in the planning process.
- Life cycle cost: effective planning that will result from the implementation of this UFC will reduce energy consumption, reduce paving requirements, and minimize overall lifecycle costs.
- Maintenance: effective application of these strategies will result in reduced maintenance costs associated with low-density auto-orientated development
- Safety: effective application of these strategies will improve pedestrian and vehicular safety.
- Efficiency: effective application of the strategies in this UFC will result in more land, energy, and cost efficient installations. Moreover, the preparation of regulating plans and planning standards is a more efficient approach than constantly updating illustrative plans.
- Force protection: this UFC revision appropriately addresses force protection requirements and will result in enhanced protection of our forces.

Non-Unification Issues

- None. All agencies participated in the development, review, and refinement of this document.

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CHAPTER 1 INTRODUCTION

1-1 BACKGROUND.

The Department of Defense is one of the world's largest builders, owners, and operators of infrastructure, responsible for managing millions of acres of land and billions of dollars' worth of facilities and infrastructure worldwide. Effective long-term development and management of these resources requires thoughtful and thorough master planning. Master planning is a continuous analytical process that involves evaluation of factors affecting the present and future physical development and operation of an installation. This evaluation forms the basis for determination of development objectives and planning proposals to solve current problems and meet future needs. Each step or element of the process builds upon the preceding step, providing a logical framework for the planning effort. For military installations, planning is accomplished primarily at the installation level through a comprehensive and collaborative planning process that results in a Master Plan. This process provides a means for sustainable and energy-efficient installation development that supports mission requirements.

1-2 PURPOSE AND SCOPE.

DOD Instruction 4165.70 (Real Property Management) establishes the requirement for installation master plans. The purpose of this UFC is to prescribe the DOD minimum requirements for master planning processes and products in accordance with the DOD instruction. The process is to use the tool of a Master Plan and its components to provide ongoing master planning of installations in support of the mission. DOD planners will use this UFC, the DODI, and applicable agency instructions to prepare master plans and other planning documents. Affiliated design and programming professionals shall refer to the Master Plan as they prepare site-specific design proposals. By incorporating today's needs and mission requirements into a compelling vision with clear goals and measurable objectives, installation planners can prepare a Master Plan that sustainably accommodates future change. This UFC outlines a total process for master planning (and ultimately the development of a Master Plan) through the preparation of linked plans that can be implemented in total or incrementally based on each service's needs and resources. A successful Master Plan:

- a. Provides timely and correct planning information and real property support for installation missions, and supports informed decision-making.
- b. Promotes cooperative and interactive intra- and inter-service and inter-governmental relationships.
- c. Incorporates infrastructure assurance and anti-terrorism considerations.
- d. Incorporates environmental planning to identify environmental impacts and protect and enhance natural, cultural, and environmental resources while supporting mission requirements.

- e. Supports and encourages sustainable and energy-efficient development.
- f. Provides scope for all programs involving real property acquisition, design, and construction; real property management and operation; real property facility utilization and accounting; real property sustainment (maintenance and repair); and disposal of land and facilities.
- g. Maintains an accurate audit trail of master planning and real property decisions.
- h. Ensures efficient and compatible land use (identifying and respecting natural and man-made constraints) and maximizes facility utilization.
- i. Provides input to the privatization of family housing, utilities, and services.
- j. Sustains ranges and training areas to meet training and testing missions on a consistent and long-term basis.
- k. Identifies resource requirements directly and indirectly associated with real property sustainment and development.
- l. Protects an installation's long-term viability by providing capability for growth, expansion of requirements, and flexible facility and land-use decisions that can accommodate changes to mission and/or users.
- m. Encourages policies and interaction with the local community to avoid encroachment, and maximizes opportunities for joint use, while preserving mission capability and growth potential.
- n. Supports Federal energy mandates
- o. Helps installations create more connected and visually pleasing environments by coordinating development, removing clutter, enforcing consistent architectural themes, creating appropriate pedestrian and vehicle circulation patterns, and focusing attention to installation appearance, which can enhance quality of life and contribute to the overall mission.
- p. Informs and is informed by related plans at each installation, to include energy plans, utility capacity plans, range and training plans, anti-terrorism (AT) plans, integrated cultural and natural resource plans, sustainability plans, and transportation plans.
- q. Supports mitigation of environmental hazards and encroachment as well as effective integration of AICUZ and RAICUZ constraints and mission synergy.

1-3 APPLICABILITY.

This UFC is designed for multi-service use and sets the standards for military installation master plans. The processes, products, tools, and strategies in this UFC apply to the preparation of master plans for all United States Army, Navy, Air Force, and Marine Corps permanent installations and reserve component locations in the United States, its territories, and overseas (see 10 USC 2801 (c)(4) for the definition of a military installation). This UFC does not apply to overseas contingency

operations/areas. This UFC recognizes and respects that the Services' mission requirements will always be the primary planning consideration and that requirements imposed by each service's unique fiscal priorities, budget constraints, strategic lay down, weapons platform acquisition and mission capabilities all combine to guide each service's planning investments (scale, scope and sequencing). Each service is encouraged to seek a balance that meets today's and tomorrow's mission requirements and remain committed to the UFC's strategies to guide and inform installation/Service decision making on future capability, infrastructure footprint and land use patterns. Throughout this document, general planning terms have been used to refer to various planning processes and products. Services may have their own specific names for various products, and they should be used as applicable. Moreover, each Service may have its own processes and procedures that may be used where appropriate, provided that they are consistent with this UFC.

1-4 REFERENCES.

See Appendix A.

1-5 TECHNICAL REQUIREMENTS.

Refer to Chapters 2 (Master Planning Strategies and General Requirements) and 3 (Master Planning Process and Products) for technical information. Supporting information is also located in Appendix B, Best Practices.

1-6 GLOSSARY.

\2\ Appendix C contains a glossary which defines abbreviations, and /2/Appendix D contains a glossary for technical terms \2\ /2/ used throughout this publication.

1-7 PLANNING PRINCIPLES.

Appendix E describes suggested planning principles appropriate for incorporation into installation master plans.

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CHAPTER 2 MASTER PLANNING STRATEGIES AND GENERAL REQUIREMENTS

2-1 INTRODUCTION.

One of the primary purposes of the planning process is to apply comprehensive planning strategies through facility and infrastructure development, to include planning, programming, engineering and design, construction, reuse, real estate actions, public-private ventures, operations and maintenance, and disposal. The following ten strategies support the DOD-wide overarching installation planning philosophy, which is to develop a sustainable platform to support the effective execution of assigned military missions as efficiently as possible.

- a. Sustainable Planning
- b. Natural, Historic and Cultural Resource Management
- c. Healthy Community Planning
- d. Defensible Planning
- e. Capacity Planning
- f. Area Development Planning
- g. Network Planning
- h. Form-Based Planning
- i. Facility Standardization
- j. Plan-Based Programming

2-2 SUSTAINABLE PLANNING.

Sustainable planning leads to “lasting” development – meeting present mission requirements without compromising the ability of future generations to meet their needs. The goal of such development is to make the most effective use of limited resources, reduce fossil fuel use and increase the use of alternative fuels, and to create more compact and sustainable communities that still meet security and safety requirements. Planners will incorporate the following key principles of sustainable planning in their master plans, area development plans, and other planning products:

2-2.1 Compact Development.

Installations must conserve their land resources. This can be achieved through compact development patterns that support an appropriate mix of uses, encourage walking and other alternative modes of transportation, accommodate appropriate residential and commercial densities, and incorporate a more integrated grid network of streets and sidewalks. Installations may have to reconfigure current land use patterns and transportation systems within their developed areas to create opportunities for future development. Compact development patterns include multi-story buildings, greater

residential densities, mixed-uses, and minimal spacing between buildings while maintaining consideration of AT requirements as well as other constraints (e.g. AICUZ).

2-2.2 Infill Development.

To conserve limited land resources, planners will, to the maximum extent possible, plan development within the installation core (existing cantonment area) and on previously developed land. Place buildings or designated open spaces in gaps between existing developed areas and buildings, while taking care to ensure preservation or addition of greenspace. Such infill development results in greater density at the core of the installation and supports more integrated land use and transportation networks to include potential for transit-oriented development. Removal/replacement of aging low-density development with higher density development may also be appropriate. Planners shall take into account the potential impacts of all proposed actions on historic properties when considering infill within an historic district.

2-2.3 Transit-Oriented Development.

Transit-oriented development focuses compact, mixed-use development around transit corridors. Public transit stops along these corridors (for buses, streetcars, light rail, etc.) shall be located at approximately half-mile intervals. Development intensity and density shall be greatest along these corridors and around the transit stops. On military bases, such development will typically take the form of 3-5 story buildings for administrative, commercial, and residential uses. Transit-oriented development has many advantages, including lowering traffic congestion and vehicular accidents, reducing parking requirements, and lowering CO2 emissions. Transit-oriented developments also promote healthy communities, by focusing on the pedestrian realm and encouraging more walking and cycling. With appropriate building typologies (e.g. rowhouses, apartments, multi-level office buildings) and with sufficient transit intervals, vehicle miles traveled can decrease by up to 50%. Planners shall also seek out ways to connect mass transit systems on the installation to outside transit systems.

2-2.4 Horizontal Mixed-Uses.

To make compact development feasible, create synergies, and reduce land use and construction costs, compatible uses should be integrated into horizontal mixed-use development. While incompatible uses must be appropriately segregated (e.g. industrial areas should be separate from housing), most uses on an installation are largely compatible. For example, of the uses typically found on military installations, community support (retail, recreation, schools, lodging, etc.), housing, medical, administrative, and classroom training uses are generally compatible. Planners should consider integrating these uses into horizontal mixed-use districts so that people can walk or bike from one use to another. Ideally, uses within these districts will be within a 10-minute walking radius (roughly 2,500 feet). Where appropriate, planners should also create a campus or town-like atmosphere since these places are tested examples of horizontal mixed-use districts. Compact mixed-use zones can be used to support combined heat and power district systems, which can increase the efficiency of primary energy use in a

district. Mixed-use districts can also be used to more appropriately balance out energy use – in areas where living and working are within one district, the system can operate at increased efficiencies since energy-use peaks are offset.

2-2.5 Vertical Mixed-Uses.

In addition to the above concept of horizontal mixed-use, where feasible, to maximize land use and infrastructure efficiencies, planners should locate compatible uses within the same building, which is referred to as vertical mixed-use. To achieve vertical mixed-use development, planners and programmers need to synchronize future projects. An example of vertical mixed-use construction using appropriated funds would be a ground floor education and training center topped with unaccompanied housing. Opportunities to collaborate with agencies such as the Exchange (the Army Air Force Exchange Service), the Defense Commissary Agency (DeCA), and privatized housing partners may enable the creation of mixed-use buildings and neighborhoods using non-governmental funds. An example using non-governmental funds would be placing privatized family housing or privatized lodging above appropriate retail facilities or activities. In addition, planners and programmers can collaborate to appropriately combine nonappropriated and appropriated funds in one facility using conjunctive funding. Costs associated with each funding category will be identified and separately programmed. An example of conjunctively funded vertical mixed-use would be military family housing (appropriated funds) located above a commissary (non-governmental funds).

2-2.6 Connected Transportation Networks.

Planners will ensure (through programming projects as appropriate) that uses within each district as well as the districts themselves are thoroughly connected by roads, sidewalks, and bikeways sized to support mission requirements. A connected network of streets is based on a modified grid pattern that affords multiple route options for vehicles, bicyclists, and pedestrians. The grid network uses appropriately scaled roads to define smaller block sizes that can accommodate a mix of compatible uses. Multi-way boulevards, parkways, main streets, residential streets, and alleys are examples of street types appropriate for integration into grids and for use on military installations. When these streets are built with integrated bikeways and continuous sidewalks buffered from the street by planting strips, users will have more and safer transportation options. When establishing the transportation network, planners will incorporate concepts that maximize safety for all users. A connected transportation network of streets with sidewalks, pedestrian pathways, and bicycle trails reduces the distance between origins and destinations and increases transportation alternatives. Short blocks and an absence of cul-de-sacs characterize a connected street network. Sidewalk easements improve connectivity in extremely long blocks and sidewalks should incorporate best practices for fitness such as mile markers. Installation gates shall be considered part of the transportation network. It is essential to coordinate the Transportation Plan with local/state/regional government agencies, to ensure that the installation's transportation network is appropriately linked with surrounding transportation access and systems.

2-2.7 Sustainable Landscape Elements.

Planners will ensure that plans incorporate appropriate use of street trees, shrubs and ground cover. These landscape elements can control soil erosion, reduce the heat island effect, absorb stormwater, improve air quality, provide comfortable places for recreation, and support AT/FP measures. In addition, trees improve the environment and provide shade, aesthetics, and security protection on an installation. Regularly spaced street trees shall be incorporated (25'-30' on center) on roadways to improve pedestrian safety by slowing vehicle traffic; provide shade for paving, vehicles, and pedestrians; and shade buildings, which can reduce energy consumption. Plant materials suitable for the particular climate conditions should be used to conserve water resources.

2-2.8 Low Impact Development and Stormwater Management.

The use of on-site natural features to control stormwater runoff quantity and quality in lieu of traditional 'end-of-the-pipe' solutions is a land planning and engineering design approach termed Low Impact Development (LID). LID is required by law (i.e., Energy Independence and Security Act 2008 Section 438) & DoD policy. The design requirements associated with compliance are defined in UFC 3-210-10 Low Impact Development. This approach implements engineered small-scale hydrologic controls to replicate the pre-development hydrologic condition of watersheds through infiltrating, filtering, storing, evaporating, and detaining runoff close to its source. These controls include not only open space and natural features, but also manmade features such as building roofs, streets, and parking surfaces. Other examples include bioswales, car parks, and on-street parking, which use substantially less paving per car than off-street parking. LID applies equally to new construction and redevelopment, and is best accomplished at the installation level.

2-2.8.1 LID and Area Development Planning.

Include LID practices and strategies in the development of the vision plan, the Area Development Plans (ADPs), the planning design standards, and other planning studies. When developing plans defined in this document, minimize impervious surfaces and insure there is additional site area available to offset the increase in impervious areas associated with siting new facilities and structures. The amount of impervious surface area can be reduced by implementing the following strategies:

- Pervious pavements
- On street parking
- Compact alignment including in-fill, mixed-use, and multi-story solutions
- Minimize street widths while maintaining adequate fire protection access
- Structured parking

2-2.8.2 LID and Integrated Management Practices.

Adding additional site area will allow the use of low cost Integrated Management Practices (IMP) such as bioretention and bioswales. A general rule of thumb for planning purposes is to allow an additional 10% of site area for increases in impervious areas. A more detailed estimate can be obtained if soil conditions are known or by evaluating existing IMP features from adjacent sites. The space within ATFP setbacks may be used to provide for bioretention features given the unobstructed space and concealment requirements of UFC 4-010-01 "DoD Minimum Antiterrorism Standards for Buildings" are met. In addition, provide a minimum of 20 feet separation from the structure/building foundation to the face of the bioretention feature. Surface parking areas with integrated bioswales should also be used to minimize perimeter bioretention facilities.

2-2.8.3 LID and Project Programming.

If site constraints prevent the use of low cost features, additional LID costs must be identified during project development and identified on the DD1391. High cost IMP features include rainwater harvesting, green roofs, underground storage, or other structural IMP.

2-2.9 Multi-Story Construction.

One-story buildings inefficiently use valuable land. Not only do they require their own area for the building footprint, but each building (whether one story or more) also has its own AT buffer requirements, which greatly increases land consumption. Planners will specify and designers will plan for multi-story buildings whenever possible. Land efficiency improves with multi-story construction and can be justified, even with progressive collapse requirements, when balanced against the cost of land and utilities required to serve multiple buildings. If needed, planners and programmers should combine multiple users into multi-story buildings. If planning multi-story construction within or adjacent to an historic district or historic properties, contact the installation Cultural Resources Manager as early in the planning process as possible. This will help minimize project delays or changes resulting from the presence of historic properties.

2-2.10 Building Orientation and Configuration.

Plan sites to provide flexibility for building orientation and configuration. This strategy is important in order to optimize building performance, conserve energy, and enhance indoor environmental quality such as thermal comfort and day-lighting. Minimize existing and planned obstructions from landscaping, structures, topography, and adjacent developments in order to preserve solar access and natural ventilation. Buildings of any configuration with footprint elements of approximately 50 feet or less (wings, central courtyards, etc.) can allow natural light deep into the building, which, when combined with energy-efficient glazing, reduces energy consumption. Narrow buildings with operable windows also allow natural ventilation to effectively flow through the interiors, which can reduce energy costs associated with air conditioning. Narrow buildings can

be used to define outdoor spaces and can be used to infill development sites across an installation. In terms of planning, when laying out building footprints on Illustrative Plans, planners should generally use building footprints no wider than 50 feet. However, in order to optimize energy performance, a building wider than 50 feet may be required especially in colder climates. Special-purpose buildings like hangars, large-format retail, and warehouses need not comply with this strategy.

2-2.11 Energy Conservation.

Energy conservation, which includes reducing demand and providing a sustainable supply both at an individual building level and installation-wide, will be part of the installation's planning goals including passive measures or active measures. Sustainable planning also includes production of renewable energy, improvement of energy security, and enhancement of energy efficiency. Installations may have opportunities to produce renewable energy through use of wind, solar, geothermal, biomass, and other sources. This reduces dependence on energy from outside sources, thereby adding to energy security. Installations are also responsible for fulfilling the goals associated with EO 13423, Federal Leadership in Environmental, Energy, and Economic Performance, which sets various Federal energy and environmental management goals, including reduction of energy intensity, increasing the use of renewable energy, and designing and operating sustainable buildings.

2-2.11.1 Building Automation.

Installation-wide building automation systems will also be considered as part of the master planning process. The proper use of this tool is a cost efficient way for an installation to manage and reduce energy consumption. Installation planners should coordinate with the appropriate personnel to implement sustainable energy strategies as appropriate.

2-2.11.2 District and Nodal Energy.

Nodal energy plants, which produce hot water, chilled water or steam for nearby facilities, are generally more efficient than large central plants or individual building level systems. Local nodal plants combine the benefits of economies of scale, load leveling and avoid system duplication. Nodal plants also help support medium to larger utility scale renewable energy systems and can help make renewable energy more cost effective. Large central energy plants are generally less cost effective due to larger line losses, operations and maintenance costs. Individual building scale energy systems are often less cost effective due to limitations of system size, efficiency and optimization of system type. Infill development and increased density reduces runs and makes nodal energy more efficient.

2-2.12 Water Conservation.

Master planners will incorporate strategies to reduce water consumption at the planning level. Strategies may include the use of greywater and designing low maintenance

landscaping features. Planners should be engaged throughout the design process to ensure that water conservation measures are applied whenever feasible.

2-2.13 Waste Management.

Master planners will incorporate strategies to reduce waste at the planning level. Adaptive reuse (as opposed to demolition) can reduce construction waste.

2-2.14 Facility Utilization and Building Reuse.

Master planners and the master planning process must support and use outputs of the installation facility utilization processes. Effective facility utilization maximizes the capacity of an installation's infrastructure and minimizes the installation's real property operations costs. To the extent existing facilities are functionally adequate in terms of location and salient features, they should be fully used to meet installation requirements. This principle includes optimizing space utilization management and reuse, repurposing, or removal of existing assets. This is also a sustainability issue in that installations should not heat, cool, or maintain excess facilities. Existing facility utilization should be done in compliance with the Vision and the Regulating Plan.

2-2.15 Lifecycle Planning.

Planners should consider the full life cycle cost of planning decisions with a focus on return on investment. The opportunity cost of land should be a primary focus.

2-2.16 Flood Protection.

Flood hazard areas must be identified during the planning process. Executive Order 11988 requires buildings to be constructed above the 100-year flood plain elevation. 2009 changes to the International Building Code (IBC) require the use of ASCE 24 when designing buildings in a flood hazard area. Facilities sited within a flood hazard area will require extensive and costly foundations and ground floor framing systems. Master plans must identify flood hazard areas. Avoid siting facilities in a flood hazard area if other practical alternatives are available. For facilities sited in a flood hazard area, identify additional costs on the DD 1391. Flood hazard areas can be obtained from the FEMA Map Service Center and by contacting station personnel. When flood maps are not available, additional studies should be performed to define flood hazard areas and the 100-year flood plain elevation.

2-2.17 \2\ Planning for Climate and Weather Resiliency. /2/

\2\ Each installation must identify and assess the risks to the installation from the effects of extreme weather and climate change, and develop plans to address those risks as appropriate. /2/

2-3 NATURAL, HISTORIC AND CULTURAL RESOURCE MANAGEMENT.

Installations have natural, historic, and cultural resources that must be considered in the planning process. Natural resources include threatened and endangered species, wetlands, habitat areas, forests, undisturbed land, and important viewsheds. Historic and cultural resources may include historic buildings, structures, objects, districts, landscapes, and archaeological sites, as well as sacred sites to Native American tribes. Planner will coordinate planning decisions with installation cultural and natural resource managers early in the planning process to avoid project delays and additional funding needs from the inadvertent discovery of historic, cultural and natural resources within proposed project areas. In addition, various environmental laws, requirements, and policies drive action that must be considered and prioritized throughout the planning process

2-3.1 Land Preservation.

Land is a valuable natural resource to the DOD for installation sustainability and future viability. It is critical to training, sustaining, and deploying our forces. Installation master planners shall employ policies and plans that preserve land to the maximum extent possible. On many installations, land is a training resource and preservation of training capabilities is a national priority. All installations should include land preservation as a primary consideration in installation master planning since they may have training missions now or in the future.

2-3.2 Mission Compatibility.

Another important function of land preservation is to provide and maintain a buffer between the civilian community and key functions of a military installation, including range impact areas, airfields, and maneuver areas. Military land requirements are constantly changing, but it is becoming increasingly difficult to acquire new land to meet expanding requirements. Whether the goal is to preserve valuable range and training land, land for future installation development, or to conserve irreplaceable environmental habitat or cultural resources, land preservation will be a key objective of the Master Plan.

2-3.3 Management of Historic and Cultural Resources.

The DoD is required to take into account the potential effects of its actions on historic properties that are eligible for or listed in the National Register of Historic Places, and areas that are considered sacred sites by Federally recognized Native American tribes. When historic properties have the potential to be affected, planning will comply with the requirements of the National Historic Preservation Act (16 USC, 470). In accordance with Section 106 of the NHPA, codified in 36 CFR Part 800, Federal agencies will take into account the potential effects of their proposed actions on historic properties, and avoid, minimize, reduce or mitigate any adverse effects to historic properties in consultation with the State Historic Preservation Office, Native American Tribes, and other relevant consulting parties. Effects to historic properties can be direct (e.g.-

demolition) or indirect (e.g.-adverse impacts to the setting or viewshed of a historic district). It is recommended that the planner involve the installation's Cultural Resource Manager as early in the planning process as possible to avoid delays.

2-4 HEALTHY COMMUNITY PLANNING.

Regular physical activity is critically important for the health and well-being of people of all ages, and reduces the negative impact from many chronic diseases. Physical fitness is key to readiness. Planners will incorporate health considerations and opportunities for physical activity based on advice from representatives of the installation's medical staff. When feasible, planners will include installation health representatives and MWR representatives in visioning sessions and planning charrettes.

2-4.1 Planning for Walking, Running, and Biking.

Effective planning can create conditions that encourage physical activity, connect land uses and facilities, and provide safe, protected pathways for physical fitness training for our service members and their families. High connectivity, mixed land uses, and well-designed pedestrian and bicycle infrastructure decrease auto dependence and increase levels of walking, running, and cycling.

2-4.2 Pedestrian and Cycling Plans.

Pedestrians and cyclists require continuous and safe pathways that connect origins and destinations. Plans shall include key destinations such as the main gate, fitness center, food locations, and include accommodations for walkers, runners, formation runners, bicyclists and motor vehicle users.

2-4.3 Community Gardens.

Healthy communities not only provide for physical activity through walking and biking but also provide opportunities to grow healthier food choices. As such, where appropriate, master plans shall incorporate locations for community gardens and local food production.

2-5 DEFENSIBLE PLANNING.

Military installations must be safe and secure in order to operate effectively and efficiently. Two key strategies impact planning: the Defense Critical Infrastructure Program and antiterrorism.

2-5.1 The Defense Critical Infrastructure Program.

The Defense Critical Infrastructure Program (DCIP) guides protection of critical infrastructure, which is a capability-focused risk management program that seeks to manage risk to installation assets and infrastructure (see DODD 3020.40, 14 Jan 2010, Change 1 and DODI 3020.45, 21 Apr 2008). DCIP enables mission success and supports commanders in both deliberate and adaptive planning as well as strategic risk

management. DCIP contributes to mission assurance and complements other DOD programs such as strategic mobilization, industrial preparedness, supply chain risk management, anti-terrorism, physical security, and continuity of operations. It addresses assets both on the installation and in surrounding communities critical to mission accomplishment.

2-5.1.1 DCIP and the Master Plan.

The Master Plan must incorporate DCIP analysis to minimize risk to the installation's strategic infrastructure and networked assets that support the critical missions necessary to provide combat capabilities. Where risk exists, the plan must have contingencies to mitigate or remediate the risk. Critical infrastructure may include both on-post assets and off-post assets such as buildings, bridges, dams, facilities, and utility and transportation systems essential to planning, mobilizing, deploying, executing, and sustaining U.S. military operations. Assets become critical as dependencies upon them to support missions become critical (i.e. without the assets the mission(s) will fail). Note that identification of elements of defense critical infrastructure may lead to classification issues; therefore, planners should coordinate with installation operational elements to identify any restrictions and to find alternate means to identify such elements. Planners should take care to avoid incorporating anything into master plans that would lead them to be classified.

2-5.1.2 Stationing Actions.

As part of a stationing action, planners must consider DCIP to assure that a single point of failure is not created that could adversely impact mission success. As an all-hazards based program, DCIP ensures a capability to detect and assess information, provide timely warning, execute planned actions to mitigate or prevent disruptions to critical assets and, if necessary, to recover full mission capability.

2-5.2 Antiterrorism (AT) and Master Planning.

The master plan must incorporate UFC 4-010-01 and the applicable Geographic Combatant Commander's (GCC) Antiterrorism (AT) Construction Standards. UFC 4-010-01 defines the DoD minimum AT standards for buildings \2\ . It also establishes 21 standards for building siting and construction for inhabited buildings, some of which may impact master plans. The GCC AT Construction Standards may provide additional requirements related to the installation perimeter, installation access control points, and the location of high value assets. Installation Commanding Officers, Regional Commanders, or Geographic Combatant Commanders may raise the DBT for a project, Installation, or geographic region. Determining the facility Design Basis Threat is the first step in planning antiterrorism requirements. However, without a defined level of protection, only the minimum standards apply. Planners, engineers, security and antiterrorism personnel must consider site specific threats, mission related issues and constraints that might dictate measures beyond the minimums. UFC 4-020-01 is used to establish project requirements and determine if the minimum standards are adequate or if additional mitigation measures are required. The engineering risk analysis conducted

as part of UFC 4-020-01 should be consistent with the terrorism risk analysis conducted by the installation security/AT staff. /2/

2-5.2.1 Antiterrorism Officer.

The Installation Antiterrorism Officer (ATO) is responsible to evaluate the local threat environment, the installation's access control screening capabilities, and risk to validate the DBT for the installation. The DBT may drive consolidation of parking areas, parking garages, pedestrian only areas, and the consolidation or dispersal of critical assets. Planners shall coordinate with the Installation ATO early in the planning phase to ensure that appropriate AT requirements are incorporated into Master Plans while pursuing other planning goals (such as compact development and sustainable design) that may be spatially interrelated. Consideration should be given to clustering facilities into compounds or pods providing a higher density core with parking and vehicle circulation on the perimeter. Low occupancy facilities or portions of facilities can be placed within primary gathering or billeting standoffs to achieve compact development. This provides a pedestrian friendly space with antiterrorism and sustainable benefits. For more information, refer to the Master Planning Considerations chapter in UFC 4-020-01.

2-5.2.2 Site Security Considerations.

Considerations shall be made for the following three key physical security principles of natural surveillance, territorial reinforcement, and physical access control, which are elements of Defensible Space/Crime Prevention through Environmental Design.

2-5.2.2.1 Natural Surveillance.

To enhance physical security, buildings should be sited and oriented to allow for natural surveillance of the built environment. Entry placements and window locations can be designed to give occupants opportunities to observe the built environment. Buildings should be sited within view of other occupied facilities. Careful consideration must be given before minimizing windows in building designs. Doing so reduces the opportunity for natural surveillance or "eyes on the street," thereby reducing building protection and making the buildings more susceptible to crime, vandalism and terrorism. Special purpose buildings like hangars, large-format retail buildings, athletic & recreation facilities, and warehouses need not comply with this strategy.

2-5.2.2.2 Territorial Reinforcement.

Another physical security strategy is territorial reinforcement. By using physical design to shape defensible areas with clear property lines, landscape elements that define public and private spaces, and buildings sited to frame identifiable realms, the defensible spheres of influence are expanded. Planners should cluster facilities that are functionally compatible to reduce the perimeter to be protected, limit access points, and provide compact security areas. Planners should also arrange buildings in proximity to one another in order to create "defensible spaces" that can be protected more efficiently than scattered buildings.

2-5.2.2.3 Natural Access Control.

Natural access control can enhance physical security. Streets, sidewalks, and building entries should be designed to mark public routes as distinct from private routes. Landscaping, fencing, and building orientation should be designed to naturally and unobtrusively control unauthorized access.

2-6 CAPACITY PLANNING.

Capacity planning allows planners to determine an installation's maximum development capacity based on conformance to the installation's planning vision, goals, and objectives. While known requirements need to be sited in the master plan, room needs to be reserved for unknown future requirements. The difference between the existing condition and the future build-out is the capacity. In this way, planning precedes programming, is proactive, and does not just account for current known requirements. Capacity planning can be shown on illustrative plans through the use of "notional buildings" or areas designated for "potential future growth."

2-6.1 Capacity Planning and Parking.

Capacity planning also addresses organizational and non-organizational parking needs through a combination of parking strategies to include on-street parking, off-street parking, and where appropriate, structured parking. Planners shall strive to minimize parking to the maximum extent possible through land-use practices that support shared-use parking, transit, and alternative modes of transportation. Planners tasked with DOD stationing can use these plans to project stationing actions. Special considerations should be considered for parking for the commissary and the exchange; parking should typically be placed with direct access to the main entrances of these facilities. For safety reasons, limit on-street parking to only parallel parking. Provide roadway markings to identify parallel parking stalls. Avoid perpendicular and angled parking on roadways. Perpendicular and angled parking is generally unsafe and increases the hazard of starting, stopping, and turning in moving traffic. The principal hazard of angled parking is the driver's lack of adequate visibility during backing maneuvers, especially when a large vehicle is parked uproad. Avoid on-street parking on roads that are designed to move high traffic volumes at moderate or high speeds. On lower speed roadways, such as main streets or residential streets, on-street parking is acceptable because it "calms" traffic and thus reduces vehicle speeds. [On-street](#) parallel parking on local access lanes parallel to arterials is also an acceptable solution for multiway boulevards on military installations.

2-6.2 Growth Boundary.

Planners will establish a growth boundary around an installation's cantonment area(s) to focus development towards the core and preserve the periphery for ecological functions, range and training, or other appropriate uses. With the exception of range and training and related functions, all projected future development will occur within these boundaries. The growth boundary identifies opportunities to accommodate future missions in both contiguous and non-contiguous development areas, and should also be identified on every ADP-level plan as appropriate. This boundary will be reviewed

every five years, and the installation's capacity for growth will be determined within the area defined by the growth boundary.

2-7 AREA DEVELOPMENT PLANNING.

As part of the master planning process, installations will be divided into identifiable and connected districts based on geographical features, land use patterns, building types, and/or transportation networks. An Area Development Plan (ADP) should then be prepared for each district. This leads to developing the Master Plan in logical planning increments. The installation planner determines the number of ADP districts.

2-7.1 District Area Focus.

By focusing on districts, planners can identify areas that need planning attention due to mission, requirement, or command priority changes. These are the districts that should have new ADPs completed or existing ADPs updated. Revisions or additional ADPs can be integrated into the installation's Master Plan updates. With the introduction of form-based planning, Illustrative and Regulating Plans will be developed for each ADP. These elements can be added to each ADP incrementally.

2-7.2 Incremental Development.

Over time, and as resources allow, installations can target specific districts for new ADPs and update the Master Plan accordingly. This ensures that the Master Plan is a living document that is relevant to current needs and future requirements. This incremental approach to updating the Master Plan recognizes the resource limitations and district development priorities that are common across all installations.

2-8 NETWORK PLANNING.

While significant planning is completed at the ADP level, these ADPs are also linked through network planning. These networks consider linkages and systems that span ADP district boundaries. These include installation-wide utility systems, transportation networks, and parks and open space networks. All installation master plans must plan at both the district scale and the installation scale. Network plans should also consider holistic approaches to energy-efficient development. Network planning should also include coordination and integration of planning with privatized housing or privatized utility partners.

2-8.1 Aesthetics and Network Planning.

When creating network plans, aesthetics should be a key consideration. For example, when addressing utility networks, a goal should be to place power lines underground for practical and aesthetic purposes.

2-8.2 Coordination of Plan Efforts.

Frequently, the various underground components of utilities are done without coordination, which results in severe second order effects such as multiple road resurfacing and repeated landscaping as the result of not having integrated plans for each component of the infrastructure network. Communications infrastructure is the component most often considered as an afterthought. In addition, there are network planning considerations where redundancies in both electrical and communications linkage are critical. Network plans should address these mission and coordination issues.

2-9 FORM-BASED PLANNING.

Form-based planning guides construction by identifying the form for installation development (building types, height, set-backs, circulation patterns, landscaping, land use, etc.) and translating that form into a set of specific planning directives. The directives use products typically developed by planners, including illustrative plans, land-use plans, and street, building, and landscape standards to flexibly guide development. The form that this approach supports reflects mission needs, program requirements, environmental constraints and opportunities, and other development factors. This practice gives installation commanders the ability to exercise more control in the installation development process. The purpose is to create a planning practice that is based on a sustainable form that supports the installation's planning vision. This approach provides for direction for both short and long-term development on installations. Form-based planning promotes horizontal and vertical mixed-uses, compact, and walkable development patterns, and emphasizes spatial principles that support sustainable development. Form-based planning uses the following components:

2-9.1 Illustrative Plans.

These graphic plans illustrate potential development that supports the overarching planning vision.

2-9.2 Regulating Plans.

These graphic plans regulate only the most important elements of the Illustrative Plan such as build-to lines, required entry and/or parking locations, minimum and maximum building heights, and acceptable uses. They are like enhanced land-use plans since they define allowable uses as well as form requirements. The Regulating Plan is a natural evolution of and replacement for the traditional land-use plan because it addresses land uses and building form together. In addition, the Regulating Plan provides specific guidance that shapes development to conform to the installation's planning vision.

2-9.3 Building Envelope Standards.

Acceptable massing, height, fenestration, exterior envelopes, and uses will be regulated through Building Envelope Standards.

2-9.4 Street Envelope Standards.

Street Envelope Standards describe and graphically present allowable street types and circulation elements in plan and section.

2-9.5 Landscape Standards.

These standards show, at a minimum, appropriate type and placement of major landscape elements (street trees). These standards may also include other natural landscape features (trees, ground cover, etc.) and manmade landscape features (street furniture, signage, lighting, etc.).

2-9.6 Implications for Designers/Developers.

The key standards are tied to parcels identified on the Regulating Plan. When development is proposed for a particular parcel, the standards are given to the designer/developer to ensure that any proposed project conforms to the overall installation planning vision.

2-10 FACILITY STANDARDIZATION.

Service-developed standard area requirements and spatial relationships recognize the need for consistency in building types repeated across installations. These area requirements and spatial relationships can be maintained within a variety of building designs that are consistent with the installation's Regulating Plan and Installation Planning Standards. When appropriate, standardized area requirements and spatial relationships will be included in the development of Illustrative and Regulating Plans. Planners will not site standard designs that are inconsistent with the Master Plan. Planners will pursue waivers as appropriate.

2-11 PLAN-BASED PROGRAMMING.

Facilities and projects will be programmed to fulfill the Master Plan's planning vision. Programming cannot be accomplished in the absence of a Master Plan.

2-11.1 Program Requirements.

Program requirements include all facility needs required to enable mission support. Facilities and projects will be validated against the Master Plan and the planning strategies before they are programmed. Installation planning and programming staff need to capture facility requirements and propose solutions to meet those requirements from the options available: better utilization of existing facilities; renovation or modernization of existing facilities; leased facilities; and new construction. Most

requirements come from established service-specific criteria and by industry or commercial standards. The requirements include all funding sources - Major Construction, Minor Construction, Operations and Maintenance, NAF, the Exchange, DeCA, private entities, etc.

2-11.2 Program Documentation.

The Program, which is oftentimes referred to as the Capital Investment Strategy, documents the strategies for fulfilling these requirements. Each service has a unique methodology and terminology of how requirements are identified and addressed. However, the services share the same objective of capturing and planning for the facility requirements necessary to support the installation mission and personnel. All solutions in the Program will conform to the installation vision, regulating plans, and standards for streets, buildings, and landscapes.

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CHAPTER 3 MASTER PLANNING PROCESS AND PRODUCTS

3-1 INTRODUCTION.

An installation's Master Plan reflects a comprehensive planning process documented using a standard set of products. The installation master planning process may be viewed as important as the Master Plan documents themselves. An effective master planning process continually collects the constantly changing information affecting the installation and its mission, and communicates them and the installation's Master Plan to affected stakeholders.

3-2 PLANNING PHASES.

While not entirely linear, the planning process consists of four primary phases (see below). The master planning process and the actual Master Plan result from the application of these phases (see Figure 3-3.1).

3-2.1 Identification.

This phase prepares the foundation for detailed planning through identification of a planning vision, specific goals that support that vision, and measurable planning objectives that support one or more goals. The product that results from this phase is the Vision Plan.

3-2.2 Evaluation.

In this phase, planners prepare and evaluate development alternatives for all scales of planning, from individual districts to the overall installation.

3-2.3 Implementation.

In this phase, planners prepare a preferred alternative that will implement the vision and they prepare detailed documents to guide installation development and implementation of the plan. The products that document this phase are typically the Installation Development Plan and the Installation Planning Standards. The Program is best developed at the end of this phase. The Plan Summary naturally comes at the end of the process.

3-2.4 Monitoring and Amending.

As the Master Plan is implemented, change is inevitable due to resource constraints, mission changes, or changes in environmental, social, or political conditions. The Master Plan will be revised and updated to reflect such change in order to maintain its relevance as a useful planning and management tool. At a minimum, master plans will be reviewed annually and updated as mission requirements dictate. Each service will identify the appropriate level and type of review.

3-3 STAKEHOLDER INVOLVEMENT.

In developing master plans, planners will talk to stakeholders to fully understand the scope of their vision and mission requirements. Stakeholders should include anyone using or maintaining a facility within the scope of a planning boundary, installation leadership, members of the civil engineering/planning/ public works staff, environmental, natural and cultural resources staff, Installation AT personnel, military police, fire department staff, mission operators, tenants, privatized housing and lodging partners, private utility partners, etc. Stakeholders also include members of higher-level headquarters and echelons with oversight over the installation. The importance of stakeholder involvement cannot be overemphasized – it is essential for planners to get out of their office, walk the site in each area development plan district, and talk to users and stakeholders. In addition to internal DOD stakeholders, external stakeholders are also important sources of information and input. These can include local municipalities, state governments, transportation agencies, other federal agencies, and Federally recognized tribes. Relevant stakeholders should be involved in all stages of the process.

3-3.1 Retail Stakeholder Involvement.

Retail stakeholders on installations provide an invaluable community support to the broad base community. Their facilities are multi-faceted and require special planning attention. It is highly encouraged that they are engaged in all stages of the base planning process. Further, in planning for these facilities our Retail stakeholders must consider the following planning considerations, they include the business case, convenience for the customer, and parking/traffic/site circulation.

3-3.2 Business Case.

Exchanges and Commissaries should be viewed as regional destinations for military installations. They are not neighborhood stores, but are destination locations that serve as anchors for installation community centers. The military retailer needs to generate earnings to support the customer and support morale, welfare and recreation programs for the services. If the demographics or location cannot justify the business need, the risk is often too great to invest the capital. Installations should work with the military retailer at the planning stage when a retail or commercial use is desired.

3-3.3 Convenience.

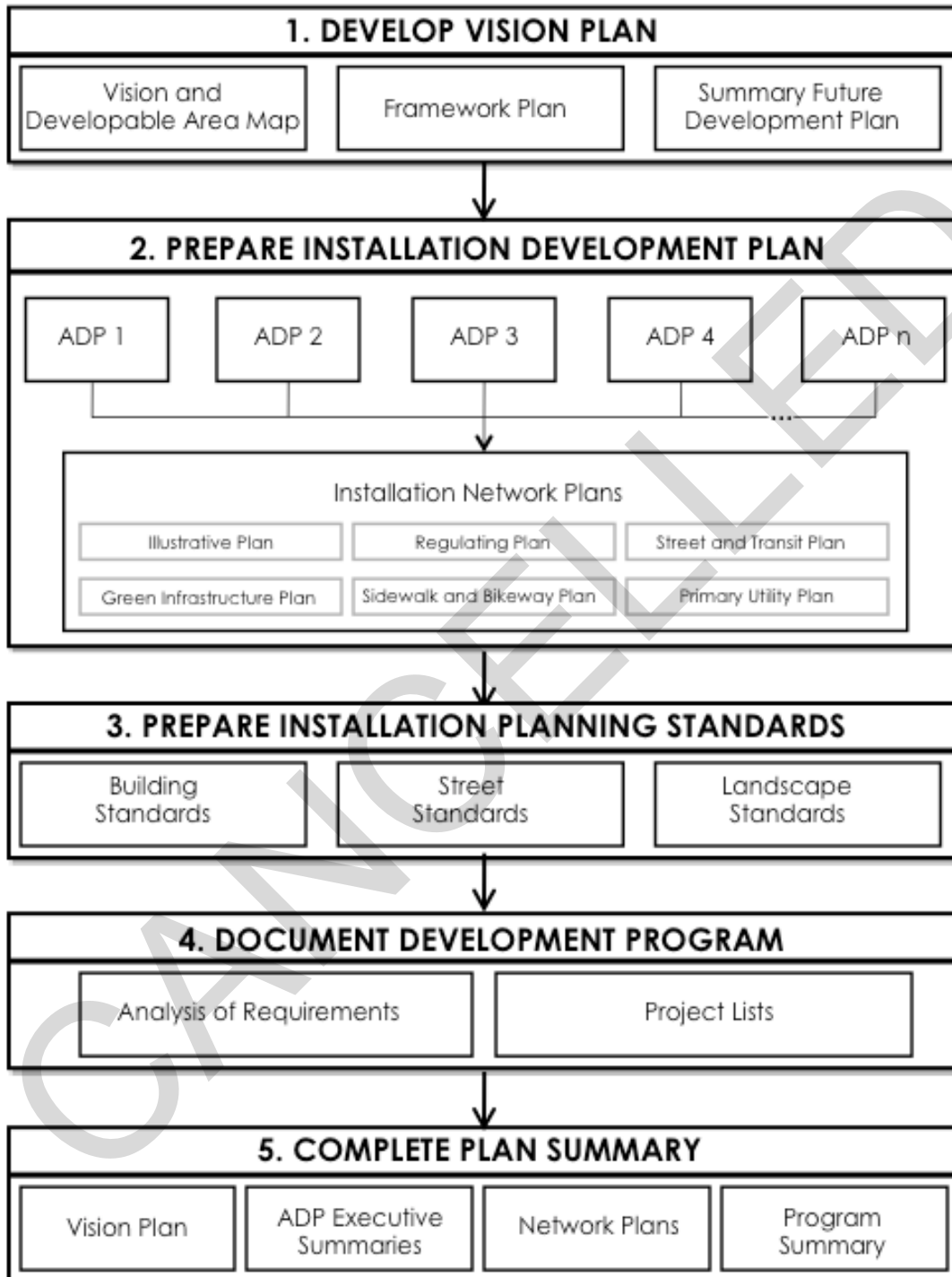
The customer is the primary focus for the military retailer and stores are designed for customer convenience. The Exchange and DeCA should be located adjacent to each other when possible. A majority of military customers live off the installation and drive a car to the installation. Parking should be convenient and easily accessible throughout the site. Fast food and convenience stores are often located on the outbound lane of traffic leading towards an exit gate or in high traffic areas for convenient customer access.

3-3.4 Parking/Traffic Circulation and Site Layout.

Convenient and accessible parking is a primary focus for all retail operations. The delivery areas should be separate from the building entrance. For functionally and safety concerns, customer parking and gas operations generally should be located with direct access to the building entry. Receiving should be located in the rear of the building. Large parking areas should be screened from streets and the pedestrian realm with liner buildings and appropriate landscaping. Vehicular access to all sides of the building is needed for convenience and life safety.

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Figure 3-1. Planning Process and Product Graphic



Note: The number of ADPs is set by the Framework Plan and may be as few as one or as many as a dozen or more.

3-4 PRODUCTS.

At a minimum, the Master Plan should include the following products:

- a. Vision Plan – includes a statement of the planning vision, planning goals, and planning objectives as well as an overall constraints and opportunities map(s), a developable area map, a framework plan for the entire installation, a land pattern matrix if applicable, and a summary future development plan.
- b. Installation Development Plan – includes Area Development Plans (including detailed constraints and opportunities maps, Regulating Plans, Illustrative Plans, Implementation Plans, capacity analysis, and supporting sketches and renderings), as well as appropriate Network Plans.
- c. Installation Planning Standards – installation standards for development.
- d. Development Program - overall installation strategy for using and investing in real property; includes list of current known projects needed to support installation missions.
- e. Plan Summary – an executive summary of each the above planning products.

3-5 VISION PLAN.

The installation mission statement cites the specific responsibilities the installation must support. It is near-term and meets the current military needs for our nation. Installation missions change as our nation's military requirements change. A vision for planning differs from an overall installation mission in that it defines ideal development principles for maximizing the installation's long-term capabilities.

3-5.1 Installation Mission.

In order to begin a holistic planning process and build an effective vision statement for planning, planners must be well versed in the installation's missions. Planners must first identify principal mission objectives and activity types, such as support, training, administration, and production. Installation units, organizations, and their relationships to installation missions also need to be identified. Planners should consult databases and reports to determine planning strengths and to identify and quantify the supported population, including assigned billeting units, tenant activities, community support organizations, and supported populations (e.g. active-duty military, civilians, military dependents and retirees, government-authorized space for contractors, etc.). This analysis should address functional relationships among activities and facilities, and will result in identifying issues and opportunities for operating and developing the installation.

3-5.2 Planning Vision and Goals.

Establishing a vision statement for planning is the first step in the planning process. Planners should meet with the senior installation leadership and ask for their input into the overall vision and goals for the installation planning process. Planners should be

prepared to help the installation leadership understand how to develop a vision to ensure that priorities for future installation-wide development are met.

3-5.3 Vision Statement.

The vision statement is a clear and concise description of a desired end state, and should capture the essence of the entire planning effort. A strong vision creates a mental picture of what the installation will look like once the vision is achieved. The vision statement can only be developed through collaboration with stakeholders and decision-makers. The recommended approach to creating the vision statement is to engage stakeholders in a series of public workshops and community surveys, and conduct a visioning charrette that includes mission operators, military members, family members, civilian staff, and installation leadership. Stakeholders from non-military, community, and other local and state agencies should also be included in the visioning process. Examples of strong vision statements include:

- a. "In support of the mission, service members, and families, we will create a sustainable community of walkable neighborhoods with identifiable town centers connected by great streets."
- b. "This installation will be a sustainable research and development community that fosters mission excellence through energy-efficient buildings organized into a walkable campus."

3-5.4 Planning Goals.

The goals of the Master Plan should flow directly from the vision, and focus on long-term redevelopment and construction projects needed to fulfill mission requirements and reshape the installation. Ideally, the key development goals are embedded within the vision statement. The key development goals are 2 in the sample vision statements below:

- a. "In support of the mission, service members, and families, we will create a 2 sustainable community of walkable neighborhoods with identifiable town centers connected by great streets 2."
- b. "The installation will be a 2 sustainable research and development community that fosters mission excellence through energy-efficient buildings organized into a walkable campus 2."

3-5.5 Planning Objectives.

Planning objectives support the goals and vision and are derived from both the planning process and the planning strategies described in Chapter 2. The objectives define how the goals in the vision can be achieved. Each objective is specific and measurable, which enables planners to determine whether or not each objective (and ultimately the supported goal and planning vision) has been achieved. In the sample vision statement, the goal of a sustainable community can in part be achieved through planning

objectives of compact, mixed-use, multi-story development. The rationale for the selection of specific objectives is based on consideration of the installation mission and analysis of on- and off-post conditions. In addition, the ten DOD planning strategies discussed in Chapter 2 will be incorporated into the planning objectives. Other objectives are selected based on installation design themes, developmental opportunities and constraints, potential encroachment situations, and consideration of community planning agencies, groups, businesses, and affected individuals' views and plans.

3-5.6 Constraints and Opportunities Maps.

In order to fully understand the existing landscape and holistically incorporate mission requirements into the Master Plan, planners shall collect and analyze two major types of data: on-installation data and off-installation data. This data should be collected using a variety of methods including electronic collection as well as stakeholder input. This data, as described in the paragraphs to follow, will be compiled and consolidated to create a narrative and a set of maps indicating the overall site constraints and developable areas (opportunities). This analysis will help form the basis for planning decisions.

3-5.6.1 On-Installation Data Collection.

On-installation data collection incorporates analysis of existing natural and man-made conditions, including land use, circulation, and utilities. Planners will evaluate the natural environment with a particular focus on those elements that may create significant limitations on the operation or construction of buildings, roadways, utility systems, runways, training ranges, airfields, and other facilities. Geology, soils, topography, hydrology, vegetation, and wildlife will be evaluated. Identify flood hazard areas and 100-year flood plain elevation as identified in Chapter 2. Data collected must also include analysis of the human environment including the location of all historic districts, historic properties and known archaeological sites. Current and forecasted demographics, military community services, outdoor recreation areas, training ranges, and maneuver areas, existing facilities and their use, traffic patterns and intensity, and utility systems use and capacities must all be incorporated.

3-5.6.1.1 Mission Data.

Mission needs largely determine land and facility support requirements. Data on current and proposed mission requirements will be used to establish limitations and conditions that directly affect the installation's ability to execute mission support. Planners will consult the real property database of record and/or the Realty Specialist concerning real property inventory data and the gross and net square footage of facilities. Planners will analyze existing land use and land use restrictions as well as collect and analyze installation-specific and headquarters-driven plans, planning guidance, and facility allowances.

3-5.6.1.2 Demographic Data.

Master planners will develop an understanding of the installation's demographics and identify appropriate principles to meet the needs of each major demographic group (i.e., personnel working on the installation, personnel living on the installation, personnel living off the installation, retirees, etc.).

3-5.6.1.3 Data Layers.

The analysis includes an in-depth look at development constraints and opportunities across the installation and within districts when planning at the district level. Data is not effective unless a regional perspective is portrayed. Because some of the information is likely to be sensitive, installation security personnel should review the document for suitability for public release. GIS, GeoMapping, or other similar systems may be used. Ideally, when preparing a Master Plan, planners will incorporate and integrate with local GIS systems. All deliverables should be developed in compatible formats to ensure ease of use. Typical layers referenced are listed in Appendix G.

3-5.6.2 Off-Installation Data Collection.

Planners should contact local, state, and federal agencies for off-installation data, reports, and plans that may be helpful to the planning process. It is vital for planners to understand regional and vicinity conditions that affect the installation. Planners should also take advantage of these data request interactions to interview local and regional stakeholders and receive their thoughts on the installation planning process and priorities. In some cases, opportunities to share costs on infrastructure or link to local park development, etc. may be available. Planners will review existing regional and vicinity maps, analyze regional transportation systems (roads, railroads, commuter mass transit systems, airports, etc.), and collect data on socioeconomic conditions, demographic patterns, and community land use and planning. This effort includes assessments of community services, land leases/easements, encroachment issues, and federal support services. Sources of data include, but are not limited to:

- a. Federal Agencies, including the Census Bureau, National Weather Service, Environmental Policy Agency, Department of Transportation, including the Federal Aviation Administration, etc.
- b. State and County Departments, including Highways and Transportation, Natural Resources and Conservation, Fish and Wildlife, Planning and Community Affairs, Housing, Public Health, Environmental Policy, State Historic Preservation Officers/Offices, etc.
- c. Local Government Offices, including City Hall, Public Works, Public Health, Parks and Recreation, School Districts, Fire and Police Departments, etc.
- d. Other Local Agencies, including Utilities and Power Companies, Chamber of Commerce, Regional Planning Agencies, etc.
- e. Installation staff activities working directly with the local governments, agencies and departments.

3-5.6.2.2 Off-Installation Personnel.

Planners will make every effort to understand the needs of various populations that live off the installation, but rely on the installation for a variety of services. Retirees, reservists, spouses, and civilian and military staff who work, shop, recreate and train on the installation may live outside the fence line. This population may outnumber those who live on the installation and they have distinctly different needs with respect to accessibility and transportation.

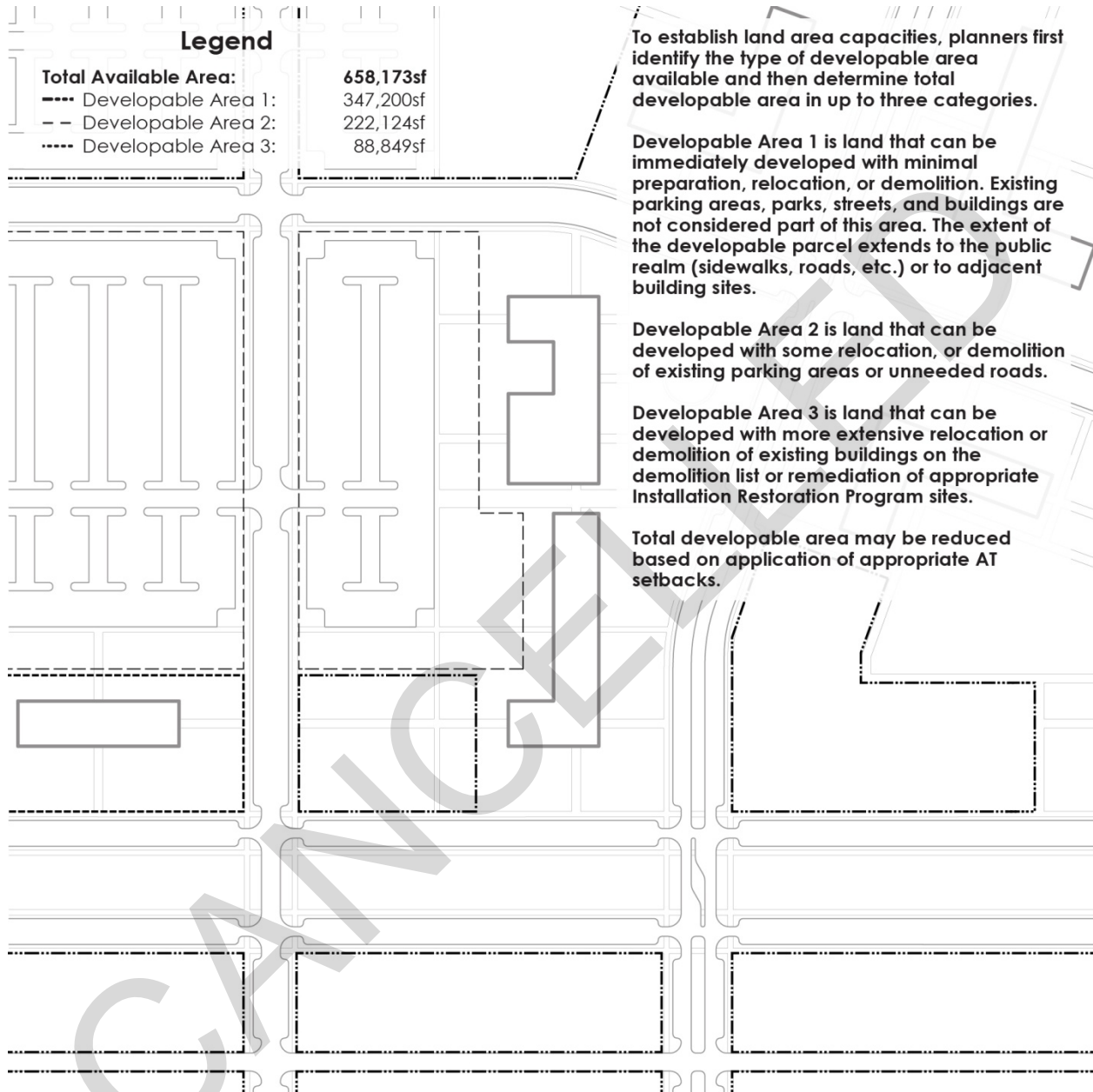
3-5.6.2.3 Environmental Conditions.

Where changing external conditions impact planning decisions, master planners will seek to understand, monitor and adapt to these changes. Such conditions include, but are not limited to, changes in land use and population density in the vicinity of installations; changes in climatic conditions such as temperature, rainfall patterns, storm frequency and intensity and water levels; and changes in infrastructure assets and configurations beyond and linking to the installation. \1\ In order to anticipate changing environmental conditions during the design life of existing or planned new facilities and infrastructure, projections from reliable and authorized sources such as the Census Bureau (for population projections), the National Academies of Sciences (for land use change projections and climate projections), the U.S. Geological Survey (for land use change projections), and the U.S. Global Change Research Office and National Climate Assessment (for climate projections) shall be considered and incorporated into military construction designs and modifications. /1/

3-5.7 Developable Area Map.

Planning cannot just account for known requirements. Effective plans also identify room for future requirements. This room for growth is initially shown on a Developable Area Map that simply highlights and calculates those areas that, given the identified vision, constraints and opportunities, are open for development and those areas that can be redeveloped to support future growth. This plan shows the general overall development capacity of an installation.

Figure 3-2. Developable Area Map Graphic

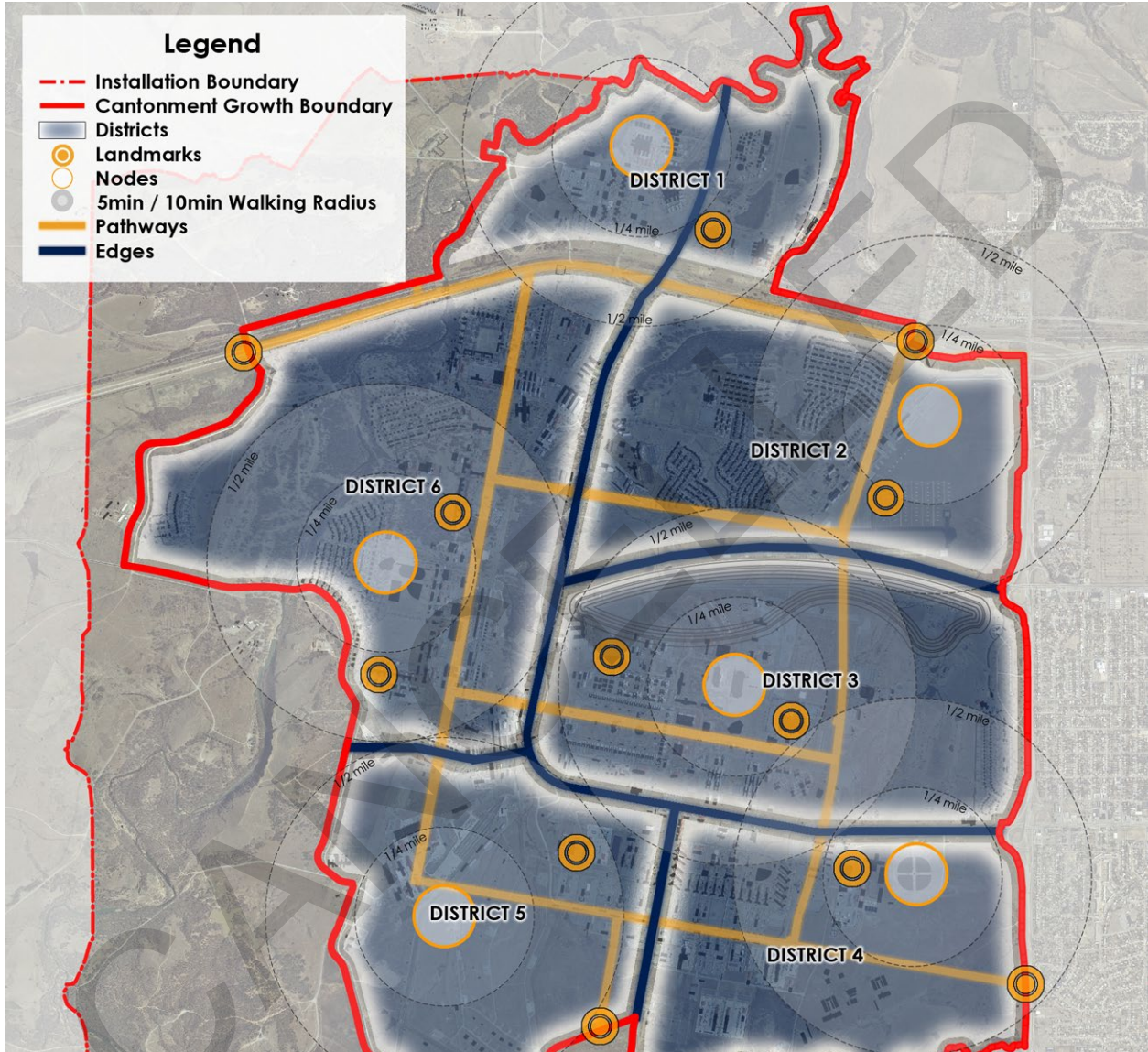


3-5.8 Framework Plan.

The Framework Plan is created as part of the planning visioning process. The Framework Plan is a map of the entire installation that shows the identified ADP districts, key transportation and land use concepts, and other significant features that will influence development patterns. The plan can also be used to graphically represent the priority ADP districts. To establish ADP boundaries, planners should use geographic features, key transportation systems, open space networks, and existing land-use patterns, and boundaries of any identified historic districts if appropriate. Note that a

district for the purposes of this UFC may incorporate one or more identified historic districts.

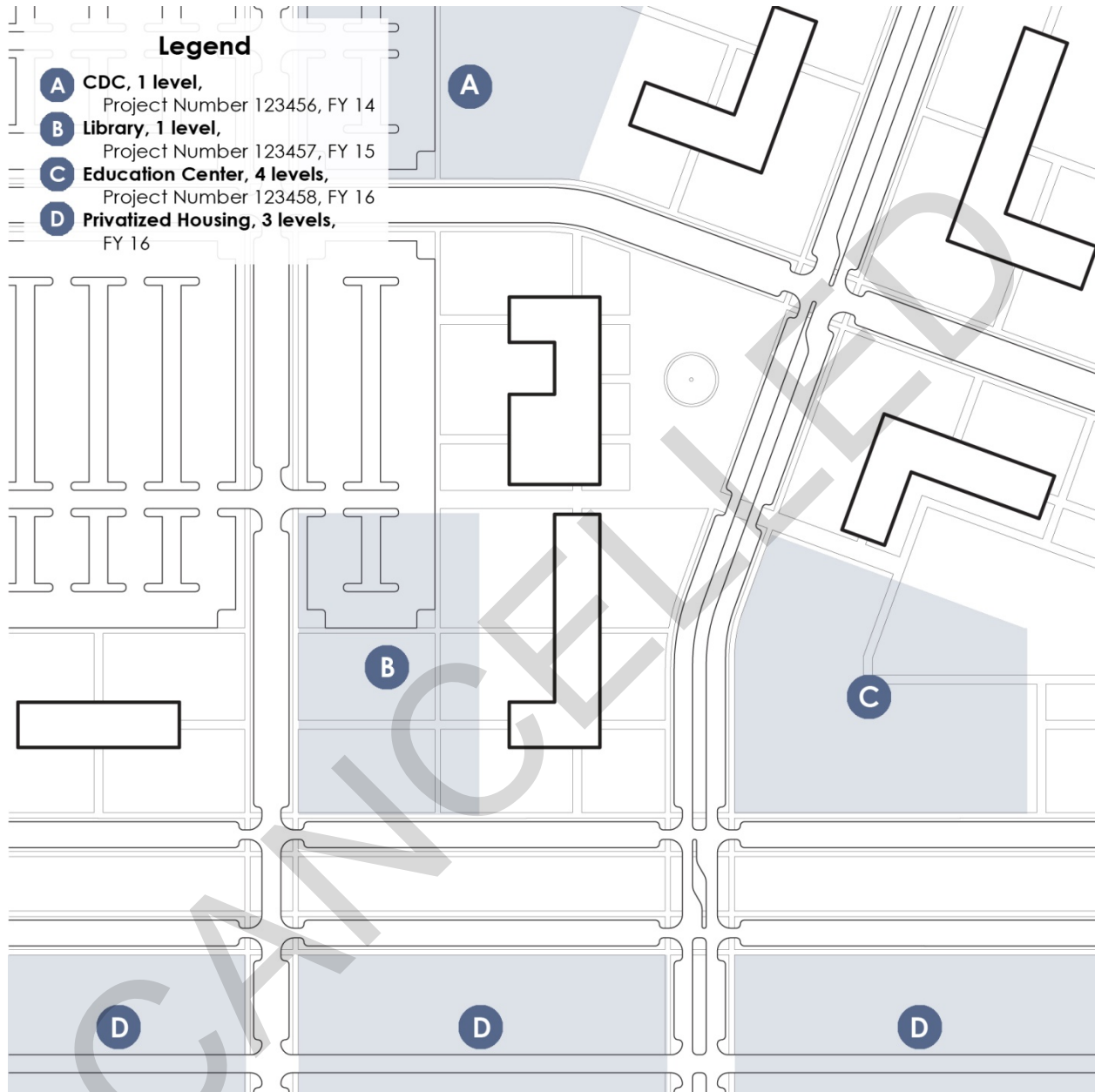
Figure 3-3. Framework Plan Graphic



3-5.9 Summary Future Development Plan.

This plan locates known projects on an installation map using a numbered key tied to a project list. The intent is not to show building footprints or other planning details, but simply to identify locations targeted for known requirements and deconflict project sitings.

Figure 3-4. Summary Future Development Plan Graphic



3-6 INSTALLATION DEVELOPMENT PLAN.

The Installation Development Plan (IDP) includes Area Development Plans (including detailed constraints and opportunities maps, Illustrative Plans, Regulating Plans, Implementation Plans, capacity analysis, and supporting sketches and renderings), as well as appropriate Network Plans.

3-6.1 Area Development Plans.

The bulk of the installation planning effort should occur at the scale of an ADP, which is a detailed plan for a district that includes an Illustrative Plan, Regulating Plan, and Implementation Plan. Supporting plans and maps as well as other graphics that illustrate the planning/development intent can be included as appropriate. ADPs describe constraints and opportunities, system studies, existing facility assessments, program requirements, and alternative analysis. Master plans are required by DODI and they need to address a level of development appropriate for each installation. The requirements in this UFC are relevant whether an installation's development is solely focused on SRM projects or on MILCON projects. These are programming and funding avenues designed to achieve the Master Plan vision and should be driven by the Master Plan. ADPs are ideally suited for the task of identifying, coordinating, and synchronizing work at any scale and as such they are useful at installations focused on SRM funding as well as installations focused on MILCON funding.

3-6.1.1 ADP Analysis.

Before beginning actual design of an ADP, planners will conduct a thorough analysis of the existing conditions, a study of the existing program requirements, and a review of the installation's planning vision, goals, and objectives. Planners will also study the installation's planning standards. Planning standards can be developed in parallel with the planning process described here.

3-6.1.2 ADP Design.

After this analysis, planners will develop conceptual alternatives, evaluate those alternatives against measurable criteria, and then select and design in detail a preferred alternative. Before investing time in detailing a preferred alternative, however, the planner should seek approval from the Installation Planning Board or other appropriate authority. Individual ADPs should be developed for each district on an installation. Large installations may need multiple ADPs; smaller installations may require only one. The installation planning staff should determine the number of ADPs appropriate for their installation.

3-6.1.3 Developing Alternatives.

Developing alternatives is a critical component of the master planning process. The National Environmental Policy Act (NEPA) requires consideration of various alternatives to minimize adverse impacts on the environment. Creating multiple options allows planners, stakeholders, and installation leadership to ensure that the ADP best fulfills the development vision. In developing alternatives, planners will review functional and spatial relationship concepts, as well as the reality of existing facility locations and the existing off-post and on-post environment. Alternatives depicting the long-range development of the ADP district, including arrangement of functional areas, circulation, and utility systems, will be developed. In documenting this phase of the ADP process, the planner will describe and show the alternatives and discuss the results of the

alternative evaluation. When preparing alternatives, planners should keep in mind the following:

- a. Alternatives should address new mission requirements; improvements to, replacement or relocation of existing mission support facilities; and implementation of installation planning standards.
- b. Each alternative may be based on a theme or point of emphasis to allow comparisons and tradeoffs.
- c. Alternatives must evaluate projects for impacts on existing conditions, installation support capabilities, and environmental impacts.
- d. Various alternatives will be defined and evaluated to satisfy deficiencies, eliminate excesses, and preserve room for future growth.
- e. Alternatives should also include determining the maximum capacity of an installation, or even critical sub-areas of an installation, whether there is currently an identified need or not.
- f. If appropriate, the alternatives will be presented to the installation planning board for discussion and decision before the recommended solution becomes part of the ADP.

3-6.1.4 Evaluating Alternatives.

This analysis supports the NEPA process by considering several alternatives and evaluating potential environmental impacts of each alternative. The process for evaluating alternatives should be presented to the installation planning board to demonstrate how the preferred course of action was selected.

3-6.1.5 Designing the Preferred Alternative.

After evaluating the ADP alternatives, planners will fully develop a preferred alternative that best meets the planning vision, goals, and objectives for each district and/or the installation as a whole. The preferred alternative is a graphical and narrative description of the fully developed plan for the district that emerged from the alternative analysis phase, and will consist of a Regulating Plan, Illustrative Plan, and Implementation plans.

3-6.1.6 Regulating Plan.

The Regulating Plan provides specific information on permitted development for each building parcel within a district and acts like an enhanced land-use plan. This plan designates the locations where different uses or building form standards apply. But instead of specifically defining only uses, as land use plans do, this method defines building form (e.g. height and frontage) while allowing for a range of possible uses.

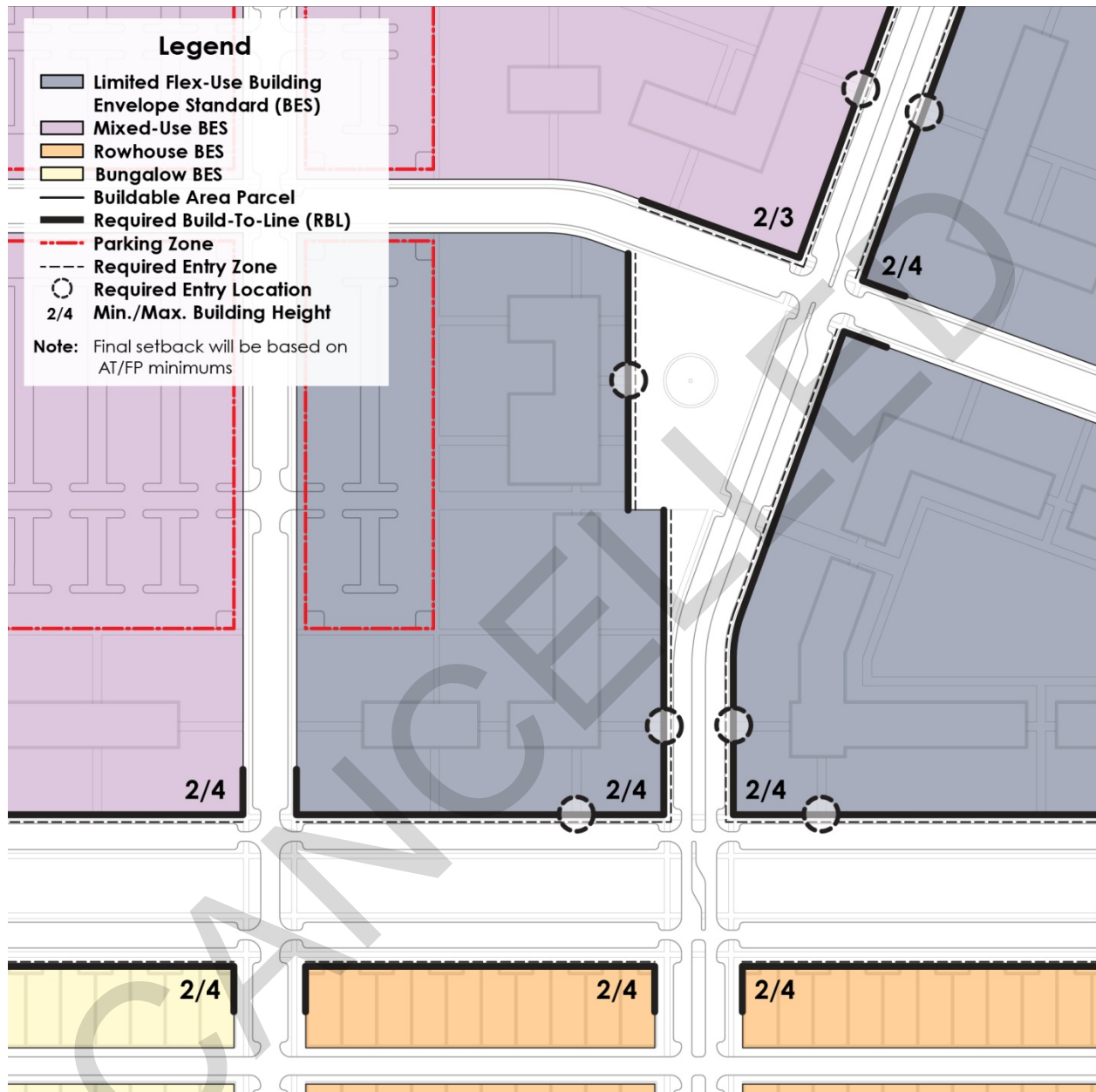
- a. **Regulating Plan Designations.** The Regulating Plan establishes development regulations for specific parcels on the installation. Existing and planned roads, permanent fence lines and borders, as well as natural features and riparian corridors will be used to establish parcel lines. Each

ADP district will be composed of developable parcels defined by parcel lines. Oftentimes, these parcels may correspond to entire blocks. In some cases, blocks may be subdivided to create smaller parcels in response to site-specific design requirements. These parcels, whether they are entire blocks or portions of a block, have accompanying regulations governing building form, placement, and use. When a building is proposed for a specific parcel, designers will refer to the criteria established for that parcel to guide the design process.

- b. Regulating Plan Components. Only the most important aspects of the Master Plan are regulated – these include build-to lines, minimum and maximum building heights, key entry locations, appropriate uses, and parking and roadway configurations.
- c. Regulating Plan Functions. The Regulating Plan ensures that facilities, parks, parking, and other uses are sited in alignment with the overall master planning vision. The Regulating Plan specifies allowable building types on individual parcels in a district; assigns development standards to specific physical locations; shows how each parcel relates to public spaces and the surrounding neighborhood; and references the more detailed building, street, and landscape standards that are contained in the Installation Planning Standards.

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Figure 3-5. Regulating Plan Graphic

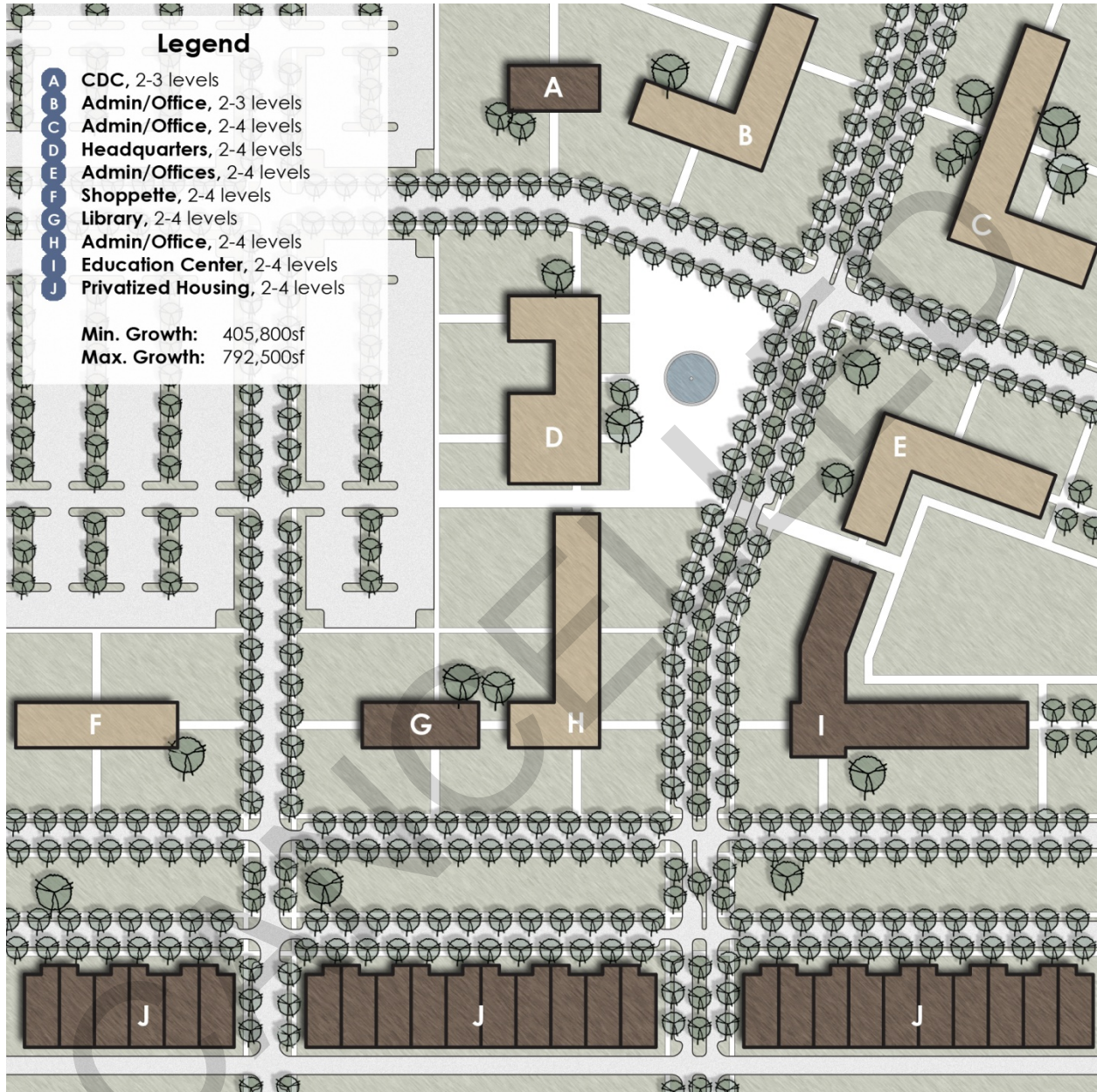


3-6.1.7 Illustrative Plan.

The Illustrative Plan graphically illustrates development within a district that conforms to the Regulating Plan. It is important to note that the Illustrative Plan shows only one possible outcome allowed by the Regulating Plan. Figure 3-6 illustrates a sample illustrative plan graphic. However, it is a sample diagram and does not infer any policy but rather graphically shows how to portray planning principles.

- a. Illustrative Plan Requirements. The Illustrative Plan must, at a minimum, show all relevant project sitings for known projects, notional building footprints for unspecified long-term development in order to facilitate capacity analysis, as well as existing and proposed roads, sidewalks, bicycle networks, street trees, open spaces, and parks. The various facility requirements will be translated into building “footprints,” utilizing appropriate siting considerations. Short-term stopgaps and recommended long-term solutions will be identified to satisfy mission, land-use and real property requirements.
- b. Relationship between the Regulating Plan and Illustrative Plan. The Regulating Plan guides the development of the area and is created iteratively with the Illustrative Plan. The Regulating Plan allows for more flexibility than a typical Illustrative Plan, and serves as an underlay to the Illustrative Plan.
- c. Capacity Analysis. Effective plans identify future requirements and provide room for notional facilities or even specific facilities that have not yet been programmed. Capacity analysis also accounts for the carrying capacity of the land and developable area on an installation. A capacity analysis should be calculated and shown on illustrative plans as “notional buildings designated for potential future growth.” Additional square footage of future facilities will be calculated to indicate the potential capacity of an area.

Figure 3-6. Illustrative Plan Graphic



3-6.2 Implementation Plans.

Implementation plans depict sequencing of key relocation, demolition, and construction actions required to move the installation from its current state to the final state shown on the Illustrative Plan.

3-6.3 Environmental Documentation.

Environmental documentation will be revised as necessary to include: analysis of the anticipated environmental impacts of plan implementation; identification of appropriate mitigation measures; and documentation of the results. Planners must also follow all service-specific environmental regulations and requirements.

3-6.4 Network Plans.

Once ADPs have been completed for the priority districts on the installation, the relevant information can be easily combined into appropriate Network Plans. Network Plans show the future development for the installation as a whole, and will, at a minimum, consist of the Installation Illustrative Plan, Regulating Plan, Street and Transit Plan, Sidewalk and Bikeway Plan, Green Infrastructure Plan, and Primary Utility Plan. Network Plans are also an appropriate place to identify net-zero planning strategies and forecasts for energy, waste, and water.

3-6.4.1 Installation Illustrative Plan.

This plan combines all of the ADP Illustrative Plans onto one graphic plan. This is a simple plan to create once the Illustrative Plan for each ADP has been completed. Where ADPs have not been accomplished, indicate that on the Installation Illustrative Plan. The primary purpose of the Installation Illustrative Plan is to graphically illustrate all major future development.

3-6.4.2 Installation Regulating Plan.

This plan combines all of the ADP Regulating Plans onto one graphic plan. This is a simple plan to create once the Regulating Plan for each ADP has been completed. Where ADPs have not been accomplished, indicate that on the Installation Regulating Plan.

3-6.4.3 Installation Street and Transit Plan.

This network plan will identify and map all current and proposed streets across the installation and will form the preferred end state for the installation street network. This plan should also identify how the street network is connected to the network outside the installation, and how street networks outside the installation affect the installation network. Installation street types will be keyed to the Installation Planning Standards. Additionally, this plan will identify current or proposed transit routes and transit stops.

3-6.4.4 Installation Sidewalk and Bikeway Plan.

This network plan will identify and map all current and proposed sidewalks and bikeways across the installation and will form the preferred end state for the installation sidewalk and bikeway networks. The sidewalk and bikeway types will be keyed to the Installation Planning Standards.

3-6.4.5 Installation Green Infrastructure Plan.

This network plan will identify and map all major park and open space elements and will include, at a minimum, current and proposed parks and open spaces, riparian corridors, wetlands, and significant bodies of water.

3-6.4.6 Installation Primary Utility Plan.

This network plan will identify all current and proposed primary utility lines across the installation and, as such, will form the preferred end state for the installation primary utility network. Primary utilities include but are not limited to lines for water, wastewater, storm sewer, electricity, natural gas, steam, telephone, and cable systems. The plan will also show all granted easements and rights of way for utilities, as well as central, alternative (e.g. solar, wind), and renewable energy sites. Development of an Installation Primary Utility Plan must be closely coordinated with the owner(s) of privatized utility system(s), as appropriate.

3-7 INSTALLATION PLANNING STANDARDS.

Installation planning standards provide a clear set of guidelines to ensure that the installation's vision and planning objectives for development are achieved, even if drastic changes to mission or program occur. These standards are developed to 1) meet sustainability and energy efficiency requirements; 2) promote visual order and architectural consistency; 3) enhance the natural and man-made environments through consistent architectural themes and standards; and 4) improve the functional aspects of the installation. At a minimum, these will include building standards, street standards, and landscape standards. Many installations have standards for buildings, streets, and landscapes. These standards will be reviewed and, if needed, adjusted to conform to this UFC.

3-7.1 Building Envelope Standards.

The intent of building standards is to shape and detail public space that is safe, comfortable, and functional through placement and envelope controls for each building type. The standards aim for the minimum level of control necessary to meet the planning goals, and include building standards, site planning standards, and building-related force protection standards. Each Building Envelope Standard (BES) should relate to existing environments where appropriate and feasible. Typical elements defined in each BES are massing, height, placement (e.g. required build-to lines and percentage of building that must be built to the required build-to lines), allowed parking locations, materials, and use. Also included is a general description of the building type. Each BES is coded to the Regulating Plan. Installations will develop a BES for each applicable building type on the installation including the following:

- a. Mission Building Types (flight line facilities, hangars, and simulator facilities)

- b. Industrial Building Types (warehouses, maintenance facilities, research labs, production facilities)
- c. Administrative Building Types (headquarters facilities and general offices)
- d. Medical Building Types (medical centers, hospitals, and clinics)
- e. Mixed-Use Building Types (mixed-use building types incorporate commercial uses on the ground floor and any other type of approved uses above)
- f. Flex-Use Building Types (flex-use building types incorporate any approved type of use on any floor)
- g. Commercial Community Support Building Types (large format retail stores, religious buildings, schools, lodges, restaurants, bowling centers, recreation facilities, clubs, and stand-alone retail)
- h. Residential Building Types (single-family homes, row houses, townhomes, apartments, and unaccompanied personnel housing)

3-7.2 Street Envelope Standards.

These standards illustrate typical configurations for all street types on an installation through Street Envelope Standards (SES). Each SES will address vehicular traffic-lane widths, curb radii, sidewalk and tree planting area dimensions, and on-street parking configurations. An SES is required for every type of street specified on the installation. After a street (or section of a street, as an entire street need not follow the same standard throughout its length) is selected, the characteristics desired for that street section will be documented in plan and section. The street types are coded to the Regulating Plan developed for each ADP and for the installation.

3-7.3 Landscape Standards.

Landscape standards show the appropriate type and placement of landscape elements, which may include natural landscape features (trees, ground cover, etc.), man-made landscape features (street furniture, signage, lighting, etc.), and landscape-related force protection standards. Landscape standards identify the installation's landscape theme(s), addressing both design intent and allowable plant materials and site furnishing elements. At a minimum, these standards will address street tree placement and type.

3-8 INSTALLATION DEVELOPMENT PROGRAM.

The program is the overall installation strategy for using and investing in real property to support installation missions and DOD objectives. It describes permanent comprehensive/holistic solutions, as well as short-term actions necessary to correct deficiencies and meet current and future mission needs in a method that assures infrastructure reliability and contributes to sustainable development.

3-8.1 Program Elements.

The development program will be completed at the installation level, and reflected in component parts in each ADP. It will include the following elements:

3-8.1.1 Narrative.

The program begins with an executive summary that describes the key facility areas that require the most attention in the near future, including a listing of facilities required and existing surplus or deficits. It also provides a description of key development issues and the strategies being employed to overcome these issues. The program narrative will include all interim steps required to eventually achieve the desired end state.

3-8.1.2 Project Listing.

The program is in part a listing of major projects planned for the installation, including major Military Construction (MILCON), major renovation or recapitalization projects within the planning horizon (i.e. SRM), Operations and Maintenance (O&M), Military Family Housing (MFH), Nonappropriated Funds (NAF); retail (the Exchange and NEX), Marine Corps Community Services (MCCS), Defense Commissary Agency (DeCA) projects; Morale, Welfare, and Recreation (MWR), sustainability and energy projects, real estate actions, public-private initiatives, and any privatized housing, lodging or utilities initiatives. Demolition projects can also be included in this listing. This listing must include information such as title, project number, fiscal year, and program amount. The listing should address all programmed projects as well as other known projected requirements that may not yet be programmed. If no fiscal year or program amount is known at the time, note that the project requires programming.

3-8.2 Program Development.

Planners will consult with programmers to identify the program requirements. These requirements emerge out of the Planning, Programming, Budgeting, and Execution System (PPBES). A portion of new programming requirements on military installations will likely be focused on recapitalization, sustainment, and restoration of existing infrastructure and adapting this into existing real estate, given environmental concerns and other obstacles to "new" site considerations and limited funding for new construction. These requirements will be based in part on service-specific facility evaluation systems and condition assessments. These systems provide a means for installations to target specific areas of construction that will enhance missions and upgrade aging infrastructure. These program requirements shall holistically incorporate all planning requirements including landscape, street, and building standards. Installation master plans also need to address working within and around existing infrastructure to enhance mission capabilities.

3-9 PLAN SUMMARY.

Once the above planning processes and products are completed, the installation planner shall prepare a plan summary document that will include the Vision Plan,

executive summaries of the Area Development Plans, appropriate Network Plans, and a summary of the development program.

3-10 SITE APPROVAL PROCESS.

All facility acquisition or construction projects will be sited in accordance with an approved Master Plan. An approved Master Plan siting means that the project meets all guidelines and objectives set forth in the Regulating Plan and Installation Planning Standards. All projects must have approved sitings prior to the start of design. Site approval shall be attained during the project programming process for Sustainment, Restoration, Modernization (SRM) projects and during development of the DD1391 for military construction (MILCON) projects. Furthermore, all projects must remain in compliance with the Master Plan through construction and occupancy. Projects proposed by affiliated agencies, including but not limited to, privatized housing contractors, MCCS, NEX, the Exchange, DeCA, MEDCOM, and DoDEA must also go through this process. The detailed site approval process is service-specific. Planners should refer to service-specific guidance for direction.

3-11 PROJECT REQUIREMENTS AND THE REGULATING PLAN.

Requirements for construction projects must be succinct, clear, and in conformance with the Master Plan. The Regulating Plan provides the required regulatory guidance to ensure that the installation's vision for development is met. It applies to all forms of acquisition that are used to implement the Master Plan. The Regulating Plan and supporting Building, Landscape, and Street Standards that apply to a proposed construction project will be included in any solicitation and subsequent contract documents for design and development of a project. Additionally, if single-line drawings (floor plans, elevations, etc.) are developed as part of an ADP, these should also be included to illustrate a way to meet the intent of the Regulating Plan. Project designs shall be evaluated in part on how well they conform to the Regulating Plan and supporting standards.

3-12 MASTER PLAN INSTALLATION PLANNING BOARD, ENDORSEMENT AND APPROVAL PROCESS.

The installation's Master Plan will be approved by an Installation Planning Board (IPB), and endorsed by the appropriate approval authority designated by each service. The Master Plan is the result of an iterative process and as such could be approved in parts or as a whole depending upon completion timelines. The Vision Plan, Installation Development Plan, Program, and Planning Standards can be approved when they are completed. Specific approval procedures are developed by each service.

3-12.1 Installation Planning Board.

Each service will determine the responsible authority that will establish and convene an IPB. The IPB will assist the installation leadership in managing, developing, and in some cases realigning, cleaning up, and closing the installation, supported sites, or area

facilities and real estate. Every installation shall have an IPB. See Appendix B, Best Practices for recommendations for roles, responsibilities, membership and operations of an IPB.

3-12.2 Endorsement.

An appropriate authority determined by each service will endorse the installation's overall Master Plan. This endorsement can take the form of a separate letter or a letter integral to the document. The letter will be updated with each change of command. A new commander, however, does not drive the need for an updated Master Plan, and master plans will not be updated solely due to a change of command. The intent of the collaborative, integrated planning process described in this UFC is to produce a sustainable Master Plan that can be updated as mission needs (not command changes) dictate.

3-12.3 Headquarters Approval.

Installations must submit their master planning products to the appropriate headquarters agency for approval, in accordance with service-specific policy and regulations.

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CHAPTER 4 KEY PERFORMANCE INDICATORS

4-1 GENERAL.

This UFC establishes Key Performance Indicators or metrics that will be used to track compliance with the requirements herein. It is highly recommended that each service will establish procedures to track these indicators for every installation. In addition, in recognition of the complexities of planning at today's military installations and the need for continuous training, this UFC highly recommends that each Service establishes minimum training requirements for planners and installation leadership.

4-2 MASTER PLAN COMPLIANCE.

Master Plan compliance will be evaluated using three tiers. Tier 1 is required compliance with minimum products. Tier 2 is required compliance with the planning strategies. Tier 3 is optional conformance to a suggested set of planning principles tied to the installation vision. Installation master plans will be evaluated against the following key performance indicators.

4-2.1 Tier 1: Product Compliance.

Each service will identify a procedure for ensuring that installations have the appropriate planning products that document their planning process. At a minimum, every installation will have a Master Plan that includes a Vision Plan and its elements, an Installation Development Plan and its elements, Installation Planning Standards, a Program and its elements, and a summary document. An appropriate higher level of authority will evaluate planning products using a standard color-coded matrix. For each product, if the product is nonexistent or in need of an update, the code is red. If the product is currently being updated or is funded for an update, the code is yellow. If the product is updated and current, the code is green. Per DODI 4165.70, master plans will cover at least a ten-year period and be updated every five years.

4-2.2 Tier 2: Strategy Compliance.

All master plans will incorporate the ten planning strategies identified in this UFC. An appropriate higher level of authority will evaluate integration of these strategies into installation master plans using a standard color-coded matrix. For each strategy, if the Master Plan does not incorporate the strategy, the code is red. If the Master Plan is currently being updated or is funded for an update to incorporate the strategy, the code is yellow. If the Master Plan incorporates the strategy, the code is green.

4-2.3 Tier 3: Principle Compliance.

Compliance with the planning principles in Appendix E is optional. Planners should, however, incorporate the relevant principles into their master plans in a way that supports the installation's planning vision. Conformance can be measured using a variety of quantitative methods. For examples, refer to Appendix E.

4-3 TRAINING REQUIREMENTS.

Training on installation master planning is an essential function and will be supported by each service. This includes training to DOD Master Planners, Installation Commanders and Contractors. The DOD Master Planning Institute, hosted by USACE, is an appropriate source for planning training. See appendix F for more information.

4-4 CERTIFICATION.

For master planners working in and with the DOD, successfully passing and maintaining certification through the American Institute of Certified Planners (AICP) is highly encouraged.

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APPENDIX A PRIMARY REFERENCES

16 USC, 470 – National Historic Preservation Act

36 CFR Part 800-Section 106 of the National Historic Preservation Act

EO 12423, Federal Leadership in Environmental, Energy, and Economic Performance

NEPA – National Environmental Policy Act

DODI 4165.70 – Real Property Management

DODD 3020.40 – DOD Policy and Responsibilities for Critical Infrastructure (14 Jan 2010, Change 1)

DODI 3020.45 – Defense Critical Infrastructure Program Management (21 Apr 2008).

UFC 3-210-10 – Low Impact Development

UFC 4-010-01 – DOD Minimum Antiterrorism Standard for Buildings

UFC 3-260-01 – Airfield and Heliport Planning and Design

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APPENDIX B SELECTED BEST PRACTICES

B-1 JOINT BASE LEWIS-McCHORD REAL PROPERTY MASTER PLAN.

Starting in August 2007, planners at Joint Base Lewis-McChord began developing a new Real Property Master Plan that incorporates many of the strategies and requirements of this UFC. The result is an award-winning plan that has successfully guided development at the installation. The American Planning Association's Federal Planning Division honored the Historic Downtown Area Development Plan as the "Outstanding Sustainable Planning Initiative" in 2008 and the entire Real Property Master Plan as "Outstanding Federal Planning Project (Honorable Mention)" in 2010.

B-1.1 Planning Strategies.

The focus of the effort is on *Sustainable Planning* using the following principles: compact, infill, and transit-oriented development, horizontal and vertical mixed-uses, multi-story and narrow buildings, and connected transportation networks. The plan also incorporates all the other strategies in this UFC including *Natural and Cultural Resource Preservation*, *Healthy Community Planning*, *Defensible Planning*, and *Capacity Planning*. In addition, the plan was created using *Area Development Planning* tied together with *Network Planning* and implemented through the use of *Form-Based Planning* – a first for the DOD. Finally, with the plan in place, installation staff are now able to implement *Plan-Based Programming*.

B-1.2 Planning Process.

The process described in this UFC was fully applied at Joint Base Lewis-McChord.

Installation planners and stakeholders first met in a series of public workshops to create the *Vision Plan*. They developed the following planning vision statement to guide development: "In support of servicemembers, families, and the mission, we will create a sustainable community of walkable neighborhoods with identifiable town centers connected by complete streets." The *Vision Plan* also included a *Framework Plan* and an overall *Constraints and Opportunities Map*. The *Framework Plan* subdivided the installation into planning districts and identified key planning concepts to guide the district planning effort.

Upon completion of the *Vision Plan*, the team began work on the *Installation Development Plan* by focusing first on completing regulating plans, illustrative plans, implementation plans, and supporting sketches and renderings for each district's *Area Development Plan*. When the ADPs were completed, the planning team created overall *Network Plans* that include an overall regulating plan, illustrative plan, transportation plan, pedestrian plan, and open space plan.

Figure B-1. Regulating Plan

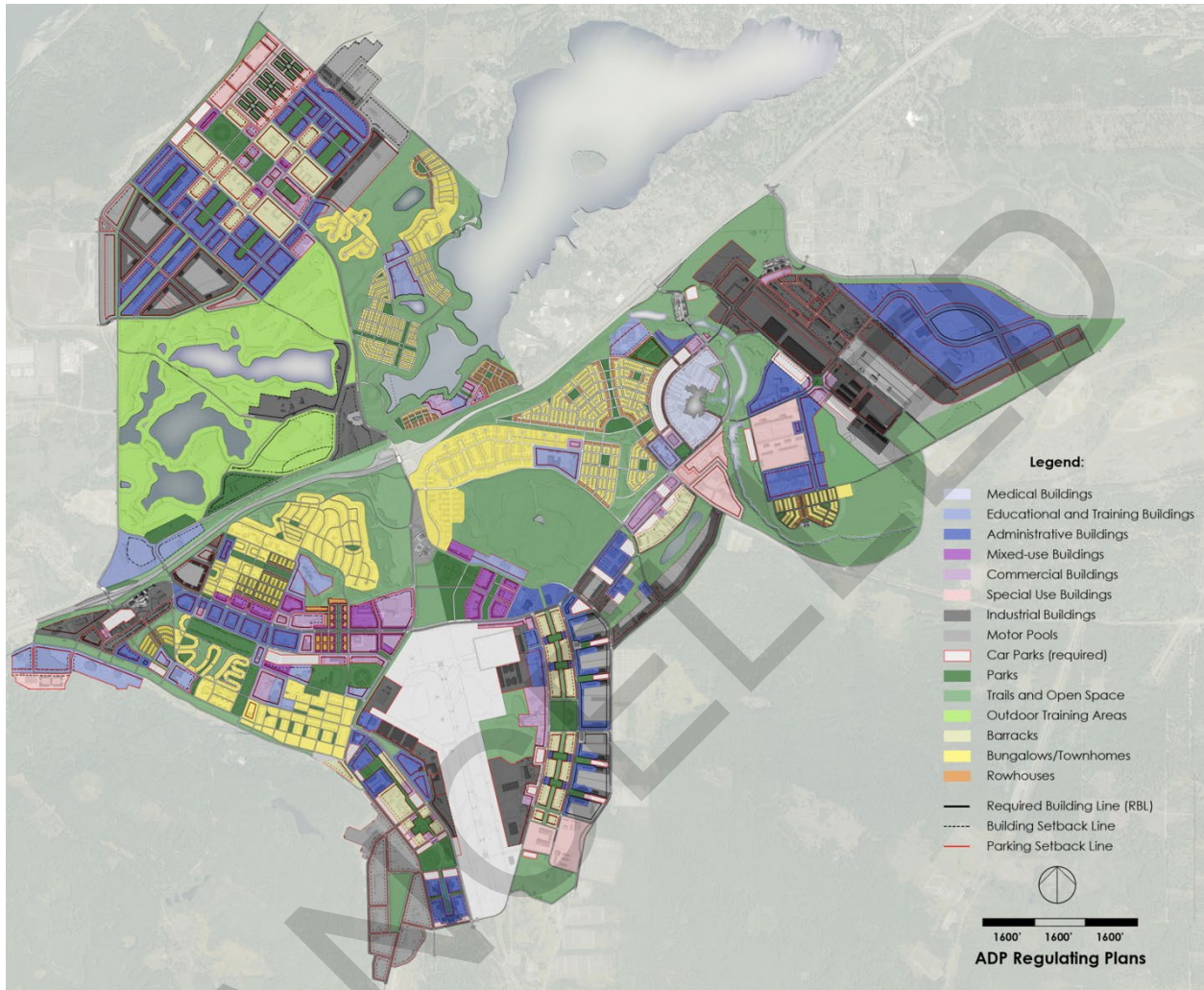


Figure B-2. Transportation Plan

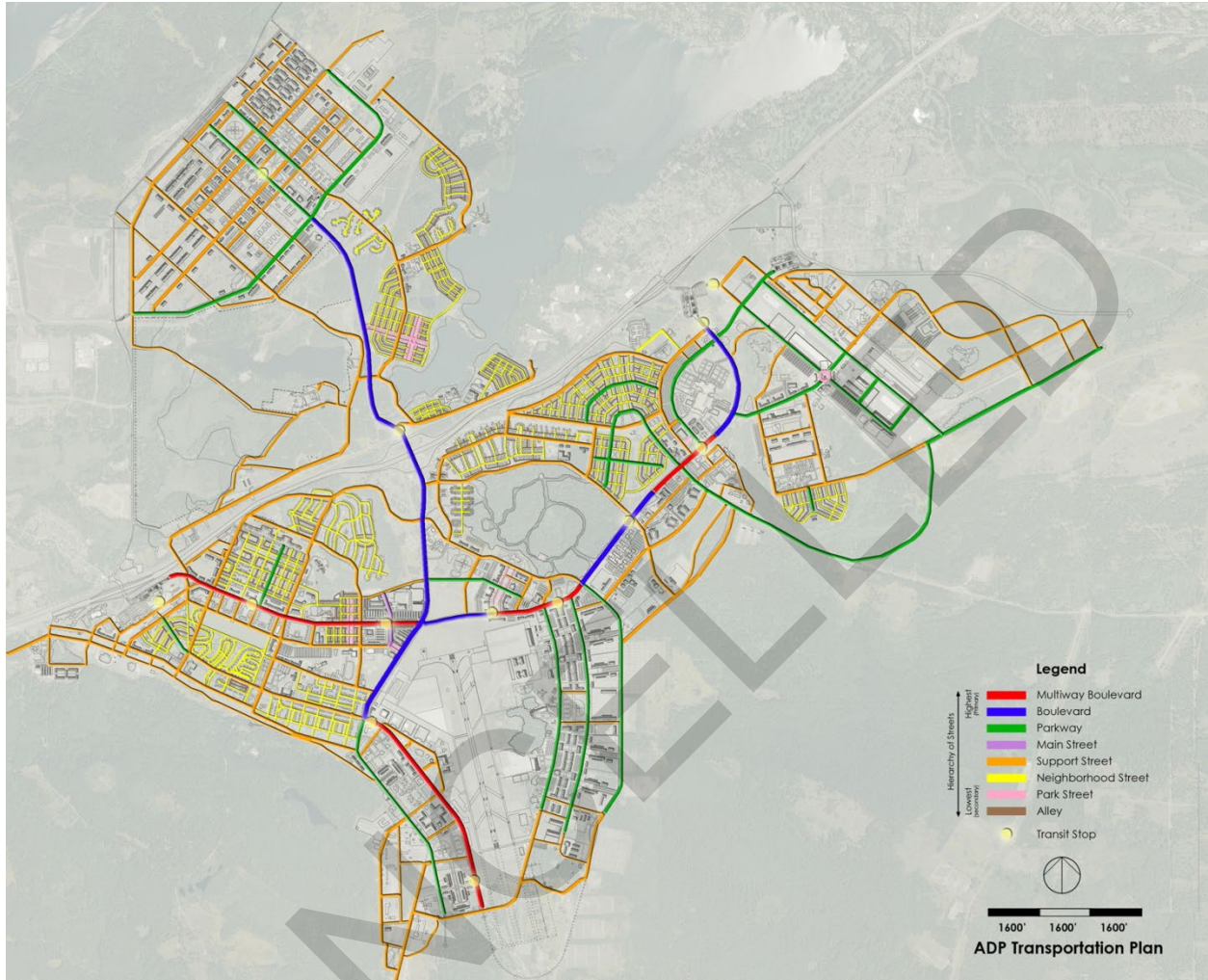


Figure B-3. Pedestrian and Bikeway Plan

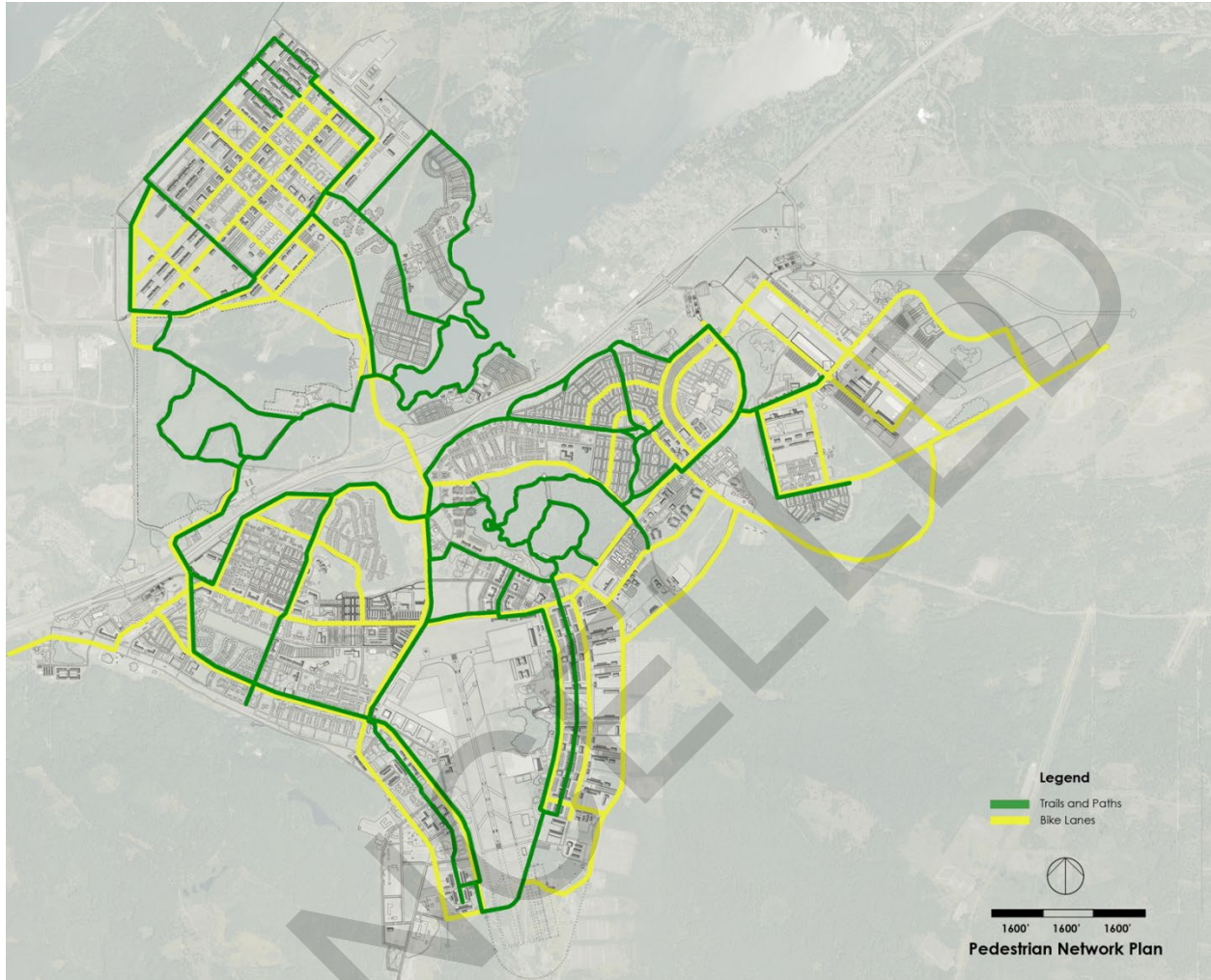


Figure B-4. Open Space Plan



As part of the Area Development Planning process, the planning team crafted *Installation Planning Standards* for streets, buildings, and landscapes. Additionally, within each ADP, the team documented the *Development Program*. A *Plan Summary*, referred to in the Army as the *Real Property Master Plan Digest*, documented the entire effort.

B-1.3 Plan Implementation.

The plan is seamlessly integrated into the installation's planning process. Upon completion, the Garrison Commander and the Senior Mission Commander endorsed the plan. Perhaps most importantly, the Regulating Plan is now used in the site approval process, and when proposed projects do not conform to the regulations, they are sent back to the project proponents for revision or reconsideration. Additionally, relevant elements of the plan are used to guide decisions of the Installation Planning Board and the Installation Sustainability Board.

Figure B-5. Street Transformation



The images above are from a street transformation at Joint Base Lewis-McChord and demonstrate how planning can be used to synchronize infrastructure and facility investments.

B-1.4 Key Performance Indicators.

Installation planning staff created a unique system to identify how well the installation is performing with regards to the Master Plan. Based on the planning vision, they identified five planning goals: enhanced mission capabilities, sustainable community, walkable neighborhoods, identifiable town centers, and great streets. These goals are operationalized through 39 design principles. Each principle has a rating that can be used to score conformance at any stage in the development cycle – from the current condition to complete build-out. The metric, which is referred to as a Sustainable Design Assessment, is based on a point system similar to LEED-ND (Neighborhood Development) and planning staff assign scores for each principal based on their assessment of the condition. This process is completed for each district on a regular basis to assess progress towards fulfillment of the planning vision. The results are graphically portrayed on a series of simple “target charts” that start at the center showing minimal conformance (red) and grow to the edge (green) as the number of points increase. The goal is to grow green. In addition to showing planners where work is needed to meet the planning vision, the target charts help leadership make funding and prioritization decisions.

Figure B-6. Target Chart Graphic (goal/2008/2017)



B-1.5 Benefits.

At Joint Base Lewis-McChord, the plan has been used to focus and guide development across the installation. It helps planners, stakeholders, and installation leadership make effective development decisions that conform to the planning vision but it also gives them flexibility through the Regulating Plan to accommodate new and changing mission requirements. The plan found room for two new Brigade Combat Teams and over 2,000 new housing units in a growth boundary defined by a cantonment that was previously considered built-out. As a result of incorporating principles of sustainable planning, at build-out, the plan will result in forecasted annual reductions of 11.4 million vehicle miles travelled, 12.9 million pounds of carbon emission, and per household gasoline costs of \$1,500.

B-2 FORT HUNTER-LIGGETT INSTALLATION DESIGN GUIDE.

In 2010 and 2011, planners and other installation staff worked together to create a series of planning documents for Fort Hunter Liggett, California. In addition to crafting Area Development Plans that conform to this UFC, they drafted a new Installation Design Guide (IDG) for Fort Hunter-Liggett. The Fort Hunter-Liggett IDG sets a new standard for these types of planning documents. Previously, such documents were several hundred pages long. Yet despite the length, they provided little specific guidance for planners. Rather, these documents provided details regarding construction, signage, and interior systems. The intent was that these detailed guides could be included in construction Requests for Proposals (RFPs). The reality, however, was different. These documents were typically too cumbersome to be used in RFPs and as a result they were not heavily used. At Fort Hunter Liggett, the goal was to use the IDG to provide specific guidance to planners with as few pages as possible. The Fort Hunter Liggett IDG sets the planning standards for streets, building, and landscapes.

B-2.1 Process.

Installation personnel and leaders worked to develop a vision, goals, and a complementary design language to address key planning issues facing Fort Hunter Liggett. The resulting planning vision, principles, and Framework Plan guided the preparation of three Area Development Plans. Using an evaluation of images of the built environment, analysis of the planning strengths and weaknesses found on the installation, and through a series of collaborative workshops and discussions, the group developed a vision for planning at Fort Hunter Liggett: *To create a flexible training environment surrounding an attractive small town with walkable main streets and a usable town square, where soldiers, civilians, and their families enjoy living and working.*

B-2.2 Purpose.

The purpose of the IDG is to provide specific design guidance for standardizing and improving the quality of the total environment of the installation. This includes not only the visual impact of features on the installation, but also the impact of projects on the total built and natural environment. The improvement of the quality of visual design and development, and the use of sustainable design and development practices has a direct impact on the quality of life for those who live, work, or visit the installation. The IDG is to be used by all individuals involved in decision-making, design, construction, and maintenance of facilities. The primary users include the following: Senior Mission Commander; Garrison Commander and Staff; installation facility planning and design personnel; installation facility maintenance personnel; U.S. Army Corps of Engineers project managers, design, and construction staff; consulting planners, architects, engineers, interior designers, and landscape architects; as well as supporting agencies such as the Exchange, DeCA, DoDDS, MEDCOM, tenants, etc. The IDG is organized to facilitate the preparation and execution of projects to improve the visual image on the installation and ensure that the design conforms to Army standards, including sustainability. Part I discusses the process, use, and implementation of the IDG. Part II

addresses the Building Envelope Standards, including setbacks, building form, building heights, and parking requirements. Part III establishes Transportation Standards for streets, intersections, service areas, and the pedestrian environment and includes recommended dimensions, treatment of bicycle lanes, street tree spacing, and methods of incompatible use screening. Part IV outlines Landscape Design Standards including objectives, guidelines, recommended plant selections, and plant spacing. Appendix A includes Installation Regulating Plans for reference purposes. Appendix B describes Aesthetic Design Guidelines including recommended colors and materials. Appendix C documents the vision, goals, and principles for the installation. Appendix D is a Technical Design Guide that outlines specific requirements for key installation construction elements.

B-2.3 Using the Installation Design Guide.

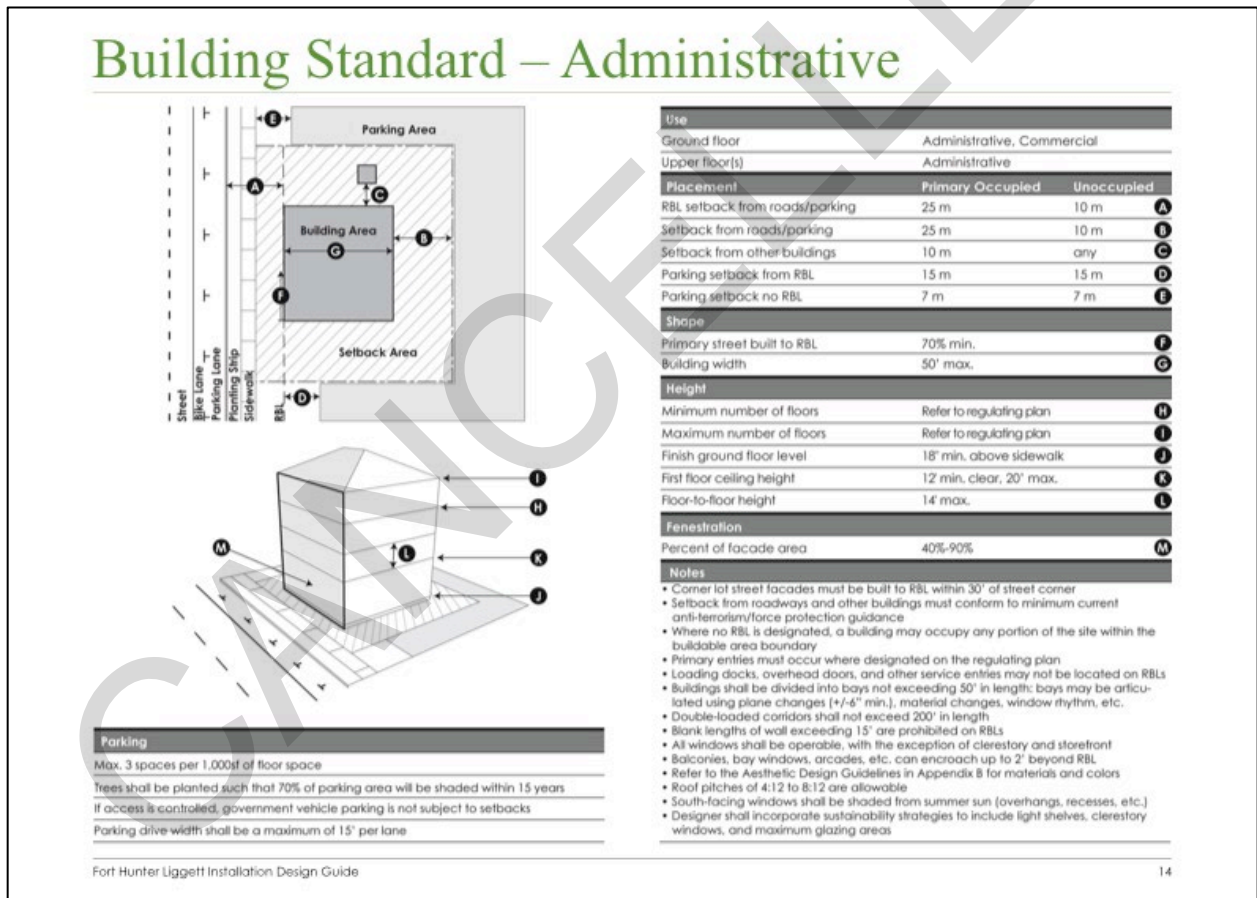
This IDG provides installation-specific design data. The general design concepts, recommendations, and standards addressed herein are applicable to construction and renovation projects at Fort Hunter Liggett, California. Planners use this IDG to determine the general design and construction considerations in the preparation of project plans. The IDG provides design guidelines and Army-wide design standards intended to be used in all projects, regardless of the funding source. The IDG is also used in developing requirements for programming documents for MCA construction (DD Form 1391), as well as cost estimates and preliminary and final designs (from both in-house and external design sources) involving exterior visual elements on the installation. The following steps illustrate how the design guide is used for the preparation of plans for new construction, renovation, maintenance and repair projects on the installation:

- Step 1: Review the design goals, objectives, and principles included in area development plan reports and Appendix C of the IDG.
- Step 2: Consult the regulating plan to determine the applicable standards for buildings, streets, and landscapes.
- Step 3: Review the applicable standards in Parts II-IV of the IDG.
- Step 4: Carefully analyze the existing conditions on the site and pay special attention to mature trees, riparian corridors, and building entries.
- Step 5: Design building form and site the project according to the Regulating Plan and appropriate standards.
- Step 6: Select building materials and colors from Appendix B of the IDG.
- Step 7: Select the appropriate landscape materials.
- Step 8: Assemble all plans documenting conformance to applicable standards and guidelines.

B-2.4 Building Envelope Standards.

The design character of an installation's buildings affects the installation's overall image. The building design component encompasses the character of the buildings as well as their relationships to one another and the environment. The continued preservation of historically and culturally significant structures adds to an installation's character. This section includes building envelope standards that regulate the form, setbacks, uses, and support requirements of any given construction project at Fort Hunter Liggett. Together with the Regulating Plan, these standards create a form-based planning practice that will facilitate mission readiness, energy-efficiency, and walkable development patterns in support of the installation's vision.

Figure B-7. Building Envelope Standards Graphic

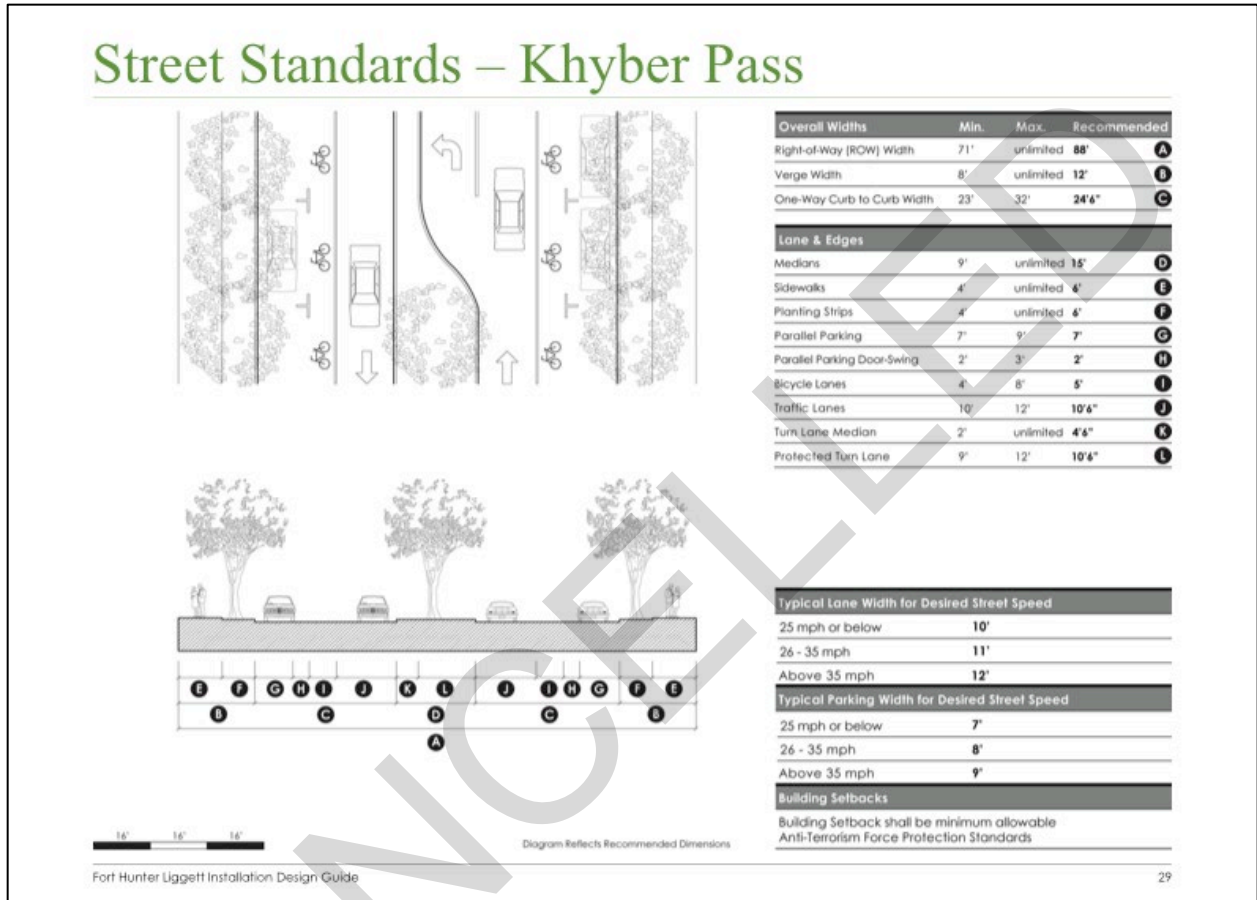


B-2.5 Street Envelope Standards.

The image and functionality of the installation is greatly determined by the design and location of roadways, walkways, entrances, and parking lots. The primary roadway system and parking lots utilize considerable amounts of land and are a visually

dominant element of any installation. This section provides detailed street, intersection, and parking standards for the installation.

Figure B-8. Street Envelope Standards Graphic



B-2.6 Landscape Design Standards.

The Landscape Design Standards address the selection, placement, and maintenance of trees, shrubs, and ground cover on the installation. The visual image conveyed by a military installation is defined not just by architectural character and site organization, but also by an attractive, organized landscape design. The presence of plant material on the installation greatly enhances the visual character and environmental quality of the installation. Plantings add an element of human scale to open spaces and can be used functionally to screen undesirable views, buffer winds, reinforce the hierarchy of the circulation system, or provide a visual transition between dissimilar land uses.

Figure B-9. Landscape Design Standards Graphic

Plant Material Selection – Trees

Pages 58-60 list various trees, shrubs, and ground cover plants to be used at Fort Hunter Liggett. The charts illustrate appropriate usage and spacing for each species. For additional recommendations, reference the plant list provided by Fort Hunter Liggett's Environmental Department.

Tree Species	Street Tree	Specimen/ Individual	Shade	Park	Fire- Tolerant	Drought- Tolerant	Spacing
California Sycamore <i>Platanus racemosa</i>	●	●		●			20' o.c.
Coast Live Oak <i>Quercus agrifolia</i>	●		●		●		25' o.c.
Box Elder <i>Acer negundo var. californicum</i>	●		●	●			30' o.c.
Hollyleaf Cherry <i>Prunus ilicifolia</i>		●			●	●	15' o.c.
California Laurel <i>Umbellularia californica</i>	●	●	●	●			30' o.c.
Western Redbud <i>Cercus occidentalis</i>		●	●	●		●	10-15' o.c.
California Juniper <i>Juniperus californica</i>		●	●	●		●	Individual
Valley Oak <i>Quercus lobata</i>		●	●	●	●		Individual
Desert Ironwood <i>Olneya tesoto</i>		●				●	15' o.c.

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B-3 EGLIN AIR FORCE BASE INSTALLATION DEVELOPMENT PLAN.

The Eglin Air Force Base Installation Development Plan (IDP) is the first example of an Air Force Base implementing a new model for what was previously called the General Plan. The model builds on the requirements described in this UFC and adds unique Air Force requirements to the planning process and products.

B-3.1 Process.

The process at Eglin AFB began with an installation-wide visioning workshop that brought together stakeholders from across the installation. They developed a planning vision, goals, and objectives; analyzed the installation's strengths, weaknesses, opportunities, and threats; and crafted the Framework Plan with its identifiable districts and key development concepts.

B-3.2 Format.

The Installation Development Plan for Eglin AFB follows the format called for in the Air Force Instruction on Comprehensive Planning. The components are as follows:

B-3.2.1 Commander's Cover Letter.

This letter serves as an endorsement of the plan and gives the Commander an opportunity to highlight the importance of the plan and reinforce the plan's key elements. Inclusion of such a letter recognizes the value of engaging senior leadership in the planning process.

B-3.2.2 Table of Contents.

While the contents are unique to each installation, the format is consistent across installations.

B-3.2.3 Executive Summary.

The key plan highlights are described in the Executive Summary, which becomes an efficient tool for decision-makers.

B-3.2.4 Plan Alignment.

In this section, planners describe the link to Executive Orders, DoD policy (including this UFC), Air Force Instructions, Air Staff and Major Command guidance for Civil Engineering, and the installation's unique mission, goals, and objectives as well as the installation's planning vision. The planning documents must be aligned with this higher guidance in order to be comprehensive and relevant.

B-3.2.5 Installation Setting.

Installations exist within a wider physical, social, and cultural context that reaches into the adjacent regional setting. This relationship should be described and should include an analysis of key regional patterns including demographics, transportation and land-use, and other relevant issues. The installation's history, mission, and internal demographics should also be described.

B-3.2.6 Planning Constraints.

All significant operational, natural, and built constraints to development should be identified and described in narrative and/or graphic form.

B-3.2.7 Installation Capacity Opportunities.

The capacity of the installation should be determined and described in five areas of Mission Operations, Mission Support, Quality of Life, Natural/Cultural and Built Infrastructure.

B-3.2.8 Sustainability Indicators.

The Air Force currently tracks numerous indicators that can be used as measures for sustainability. These include air quality, energy use, water conservation (quality and

quantity), encroachment, community planning, non-hazardous waste reduction, renewable energy and space optimization.

B-3.2.9 Future Development Planning.

This section outlines future plans, planning districts, area development plans if completed, future transportation plans, future alternative scenarios, and linkages to related component plans.

B-3.2.10 Plan Implementation.

This is the program for development. This section includes the following elements: 1) Short Range Development Plan (1-5 years); 2) CIP Plan Achievement Matrix; 3) Medium Range Development Plan (5-10 years); 4) Long Range Development Plan (11-20 years); and 5) Installation Development Plan (color coded by development timeframe).

B-3.2.11 Land Pattern Matrix.

As described in this UFC, planners should not determine district boundaries based solely on uses within the district. In fact, most districts will contain multiple, compatible uses. In recognition of this fact, planners at Eglin AFB developed a Land Pattern Matrix that documents the types of uses allowed within each district. The matrix uses Category Codes, which are commonly understood facility designations, to simply identify appropriate uses within each district.

B-4 OPERATION OF AN INSTALLATION PLANNING BOARD.

B-4.1 Primary Responsibilities of the IPB.

The IPB will ensure the orderly development and management of installation real property in support of the planning vision and the installation mission. The board will guide the development and maintenance of all components of the Master Plan, and assist in ensuring that the Master Plan addresses all real property requirements for all agencies and activities on the installation and supported area; reflects changes in installation missions and the military community's current or future development plans, with full consideration of, and respect for, regional and local communities.

B-4.1.1 Coordination.

The IPB will ensure that the Master Plan is coordinated with:

- a. Adjacent and nearby installations.
- b. Other activities and land use of DOD and federal agencies.
- c. Federally recognized Native American tribes, recognized Alaskan native entities, and native Hawaiian organizations.

- d. Local agencies and planning commissions of neighboring cities, counties, and states for mutual development concerns, encroachment issues impacting range operations and training, and environmental issues. (Established intergovernmental coordination processes will normally be followed.)
- e. Interested non-governmental groups and associations, state recognized tribes, businesses, and concerned individuals.
- f. State Historic Preservation Officer (SHPO).

B-4.2 Additional Responsibilities of the IPB.

The IPB will also:

- a. Approve installation architectural and design themes, as set forth in the Installation Planning Standards; monitor compliance, and adjudicate conflicts and variances from the established standards.
- b. Develop plans and programs that are in harmony with, protect, and enhance the environment, fully observant of sustainable design and development policies and objectives.
- c. Ensure maximum use of existing facilities; oversee the assignment and reassignment of space within existing facilities; monitor land use; and adjudicate conflicts in facility, land use, or assignments.
- d. Oversee actions to realign, clean up, impose land use controls, and close the installation or locations supported by the installation, as required.
- e. Resolve Master Plan disputes between competing organizations on the installation.
- f. Adjudicate variances from the Installation Planning Standards and forward for approval.

B-4.3 Composition of the IPB

The IPB is comprised of members or alternates, appointed on orders, and organized as follows:

- a. Chair. The chair is designated by each service and could be the senior commander or garrison/base/installation commander.
- b. Voting Members:
 - The Chair
 - Military or civilian commanders of civil engineering, public works, or appropriate equivalent. This individual will also serve as the executive secretary of the board.

- The director/chief of each principal and special staff section of the organization, the environmental coordinator or NEPA Planner, and other staff members designated by the IPB Chair.
 - The Commander or appointed representative of each unit or independent activity designated by the Commander, including guard and reserve activities occupying real property administered by the Commander. This includes all activities located within the boundaries of the installation or at physically separate sites for which the Commander has real property master planning responsibilities.
 - For installations with a high number of historic properties, it is recommended that the installation cultural resource manager be an IPB member.
- c. Guests. The Chair may invite guests to IPB meetings. Guests may include representatives of U.S. or host nation regional and local governments, representatives of planning agencies in the community, non-governmental groups, Federally recognized tribes, Alaska Native corporations, Native Hawaiian organizations, and property or business owners in the community affected by IPB planning decisions.
- d. Service-specific requirements may override composition and voting members of the IPB as appropriate.

B-4.4 Meetings of the IPB.

The meeting schedule and operations of the IPB will be determined by each service. Generally, the secretary will prepare the meeting agenda, read-ahead packages, and perform other administrative tasks. The minutes will record voting members present and absent; associate member attendance; and topics discussed, including issues, points of discussion, board recommendations with vote tally, if appropriate, and decisions made.

B-4.5 Approval Responsibilities.

The IPB will recommend formal approval of:

- a. All components of the Master Plan and the resources required to prepare and to maintain them.
- b. Variances from planning requirements established by the Regulating Plan and the Planning Standards
- c. Priorities and funding of Master Plan projects and other related resource issues.
- d. Real property utilization and space assignment resolutions.
- e. Other items within the purview of the board's charter, as designated by the Commander.

APPENDIX C GLOSSARY – ABBREVIATIONS

AAFES – Army Air Force Exchange Services (also called the Exchange)

ADP – Area Development Plan

AFIT – Air Force Institute of Technology

AICP – American Institute of Certified Planners

AICUZ – Air Installations Compatible Use Zone

APA – American Planning Association

AT – Anti-Terrorism

BES – Building Envelope Standard

CRM – Cultural Resources Manager

DCIP – Defense Critical Infrastructure Program

DCI – Defense Critical Infrastructure

DeCA – Defense Commissary Agency

DOD – Department of Defense

DoDEA – Department of Defense Education Activity

EIAP – Environmental Impact Analysis Process

ERP – Environmental Restoration Program also called Installation Restoration Program (IRP)

FPD – Federal Planning Division

HVAC – Heating, Ventilation, and Air Conditioning

IPB – Installation Planning Board

LID – Low-Impact Development

MCCS – Marine Corps Community Services

MFH – Military Family Housing

MILCON – Military Construction

MPI – Master Planning Institute

MWR – Morale, Welfare, and Recreation

NAF – Non-Appropriated Funds

NEPA – National Environmental Policy Act

NEX – Navy Exchange

O&M – Operations and Maintenance (Funding)

PPBES – Planning, Programming, Budgeting, and Execution System

RAICUZ – Range Air Installations Compatible Use Zone

RFP – Request for Proposal

SES – Street Envelope Standard

SHPO – State Historic Preservation Officer

TOD – Transit Oriented Development

USACE – U.S. Army Corps of Engineers

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APPENDIX D GLOSSARY – TERMS

Area Development Plan (ADP)

These plans show the proposed detailed development of a district on the installation. The ADP should show both short-term and long-range development. Each ADP will be described with an Illustrative Plan, Regulating Plan, and Phasing Plans.

The ADP supports the Master Plan by addressing and resolving localized comprehensive planning issues. ADPs are created for geographically identifiable districts.

Building Envelope Standard (BES)

These standards regulate acceptable massing, height, fenestration, exterior envelopes, and uses.

Carrying Capacity

The carrying capacity is the maximum capability of the installation to support designated functions or activities without seriously degrading the function, activity, or assets of the installation or some portion thereof. Some examples are ability of the land to support training at certain levels of intensity, or availability of utilities (water, electricity, sewer) to support an activity, or ability of the transportation network to carry levels of traffic safely and efficiently.

Defense Critical Infrastructure Program (DCIP)

The Defense Critical Infrastructure Program is a Department of Defense risk management program that seeks to ensure the availability of Defense Critical Infrastructure (DCI). Activities include identifying and determining risks to DCI, implementing DOD-wide procedures to respond to DCI risks and supporting DOD initiatives to respond to risks to national critical infrastructure. The Public Works Sector, which includes the Services Installations, is the backbone infrastructure that supports most of DOD's mission requirements. DCIP Public Works ranges from the commercial utility provider to the installation distribution system.

District

A district is an identifiable geographic area based on compatible but not solely single uses. A single district may contain administrative, commercial, and residential uses. A base is comprised of adjacent districts (i.e. downtown, midtown, industrial, airfield, trainyards, munitions storage, campuses).

Edge

An edge is the dividing line between districts – when two districts are joined at one edge they form a seam. The termination of a district is an edge. Edges are linear elements (e.g. shores, railroads, edges of development, riparian corridors, installation boundaries). Generally, paths (e.g. roads) are not considered edges unless they clearly mark a demarcation between geographic areas.

Expansion \2\ Capacity /2/

The expansion capacity is the potential for an installation to successfully accommodate mobilization requirements or the stationing of additional missions, units, activities, individuals, or functions.

Facility

A real property entity consisting of one or more of the following: a building, a structure, a utility system, pavement, and underlying land.

Form-Based Planning

Form-based planning guides construction by identifying the form for installation development (building types, height, set-backs, circulation patterns, landscaping, land use, etc.) and translating that form into a series of planning requirements. The form that this practice supports reflects mission needs, program requirements, environmental constraints and opportunities, and other development factors.

Framework Plan

This conceptual plan of the entire installation shows the identified ADP districts, key transportation and land use concepts, and other significant features that will influence development patterns. To establish ADP boundaries, planners should use geographic features, key transportation systems, and existing land use patterns. Within the installation, where succinct districts are not identifiable, specific land uses should be identified.

Future Development Plan

The Future Development Plan is an installation-level plan with all projects in the \2\ Development Program /2/ assigned to developable sites in order to deconflict future development.

Geographic Information System (GIS)

This is a collection of computer hardware, software, and geographic data for capturing, storing, manipulating, analyzing, and displaying all forms of geographically referenced information.

Historic District

An identifiable geographic area that has been determined to be eligible for or has been listed on the National Register of Historic Places.

Historic Property

As defined in Section 106 of the National Historic Preservation Act, an historic property is a building, structure, object, district or site (archaeological) that has been determined eligible for or is listed on the National Register of Historic Places

Illustrative Plan

Illustrative plans are graphic plans that illustrate potential development supporting the overall planning vision. The illustrative plan shows existing and future streets, building

footprints, sidewalks, parking, major landscape features, and key mission areas. Each ADP has an Illustrative Plan.

Installation Development Plan (IDP)

The Installation Development Plan is a combined plan that integrates all the installation's Area Development Plans, Illustrative Plans, and Regulating Plans into one consolidated plan. The IDP also includes installation-wide network plans for streets, sidewalks, parks and open spaces, and primary utilities.

Installation Planning Board (IPB)

The IPB is a board consisting of members of the command, operational, engineering, planning and tenant interests of the installation or community that advises mission commanders regarding planning decisions. The IPB will assist the installation leadership in managing, developing, and in some cases realigning, cleaning up, and closing the installation, supported sites, or area facilities and real estate.

Landmarks

Landmarks are readily identifiable objects that serve as reference points. Examples include gates, memorials, and headquarters buildings. Landmarks are singular points on a map.

Landscape Standards

Landscape standards show appropriate type and placement of major landscape elements (street trees). These standards may also include other natural landscape features (trees, ground cover, etc.) and manmade landscape features (street furniture, signage, lighting, etc.).

Network Plans

Network Plans cover linkages and systems that span ADP district boundaries. These include installation-wide utility systems, street and transit networks, and parks and open space networks.

Nodes

Nodes are centers of activity within a district (e.g. town squares, community centers, plazas, intersections, etc.). Walking radii of $\frac{1}{4}$ mile and $\frac{1}{2}$ mile should be shown around each node, identifying amenities within a 5- and 10-minute walk.

Path

Paths are channels in which people travel. At the installation level, primary roads and transit routes are paths. In a more detailed plan, sidewalks, trails, and secondary streets can also be considered paths.

Phasing Plan

A phasing plan depicts all relocation, demolition, and construction actions as they occur over time and in a way that moves the installation from its current state to the final state shown on the Illustrative Plan.

Planning, Programming, Budgeting, and Execution System (PPBES)

This is the DOD's primary resource management system. It constitutes a major decision-making process. It ties planning, programming, and budgeting together. It forms the basis for building a comprehensive plan in which budgets flow from programs, programs flow from requirements, requirements from plans and missions, and missions from national security objectives. The system integrates centrally managed programs for manpower; research, development, and acquisition; and stationing and construction. The system also integrates the operations and maintenance budgets and needs for manpower, housing and construction. It supports budget preparation from installation to departmental level. During execution, it provides feedback to the planning, programming, and budgeting process.

Regulating Plan

These graphic plans regulate the most important elements of the Illustrative Plan. They are like enhanced land-use plans. Each Regulating Plan will show buildable area, required build-to lines, required entry and parking locations, minimum and maximum building heights, and acceptable uses (as designated by facility envelope standards). Each ADP has a Regulating Plan.

Stationing or Basing Actions

Stationing or basing actions involve the process of combining force structure and installation structure at a specific location to satisfy mission requirements.

Street Envelope Standards (SES)

These standards describe and graphically present allowable street types and circulation elements in plan and section. They can also be referred to as Street Standards.

Sustainable Planning

Sustainable planning meets the needs of the present without compromising the ability of future generations to meet their needs. The inter-relationship between environments, resources consumed, waste products, and use of facilities and land must be carefully designed and developed to preclude permanent damage to the future environment.

Tenant Unit, Agency, or Activity

These terms refer to a unit, agency, or activity that occupies facilities on an installation and receives support services from that installation.

Viewshed

Viewsheds are view corridors that should not be blocked. Development should be appropriately sited to take advantage of natural viewsheds.

Vision

This is the Commander's statement on how the installation will develop and improve over the next 20 years to adapt to the modernizing world, the changing military mission, and our changing society. It expresses the desired relationship between the installation and the surrounding communities and the desired interaction of installation functions, activities and land uses. It also expresses how the installation Commander will satisfy

future mission needs while maintaining excellent stewardship of the environment. Installations consist of people as well as land and infrastructure. Therefore, the vision should express how quality of life remains a paramount issue in the operation, management and development of the installation.

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APPENDIX E PLANNING PRINCIPLES

E-1 PURPOSE.

The purpose of this appendix is to outline specific planning principles applicable to military planning. Listed below is an example scorecard tool that organizes the principles into categories that support relevant planning strategies discussed in this UFC. In establishing this scorecard, rather than develop a new set of principles, this example adopts selected principles from the U.S. Green Building Council's LEED-Neighborhood Development program (revised in February 2011) and adds appropriate principles tailored to military needs. It is highly recommended that using a scorecard tool is effective in guiding sustainable energy efficient development. While this scorecard is a good foundation, Services and their installations are encouraged to leverage their innovation, originality, and flexibility formulating their unique measurement tools.

E-2 PROCESS.

Planners shall evaluate the existing condition at each district to determine a baseline score and then evaluate the approved ADP Illustrative Plan to determine the maximum possible score based on the projected final conditions shown in the Illustrative Plan. Requirements are identified with an "R" in the table and credits are identified with maximum points allowable.

Figure E-1. Principles for Military Development Criteria Table

Military Development Sustainability Credit Designation		Credits Available (note 1)
SUSTAINABLE PLANNING (SP)		59 max
SP1	Compact Development*	R
SP2	Compact Development*	6
SP3	Mixed-Use Neighborhood Centers*	4
SP4	Reduced Parking Footprint*	1
SP5	Street Network*	2
SP6	Transit Facilities*	1
SP7	Community Outreach and Involvement* (note 3)	2
SP8	Tree-Lined and Shaded Streets*	2
SP9	Water-Efficient Landscaping*	1
SP10	Existing Building Reuse*	1
SP11	Historic Resource Preservation and Adaptive Use*	1
SP12	Stormwater Management*	4
SP13	Heat Island Reduction*	1
SP14	Solar Orientation*	1

SP15	On-Site Renewable Energy Sources*	3
SP16	District Heating and Cooling*	2
SP17	Wastewater Management*	2
SP18	Solid Waste Management Infrastructure*	1
SP19	Close-in Training	2
SP20	Hidden Parking	6
SP21	Car Parks	6
SP22	Mixed-Use Buildings	5
SP23	On-Installation Housing	5
NATURAL AND CULTURAL RESOURCE PRESERVATION (RP)		5 Max
RP1	Imperiled Species and Ecological Communities*	R
RP2	Wetland and Water Body Conservation*	R
RP3	Floodplain Avoidance*	R
RP4	Range and Training Land Conservation	R
RP5	Steep Slope Protection*	1
RP6	Site Design for Habitat or Wetland and Water Body Conservation*	1
RP7	Restoration of Habitat or Wetlands and Water Bodies*	1
RP8	Long-term Conservation Management of Habitat or Wetlands and Water Bodies*	1
RP9	Minimized Site Disturbance in Design and Construction*	1
HEALTHY COMMUNITY PLANNING (HP)		17 Max
HP1	Walkable Streets*	R
HP2	Porches	R
HP3	Walkable Streets*	12
HP4	Access to Civic and Public Spaces*	1
HP5	Access to Recreation Facilities*	1
HP6	Visitability and Universal Design* (note 4)	1
HP7	Local Food Production* (note 5)	1
HP8	Neighborhood Schools*	1
DEFENSIBLE PLANNING (DP)		
DP1	AT/FP Compliance	R
MAXIMUM POSSIBLE SCORE		81
CERTIFICATION LEVELS		
	Certified	42-51
	Silver	52-61
	Gold	62-71
	Platinum	72-81
NOTES		
1	Applicable LEED-ND criteria is incorporated by reference from LEED-ND (2009) revised February 2011. R refers to a Prerequisite and Credits are indicated with variable points possible. LEED-ND criteria are shown with an asterisk.	
2	The requirement for a connected community applies to land within the installation only. The prohibition against gated communities applies only to districts or neighborhoods within the installation.	
3	Community outreach and involvement applies to on-installation populations only.	
4	Universal design applies to 5% of housing units - not the 20% noted in LEED-ND	
5	Local food production allowance should be stated in the Master Plan and not in CC&Rs.	

E-3 APPLICABILITY.

The principles are applicable at the Area Development Plan scale prior to construction. All new ADPs should be evaluated using this criteria. The DOD goal is to have all ADPs perform at the silver level. Industrial ADPs and Flightline ADPs are exempt from the housing requirements of the criteria

E-4 MILITARY DEVELOPMENT CRITERIA.

Planners can refer to LEED-ND (2011 revision) for detailed explanations of all the LEED-ND criteria noted in the table above. However, for the Military Development Criteria, planners shall refer to the below descriptions.

E-4.1 Prerequisite: AT Compliance – Required

Ensure that personnel are protected from possible terrorist attack. All new facilities sited as part of the project conform to the latest Unified Facilities Criteria or approved local guidance on anti-terrorism.

E-4.2 Prerequisite: Range and Training Land Conservation - Required

Preserve mission critical resources by protecting range and training land from development. Locate the project such that 0% of the development area is located on installation-designated range and training land.

E-4.3 Prerequisite: Narrow Buildings - Required

Improve productivity and indoor air quality and reduce energy costs using natural lighting and ventilation.

- As measured by total floor area, 90% of administrative, medical, commercial, and residential type facilities are designed at a maximum width of 50 feet. Hangars, warehouses, and retail facilities are exempt from this requirement.

AND

- The same facilities must be designed to include operable windows that provide daylight and natural ventilation to 75% of all regular occupants of building.

E-4.4 Prerequisite: Multi-Story Buildings - Required

Reduce automobile use, infrastructure requirements, and land consumption by using vertical construction.

- As measured by total floor area, 90% of all new facilities sited must be two stories or more. Hangars, weapon storage facilities, and warehouses are exempt from this requirement.

E-4.5 Prerequisite: Alleys - Required

Improve pedestrian safety, reduce automobile use, and support neighborhood cohesion by using alleys in all military family housing neighborhoods, whether funded by MILCON or privatized housing partners.

- Alleys with paving widths of no more than 15 feet will be used for all new housing and incorporated into redevelopment plans for existing housing except in areas with extreme topographic conditions.
- All garages and carports will be placed off of the alleys.

E-4.6 Prerequisite: Porches - Required

Improve pedestrian safety, reduce automobile use, and support neighborhood cohesion by placing front porches on all single-family and duplex, and triplex homes in military family housing neighborhoods, whether funded by MILCON or privatized housing partners.

- Porches shall be a minimum six feet deep and ten feet wide.
- Porches shall be elevated from the street level by at least three risers. Universal access shall be through alley access or ramps
- Rowhouses and townhomes with at least four connected units can use stoops in place of porches. Stoops must be a minimum four feet deep and six feet wide and they must be at least three risers above the street level.

E-4.7 Prerequisite: Planting Strips - Required

Improve pedestrian safety, enhance stormwater management, and provide locations for regularly placed street trees by using planting strips between the curb and sidewalks.

- Planting strips shall be a minimum of five feet wide and located on both sides of all streets where sidewalks are used. This does not apply to “downtown” streets that have sidewalk widths of greater than 14 feet and regularly spaced street trees in tree gates no farther than 25 feet on center.

E-4.8 Credit: Close-In Training – 2 Points

Provide mission critical open spaces for physical training and formations needed to train Soldiers within close proximity of their workplaces.

- Site one square foot per Soldier of open space within a $\frac{3}{4}$ -mile radius of any Company Operations Facility. Number of Soldiers determined by number of occupants currently using (or planned) for that facility.

Consolidated open spaces are encouraged, provided they fall within the required radius.

E-4.9 Credit: Hidden Parking – up to 6 Points

Improve health and safety of residents and reduce impacts of automobile use by improving walkability of streets by placing commercial and residential parking to the rear or to the side.

- Locate 90% of off-street parking commercial uses to the rear or to the side of the structure (3 points)
- With the exception of visitor parking, locate all off-street parking for residential units to the rear of the structure and provide alley access (3 points)

E-4.10 Credit: Car Parks – up to 6 Points

Improve stormwater retention, reduce heat islands, reduce land consumption per parked vehicle and improve life of paving areas through parking lot design.

- In all surface parking lots with more than one bay of parking, place planting strips between every bay. Planting strips must be at least 15 feet wide and planted with shade providing trees, placed 25 feet apart (2 points).
- An additional two points can be gained if the planting strips are designed to handle the entire stormwater runoff requirements of the parking lot. Design to accommodate a one year 24 hour design storm (2 points).
- An additional two points can be gained if the paving is pervious surfacing (2 points).

E-4.11 Credit: Mixed-Use Buildings – up to 5 Points

Reduce land use and automobile usage through mixing compatible uses in a single structure.

- Locate at least one mixed-use building within the highest density square mile of the project (1 point), or
- Locate at least two mixed-use buildings within the highest density square mile of the project (2 points), or
- Locate at least three mixed-use buildings within the highest density square mile of the project (3 points)
- Locate at least four mixed-use buildings within the highest density square mile of the project (4 points), or
- Locate at least five or more mixed-use buildings within the highest density square mile of the project (5 points)

E-4.12 Credit: On-Installation Housing – up to 5 points

Increase the amount of family housing on the installation to reduce carbon emissions associated with commuting, reduce congestion at gates and on local roads, reduce family expenses associated with commuting, and support a more vibrant installation. To calculate the amount of housing per district, first identify the total military population and the total area of the cantonment (installation land area less range and training land). Then identify the total area of the district and determine the percentage of total installation land area within the district. Each district should hold the percentage of housing proportional to its land area. For example, if the installation is providing housing for 30% of assigned military families and the area of the district represents 50% of the area of the cantonment, then, to get 1 point of credit, the district needs to provide for 15% of the total housing inventory.

- Provide proportional housing within the district for 30% of assigned military families on the installation (1 point), or
- Provide proportional housing within the district for 40% of assigned military families on the installation (2 points), or
- Provide proportional housing within the district for 50% of assigned military families on the installation (3 points), or
- Provide proportional housing within the district for 60% of assigned military families on the installation (4 points), or
- Provide proportional housing within the district for 70% of assigned military families on the installation (5 points).

APPENDIX F MASTER PLANNING TRAINING

Master Planning Training is highly encouraged throughout DOD. Noted below are recommended guidelines for continuing education.

F-1 TRAINING FOR DOD MASTER PLANNERS.

All DOD employees employed as master planners are highly encouraged to complete at least 32 hours of professional continuing education related to master planning topics every two years. Training may count for multiple requirements (e.g. for AICP, PE, USGBC, AIA, ASLA, and/or continuing education credits and the fulfillment of this requirement) simultaneously. In addition, training and educational opportunities to support pursuit of AICP certification should be supported by each service.

F-2 TRAINING FOR INSTALLATION COMMANDERS.

New Garrison Commanders (Army), Installation Commanding Officers (Navy and Marine Corps), and Wing Commanders, Mission Support Group Commanders, and Civil Engineers (Air Force), are highly encouraged to have at least 4 hours of master planning training before or within the first six months of assuming command in a venue determined by each service.

F-3 TRAINING FOR CONTRACTORS.

Contractor training is highly encouraged, and joint training with military planners should be made available whenever possible.

F-4 MASTER PLANNING INSTITUTE.

The Master Planning Institute, hosted by USACE, is a source for Master Planning training. The Master Planning Institute (MPI) coordinates opportunities to provide education and training for personnel working in planning throughout the Department of Defense. The MPI coordinates and publicizes courses available for master planners in each service, including the Comprehensive Planning Development course offered through The Civil Engineer School at the Air Force Institute of Technology (AFIT), the Navy planning course at Port Hueneme and other locations, and a suite of USACE Learning Center Proponent Sponsored Engineer Corps Training (PROSPECT) master planning courses offered by the Army Corps of Engineers. Please refer to www.dodmpi.org for more information. These programs offer a series of planning courses, symposiums, and practicums to promote the strategies of master planning as emphasized in this UFC.

Relevant Army PROSPECT courses include:

- Master Planning Principles (75)
- Master Planning \2\ Sustainability and Resiliency /2/ (163)
- Master Planning Practices (241)

- Master Planning Energy and Sustainability \2\ /2/ (258)
\2\ /2/
- Master Planning \2\ Programming and Siting /2/ (326)
- Master Planning \2\ Sustainable Historic Structures /2/ (392)
\2\ /2/
- Master Planning Visualization Techniques (948)
- Master Planning Advanced Techniques (952)

Relevant Air Force Institute of Technology Civil Engineer School Courses include:

- Project Programming (WENG 423)
- Comprehensive Planning Development (WENG 520)

Relevant Naval Civil Engineer Corps Officers School courses include:

- Facilities Planner (A-4A-0016)

Additional training opportunities available for master planners are offered through non-government sources, including the American Planning Association (APA). The Federal Planning Division (FPD) hosts a training workshop each year in conjunction with the APA's annual conference. The American Institute of Certified Planners (AICP) also offers courses and various training opportunities throughout the year.

APPENDIX G TYPICAL DATA LAYERS

When preparing a constraints map, planners should refer to data embedded in the installation's GIS system. Typical data layers referenced may include, but are not limited to:

- (1) Airfield Constraints
- (2) AT Restrictions
- (3) Quantity-Distance Arcs (Munitions Safety)
- (4) Noise Contours
- (5) Safety Buffers (setbacks required)
- (6) Former Firing Ranges and Impact Areas
- (7) Impact Areas (duded and non-duded)
- (8) Chemical Storage Areas
- (9) Topography
- (10) Wetlands
- (11) Threatened/Endangered Species Habitat
- (12) Protected Natural/Cultural Areas
- (13) Floodplains
- (14) Soil Restrictions
- (15) Environmental Contamination
- (16) Desirable and undesirable land use features off the installation
- (17) Land Use Controls
- (18) Landfills
- (19) Historic Districts
- (20) Transportation Systems
- (21) Open Space Systems
- (22) Utility Systems
- (23) Encroachment Areas
- (24) Areas Proposed for Disposal/Deconstruction
- (25) Cultural Resource/Archeological Sites
- (26) Pesticide Storage Areas
- (27) Pesticide-Sensitive Application Facilities and Areas
- (28) Surface and Subsurface Hazardous Material Storage
- (29) Existing Facility Assessment
- (30) Future Development
- (31) In/Out Grants
- (32) Overall Real Estate boundaries (borders, easements, etc.)
- (33) Access Control Points
- (34) Open and Closed IRPs
- (35) High Resolution Aerial Photography/ LIDAR Contour Mapping