

# UNIFIED FACILITIES CRITERIA (UFC)

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## INSTALLATION MASTER PLANNING



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**UNIFIED FACILITIES CRITERIA (UFC)**

**INSTALLATION MASTER PLANNING**

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NAVAL FACILITIES ENGINEERING COMMAND

AIR FORCE CIVIL ENGINEER CENTER (Preparing Activity)

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**This UFC supersedes UFC 2-100-01, *Installation Master Planning*, dated 25 October 2019.**

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## 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, its territories, and possessions 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 Military Department's responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Systems Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Technical content of UFC is the responsibility of the cognizant DoD working group. Defense Agencies should contact the respective DoD Working Group for document interpretation and improvements. Recommended changes with supporting rationale may be sent to the respective DoD working group by submitting a Criteria Change Request (CCR) via the Internet site 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://www.wbdg.org/ffc/dod>.

Refer to UFC 1-200-01, *DoD Building Code*, for implementation of new issuances on projects.

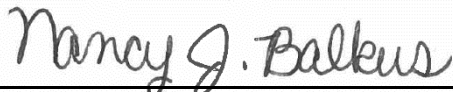
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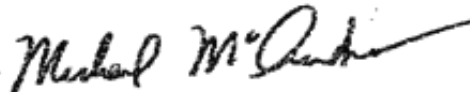
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## UNIFIED FACILITIES CRITERIA (UFC) REVISION SUMMARY SHEET

**Document:** UFC 2-100-1, *Installation Master Planning*

**Superseding:** UFC 2-100-1, *Installation Master Planning*, dated 25 October 2019, with Changes 1 and 2.

**Description:** 10 USC 2864 requires all major military installations to have a Master Plan. This specific document is issued under the authority of DoDI 4165.70, *Real Property Management*, which implements the requirement for installation Master Plans.

### Reasons for Document:

- Updates master planning processes and products, including energy and climate resilience and requirements for transportation and military installation resilience components as required by 10 USC 2864.
- Updates master planning processes and products to incorporate climate change effects as required by FY20 National Defense Authorization Act
- Administrative revisions to comply with UFC 1-300-01, *Criteria Format Standard*.

### Summary of Changes:

#### FY20 NDAA Changes:

- FY20 NDAA Section 2801(a): 3-4.b, 3-10.2, 4-2.1 (Requirement to have a Military Installation Resilience Component to the Master Plan).
- FY20 NDAA Section 2804(c) (i): 2-2.16, 2-5.1.1, 2-6, 2-8, 2-9, 2-9.1, 2-9.3, 3-5.6.1, 3-6.1.6, 3-5.5, 3-5.6.1, 3-5.7, 3-6.1.1, 3-6.1.3.c, 3-6.1.6, 3-6.4, 3-7, Appendix B (Verbiage changes to specifically identify climate and weather considerations in planning processes).
- FY20 NDAA section 2804(c)(ii): 3-5.6.2.a, 3-5.6.2.2 (Specifies certain agencies for climate change information).
- FY20 NDAA section 2804(c)(iv): 2-2.17.1, 3-10.2 (NAVFAC *Installation Adaptation & Resilience Climate Change Planning Handbook*).

#### Summary of Other Changes:

- Specific updates to institute DRSL database for sea level change: 2-2.17.1.2 (new paragraph), 3-5.6.1.
- Include use of the DoD Climate Vulnerability Assessment Tool: 2-2.17.1.1.
- Updates to incorporate explosive safety quantity-distance arcs: 2-2.1, 2-3.2, 2-9, 3-5.6.1, 3-5.7.1, D-3.

- Updates to reflect changes in UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*; adds reference to 4-020-01, *DoD Security Engineering Facilities Planning Manual*: 2-5.2
- Updates to the descriptions of aesthetics and Network Plan to provide greater fidelity on the requirement: 2-8.1.
- Clarification to Illustrative Plan description: 2-9.1.
- Clarifications to Plan-Based Programming: 2-11.
- Removed requirement for a land pattern matrix: 3-4.1.
- Clarifications to the Installation Street and Transit Plan for consistency with 10 USC 2864: 3-6.4.3.
- Clarifications to Program Development: 3-8.2.
- Added description of Functional Annexes to the requirements of the Master Plan to accommodate additional components of the Master Plan as required by 10 USC 2864: 3-4.2, 4-2.1.
- Add requirement for Installation Energy Plan per OSD Memo and 10 USC 2864: 3-10.1, 4-2.1, Appendix E.
- Added description of optional Functional Annexes: 3-10.
- Clarified the applicability of Appendix B and removed references to use LEED-ND criteria.
- Updated training courses in Appendix C.
- \1\ Added requirement to identify coordination efforts maintaining or enhancing military installation resilience or resilience of the community infrastructure: 3-10.2.7. /1/

**Impact:**

- Additional costs to complete the Installation Energy Plan (IEP) and Installation Climate Resilience Plan (ICRP) will be needed.
- Improved installation efficiency, safety, resilience, and mission sustainability.
- Enhanced integration of comprehensive planning and project programming activities.

**Unification Issues:** There are no unification issues.



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## CHAPTER 1 INTRODUCTION

### 1-1 BACKGROUND.

DoD is one of the world's largest builders, owners, and operators of infrastructure and is 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 evaluating factors affecting the present and future physical development and operation of an installation. This evaluation forms the basis for determining development objectives and planning proposals to solve current problems and meet future needs. Each step 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 resulting in a Master Plan. This process provides a means for sustainable, resilient, and energy-efficient installation development that supports mission requirements.

### 1-2 PURPOSE AND SCOPE.

10 USC 2864 requires all major military installations have a Master Plan. DoDI 4165.70, *Real Property Management*, establishes the requirement for installation Master Plans. This UFC prescribes DoD minimum requirements for master planning processes and products in accordance with DoDI 4165.70. The process includes the use of a Master Plan and its components as a tool to provide ongoing planning for installations in support of the mission. DoD planners utilize this UFC, the DoDI, and applicable agency instructions to prepare Master Plans and other planning documents. Affiliated design and programming professionals will 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 complete process for master planning (and ultimately the development of a Master Plan) through the preparation of linked plans (Functional Annexes) that can be implemented entirely or incrementally based on each installation's needs and resources. A successful Master Plan:

- Provides timely and correct planning information and real property support for installation missions and supports informed decision-making.
- Promotes cooperative and interactive intra- and inter-Service and inter-governmental relationships.
- Incorporates infrastructure, assurance, and anti-terrorism considerations.
- Incorporates climate resilience analysis to ensure mission sustainment over the intended lifespan of the infrastructure and assets.

- Incorporates environmental planning to identify environmental impacts and protect and enhance natural, cultural, and environmental resources while supporting mission requirements.
- Supports and encourages sustainable and energy-efficient development.
- 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.
- Maintains an accurate audit trail of master planning and real property decisions.
- Ensures efficient and compatible land use (identifying and respecting natural and man-made constraints) and maximizes facility utilization.
- Provides input to the privatization of family housing, utilities, and services.
- Sustains ranges and training areas to meet training and testing missions on a consistent and long-term basis.
- Identifies resource requirements directly and indirectly associated with real property sustainment and development.
- 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 missions and/or users.
- Encourages policies and interaction with the local community to avoid encroachment and maximizes opportunities for joint use while preserving mission capability and growth potential.
- Supports federal energy mandates.
- Creates connected and visually pleasing environments by coordinating development, removing clutter, enforcing consistent architectural themes, creating appropriate pedestrian and vehicle circulation patterns, and focusing attention on installation appearance, which can enhance quality of life and contribute to the overall mission.
- Informs and is informed by related plans at each installation, including energy plans, utility capacity plans, range complex Master Plans (RCMP), anti-terrorism (AT) plans, integrated cultural and natural resource management plans, sustainability plans, and transportation plans.
- Supports mitigation of environmental hazards and encroachment as well as effective integration of air installation compatible use zone (AICUZ) and range air installation compatible use zone (RAICUZ) constraints and mission synergy.



### **1-3 APPLICABILITY.**

This UFC is 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 the Services' mission requirements. These requirements serve as the primary planning consideration and 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 to meet current and future 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 UFC, 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, Service-specific processes and procedures may be used where appropriate, provided they are consistent with this UFC.

### **1-4 GENERAL BUILDING REQUIREMENTS.**

Comply with UFC 1-200-01, *DoD Building Code*. UFC 1-200-01 provides applicability of model building codes and government unique criteria for typical design disciplines and building systems, as well as for accessibility, antiterrorism, security, high performance and sustainability requirements, and safety. Use this UFC in addition to UFC 1-200-01 and the UFCs and government criteria referenced therein.

### **1-5 CYBERSECURITY.**

All control systems (including systems separate from an energy management control system) must be planned, designed, acquired, executed, and maintained in accordance with UFC 4-010-06, *Cybersecurity of Facility-Related Controls*, and as required by individual Service implementation policy.

### **1-6 GLOSSARY.**

Appendix E contains acronyms, abbreviations, and terms.

### **1-7 REFERENCES.**

Appendix F contains a list of references used in this UFC. The publication date of the code or standard is not included in this UFC. Unless otherwise specified, the most recent edition of the referenced publication applies.

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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, including 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.

- Sustainability planning
- Natural, historic and cultural resource management
- Healthy community planning
- Defensible planning
- Capacity planning
- Area development planning
- Network planning
- Form-based planning
- Facility standardization
- Plan-based programming

### **2-2 SUSTAINABILITY PLANNING.**

Sustainability 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 create more compact, sustainable, and resilient communities while meeting security and safety requirements. Incorporate the following key principles of sustainability planning into Master Plans, Area Development Plans (ADP), and other planning products.

#### **2-2.1 Compact Development.**

Conserve land as a resource to be utilized to the maximum extent possible. 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. Land use patterns and transportation systems may have to be reconfigured to create opportunities for future development. Compact development patterns include multi-story buildings, increased residential densities,

mixed-uses, and minimal spacing between buildings while maintaining consideration of AT requirements as well as other constraints (e.g., airfield clearances or explosive safety quantity-distance arcs).

### **2-2.2 Infill Development.**

To conserve limited land resources, to the maximum extent possible, focus 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. Infill development results in greater density at the core of the installation and supports integrated land use and transportation networks to include transit-oriented development. Removing/replacing aging low-density development with higher density development may also be appropriate. 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. Locate public transit stops along these corridors (for buses, streetcars, light rail) at approximately half-mile intervals. Development intensity and density should be greatest along these corridors and around the transit stops. On military bases, such development typically takes the form of three- to five-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 CO<sub>2</sub> emissions. Transit-oriented developments also promote healthy communities by focusing on pedestrian use 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%. 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.
- Reduce land use and construction costs.
- Integrate compatible uses into horizontal mixed-use development.
- Segregate incompatible uses (e.g., industrial areas should be separate from housing).

Uses typically found on military installations, community support (retail, recreation, schools, lodging), housing, medical, administrative, and classroom training uses are generally compatible. Consider integrating these uses into horizontal mixed-use districts

to enable walking or biking from one use to another. Ideally, uses within walkable areas are within a 10-minute walking radius (roughly 2,500 feet [760 meters]). Where appropriate, create a campus or town center-like atmosphere since these places are tested examples of horizontal mixed-use districts. Use compact mixed-use zones to support combined heat and power district systems, which can increase the efficiency of primary energy use in a district. Use mixed-use districts to 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.**

Vertical mixed-use is compatible uses located within the same building, enabling maximize land use and infrastructure efficiencies. Synchronizing future requirements is required to achieve vertical mixed-use development. Ground floor education and training centers with unaccompanied housing on upper floors is an example of vertical mixed-use construction using appropriated funds. Collaboration with agencies such as the Army Air Force Exchange Service (AAFES), the Defense Commissary Agency (DeCA), and privatized housing partners enables the creation of mixed-use buildings and neighborhoods using non-governmental funds. Use collaborative efforts to combine non-appropriated and appropriated funds in one facility using conjunctive funding. Identify and program costs associated with each funding category separately. An example of conjunctively funded vertical mixed-use is military family housing (appropriated funds) located above a commissary (non-appropriated funds).

### **2-2.6 Connected Transportation Networks.**

Connect uses within each district, as well as the districts themselves, by roads, sidewalks, and bikeways. Size transportation networks to support mission requirements through properly programming projects. 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 streets are built with integrated bikeways and continuous sidewalks buffered from the street by planting strips, users have more safe transportation options. When establishing the transportation network, 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 are part of the transportation network. Coordinate the transportation plan with local/state/regional government agencies to ensure the installation's transportation network is linked with surrounding transportation access and systems.

## **2-2.7 Sustainable Landscape Elements.**

Ensure 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 measures. In addition, trees improve the environment and provide shade, aesthetics, and security protection on an installation. Space street trees 25 feet to 30 feet (7.6 meters to 9 meters) 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. To the greatest extent possible, use native plant materials that are suitable for the particular climate and soil conditions to limit maintenance requirements and conserve water resources. Refer to UFC 3-201-02, *Landscape Architecture*, for additional information.

## **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 the Energy Independence and Security Act of 2007, § 438, and DoD policy. UFC 3-210-10, *Low Impact Development*, defines the design requirements associated with compliance. 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, Area Development Plans (ADPs), planning design standards, and other planning studies. When developing plans defined in this UFC, minimize impervious surfaces and ensure there is adequate space available on-site to offset the increase in impervious areas associated with siting new facilities and structures. Reduce the amount of impervious surface areas by implementing the following best management practices (BMP):

- Pervious pavements
- On-street parking
- Compact alignment, including in-fill, mixed-use, and multi-story solutions
- Minimized street widths that maintain 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. Anti-terrorism and force protection (AT/FP) setbacks may be used to provide 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 (6.1 meters) of separation from the structure/building foundation to the face of the bioretention feature. Use surface parking areas with integrated bioswales to minimize perimeter bioretention facilities.

### **2-2.8.3 LID and Project Programing.**

If site constraints prevent the use of low-cost features, identify additional LID costs during project development and on DD Form 1391, *FY\_Military Construction Project Data*. High-cost IMP features include rainwater harvesting, green roofs, underground storage, or other structural IMP. Refer to UFC 3-260-01, *Airfield and Heliport Planning and Design*, paragraph 2-5.5, "Storm Water Management Facilities," and paragraph 2-3.3, "Safety," and UFC-3-201-01, *Civil Engineering*, paragraph 3-6.2, "Airfields," for restrictions to certain LID measures for certain installation areas, in particular airfields, to control bird air strike hazards (BASH).

### **2-2.9 Multi-Story Construction.**

One-story buildings inefficiently use valuable land. Plan for and specify multi-story buildings when 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. As appropriate, 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 early in the planning process. This minimizes project delays or changes resulting from the presence of historic properties. Consider multi-story buildings as a flood mitigation strategy.

### **2-2.10 Building Orientation and Configuration.**

Plan sites to provide flexibility for building orientation and configuration. This strategy optimizes building performance, conserves energy, and enhances indoor environmental quality such as thermal comfort and day-lighting. Minimize existing and planned obstructions from landscaping, structures, topography, and adjacent developments to preserve solar access and natural ventilation. Buildings of any configuration with footprint elements of approximately 50 feet (15 meters) or less (wings, central courtyards) can allow natural light deep into the building, which, when combined with energy-efficient glazing, reduces energy consumption. Narrow buildings with operable

windows allow natural ventilation to effectively flow through the interiors, which can reduce energy costs associated with air conditioning. Use narrow buildings to define outdoor spaces and for infill development. When laying out building footprints on Illustrative Plans, strive to use building footprints no wider than 50 feet (15 meters). Use buildings wider than 50 feet (15 meters) to optimize energy performance, 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.**

Include energy conservation as part of the planning goals. Employ energy demand reduction and the development of installation-wide and building-level sustainable supplies as strategies to attain the energy conservation goals. Sustainability planning also includes consideration of renewable energy production, energy security improvements, and energy efficiency enhancements. Leverage opportunities to produce renewable energy through the use of wind, solar, geothermal, biomass, and other production sources. Reducing dependence on energy from outside sources increases energy security. Installations are responsible for fulfilling the goals associated with EO 13834, *Efficient Federal Operations*, 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.**

Consider installation-wide building automation systems 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. 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, and/or steam for nearby facilities, are generally more efficient than large central plants or individual building-level systems. Nodal plants combine the benefits of economies of scale and load leveling, and avoid system duplication. Nodal plants support medium- to large-scale renewable energy systems and can make renewable energy more cost effective. Large central energy plants are generally less cost-effective due to line losses and 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. Follow UFC 3-410-01, *Heating, Ventilating, and Air Conditioning Systems*, when considering district or nodal energy generation and distribution.

## **2-2.12 Water Conservation.**

Incorporate strategies to reduce water consumption at the planning level. Strategies include the use of greywater, designing low-maintenance landscaping features, and



using synthetic turf when applicable (e.g., youth and adult sports fields.) Planners should be engaged throughout the design process to ensure water conservation measures are applied whenever feasible.

### **2-2.13 Waste Management.**

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.**

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. Use existing facilities, to the extent possible, to meet installation requirements. This principle includes fully utilizing existing facilities and reuse, repurposing, or removal of existing assets. This also supports sustainability objectives as installations should not heat, cool, or maintain excess facilities. Ensure facility utilization is in compliance with the Vision Plan and Regulating Plan.

### **2-2.15 Lifecycle Planning.**

Consider the full lifecycle cost of planning decisions with a focus on return on investment. Lifecycle cost analysis (LCCA) instructions are in UFC 1-200-02, *High Performance and Sustainable Building Requirements*. Include the opportunity cost of land as a focus.

### **2-2.16 Flood Protection.**

Identify flood hazard areas during the planning process. EO 11988, *Floodplain Management*, and UFC 3-201-01 require the construction of buildings above the 100-year floodplain elevation. Changes in 2009 to the International Building Code (IBC) require the use of ASCE 24, *Flood Resistant Design and Construction*, when designing buildings in a flood hazard area. Facilities sited within a flood hazard area require extensive and costly foundations and ground floor framing systems. Master plans must identify flood hazard areas as a constraint. Avoid siting facilities in a flood hazard area if other practical alternatives are available. For facilities that must be sited in a flood hazard area with no practical alternative, identify additional costs on DD Form 1391 and ensure compliance with mitigation and reporting requirements as identified in UFC 3-201-01. For CONUS installations, contact the installation public works/civil engineer organization or the FEMA Map Service Center to obtain flood hazard areas. For OCONUS installations, contact the installation public works/civil engineer organization and/or obtain host nation resources for accurate flood hazard area information. When flood maps are not available, perform additional studies to delineate flood hazard areas and the 100-year flood plain elevation.

## **2-2.17 Planning for Severe Weather and Climate Resiliency.**

Identify and assess risks to the installation from the effects of extreme weather and climate change and develop plans to address and mitigate those risks. Weather is the day-to-day environmental conditions at a particular locale measured in terms of temperature, atmospheric pressure, wind, and moisture. Weather phenomena are short-term occurrences, including snowfall or rain events, storm surge, thunderstorms, tornados, cold fronts, or heat waves. Climate change is the variation in average weather conditions for a particular locale or region that persists over several decades or longer and encompasses increases or decreases in average temperatures, shifts in precipitation, and an altered risk of certain types of weather events. Examples of climate change phenomena include sea level change, changes in precipitation or temperature patterns, and extreme temperatures. Each DoD location is affected differently by local weather and geography. Assess the risks related to extreme weather events and climate change phenomena applicable to a specific location as part of a severe weather and climate resiliency analysis to develop appropriate recommendations and plans for the installation.

### **2-2.17.1 Scenario Planning.**

a. Scenario planning is an accepted method for planning when future conditions are highly uncertain and it can be employed as a strategy for considering future climate scenarios. Scenarios do not have an associated likelihood of occurrence. Rather than addressing a single plausible future condition, installation planners work with several storylines (called scenarios) to bracket the range of potential future conditions for their installation. Using and evaluating the potential effects from multiple plausible future conditions enables the understanding of whether the installation is (or could be) resilient to different future conditions even with uncertainty in how much change may occur and how soon. Master plans identify opportunities for future development, usually within the next 20 years; scenario planning acknowledges completed facility and infrastructure projects last longer than the plan timeframe. To support decision-making such as future facility siting, scenarios should cover the design life of a new asset, which is typically 50 or more years.

b. Develop a list of the climate change scenarios for evaluation, impacts at the installation level, and a list of climate preparedness and resilience measures that will be implemented alone or as a group. Climate change scenarios will change over time due to changes in available data, technology, and better information. Review planning assumptions used in developing scenarios and impacts at all major plan updates. Scenario planning is an iterative process. Reference the NAVFAC *Installation Adaptation & Resilience Climate Change Planning Handbook* or other Service-specific guidance to conduct scenario planning for climate change resilience.

c. Be aware of (and document) the uncertainties relating to climate projections, current knowledge, and planning assumptions used during the planning process. Evaluate a range of scenarios informed by the data sources as described in

paragraph 3-5.6. Evaluate multiple scenarios to provide information on the potential risks associated with climate change and help formulate potential solutions.

d. Severe weather and climate change considerations in planning should include, as applicable to the installation: storm surge flooding, non-storm surge (riverine or surface) flooding, hurricanes/typhoons, high winds, tornados, drought, wildland fires/wildfires, permafrost, desertification, volcanic, seismic, tsunamis, subsidence, sea level change, precipitation change, annual average temperature increases, and extreme heat/cold. Not all phenomena are applicable to all installations. Document those phenomena applicable to an installation in the constraints mapping process and/or Installation Climate Resilience Plan (ICRP). The following two resources are available to aid in the scenario planning process and other tools, models, or databases may be used, if available.

#### **2-2.17.1.1 DoD Climate Vulnerability Assessment Tool.**

DoD tasked the U.S. Army Corps of Engineers to adapt one of its Army-focused tools to provide a screening-level assessment of the exposure to extreme weather and climate effects for selected U.S. and foreign locations for each Department. The Climate Assessment Tool is a geospatial indicator-based tool that relies on nationally consistent, authoritative data from federal agencies and other sources. The web-based tool includes indicators (current and future) for many climate factors, including coastal total water levels, coastal erosion, riverine flooding, drought, desertification, wildfires, thawing permafrost, and historic extreme weather events.

The tool is Common Access Card (CAC) -enabled and available at the following web sites:

- CONUS, Alaska, Hawaii:  
[https://corpsmapr.usace.army.mil/cm\\_apex/f?p=118](https://corpsmapr.usace.army.mil/cm_apex/f?p=118)
- Rest of the World (ROW):  
[https://corpsmapr.usace.army.mil/cm\\_apex/f?p=119](https://corpsmapr.usace.army.mil/cm_apex/f?p=119)

#### **2-2.17.1.2 DoD Regional Sea Level (DRSL) Database.**

For coastal or tidally influenced installations, use the sea level change scenarios in the DoD Regional Sea Level (DRSL) database to ensure DoD uses a consistent, authoritative data set for DoD sites. Scenarios are not predictions of the future but plausible future conditions. The DRSL database is CAC-enabled and available at <https://sealevelscenarios.serdp-estcp.org>. An accompanying report documents the methods used to develop the scenarios, provides case studies, and is available at <https://www.serdp-estcp.org/Program-Areas/Resource-Conservation-and-Resiliency/Infrastructure-Resiliency/Regional-Sea-Level-Scenarios-for-Coastal-Risk-Management>.

The DRSL database provides regionally adjusted future values, or projections, for five global sea level change scenarios for three future timeframes: 2035, 2065, and 2100.

The five global scenarios are based upon bounding conditions of 0.2-, 0.5-, 1.0-, 1.5-, and 2.0-meter rise by 2100. Scenarios are not predictions of the future but plausible future conditions. Use the DRSL database projections to determine future inundated areas and related parameters at coastal or tidally influenced locations. The DRSL database may be used for determining floodplains and flood design elevations. For installations, sites, or data not included in the DRSL database (primarily OCONUS), consult your Service-specific guidance. Incorporate at least one projection from each timeframe—2035, 2065, and 2100—into constraints mapping (paragraph 3-5.6).

## **2-3 NATURAL, HISTORIC AND CULTURAL RESOURCE MANAGEMENT.**

Consider natural, historic, and cultural resources in the planning process. Natural resources include threatened and endangered species, wetlands, habitat areas, forests, undisturbed land, and important viewsheds. Historic and cultural resources include historic buildings, structures, objects, districts, landscapes, and archaeological sites, as well as sites sacred to Native American tribes. 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. Consider and prioritize actions required by environmental laws, requirements, and policies to drive actions throughout the planning process.

### **2-3.1 Land Preservation.**

Land is a valuable natural resource to DoD for installation sustainability and future viability. It is critical for training, sustaining, and deploying our forces. 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 ranges, impact areas, airfields, heliports, and maneuver areas. Ensure on-base mission-required buffers, such as airfield clearances and explosive safety quantity-distance arcs, are maintained. Military land requirements are constantly changing and 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.**

DoD is required to take into account the potential effects of its actions on historic properties eligible for or listed in the National Register of Historic Places and areas

considered sacred sites by federally recognized Native American tribes. When historic properties have the potential to be affected, comply with the requirements of the National Historic Preservation Act (NHPA) (16 USC 470). In accordance with § 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). Involve the installation's Cultural Resource Manager early in the planning process to avoid delays. Refer to UFC 1-200-02, Appendix D, "Projects Impacting a Historic Building or District," for strategies for improving performance of historic properties.

## **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 military readiness. Incorporate health considerations and opportunities for physical activity based on advice from representatives of the installation's medical staff. Include installation health representatives and Morale, Welfare, and Recreation (MWR) representatives in visioning sessions and planning charrettes.

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

Effective planning creates conditions that encourage physical activity, connect land uses and facilities, and provide safe, protected pathways for physical fitness training for 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. Pedestrians and cyclists require contiguous and safe pathways that connect origins and destinations. Include key destinations such as the main gate, fitness center, food locations, and accommodations for walkers, runners, formation runners, bicyclists, and motor vehicle users on plans.

### **2-4.2 Community Gardens.**

Healthy communities not only provide for physical activity through walking and biking but also provide opportunities to grow healthier food choices. In accordance with installation policy, incorporate locations for community gardens and local food production.

## **2-5 DEFENSIBLE PLANNING.**

Military installations must be safe and secure to operate effectively and efficiently. Two key programs impact planning: the DoD Mission Assurance (MA) program as it relates to Defense Critical Infrastructure (DCI) and AT. Integrate the strategies of defensible planning with the goal of achieving a resilient installation to multi-spectrum types of natural and/or man-made threats.

## **2-5.1 Defense Critical Infrastructure (DCI).**

The DoD Mission Assurance (MA) program guides protection of DCI, which is a capability-focused risk management program that seeks to manage risk to installation assets and infrastructure (see DoDD 3020.40, *Mission Assurance (MA)*, and DoDI 3020.45, *Mission Assurance (MA) Construct*). The DoD uses MA as a process to protect or ensure the continued function and resilience of capabilities and assets that directly relate to mission execution. MA enables mission success and supports commanders in both deliberate and adaptive planning as well as strategic risk management. DCI contributes to mission assurance and complements other DoD programs, such as strategic mobilization, industrial preparedness, supply chain risk management, AT, physical security, and continuity of operations. It addresses assets on the installation and in surrounding communities critical to mission accomplishment and overall resiliency of the installation.

### **2-5.1.1 DCI and the Master Plan.**

Incorporate a DCI analysis in the Master Plan to minimize risk to the installation's strategic infrastructure and networked assets that support the critical missions necessary to provide combat capabilities. 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 will fail). As identified in the DCI analysis, develop contingencies in the Master Plan to mitigate or remediate risks, including existing or future projected risk resulting from extreme weather events, mean sea level fluctuation, wildfires, flooding, and other changes in environmental condition. Identification of elements of defense critical infrastructure may lead to classification issues. Coordinate with installation operational elements to identify any restrictions and find alternate means to identify such elements. 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, consider DCI requirements to ensure a single point of failure is not created that could adversely impact mission success. As an all-hazards based program, DCI ensures the capability to detect and assess information, provide timely warning, execute planned actions to mitigate or prevent disruptions to critical assets, and, if necessary, recover full mission capability.

## **2-5.2 Antiterrorism (AT) and Master Planning.**

Coordinate with the installation antiterrorism officer (ATO) early in the planning process to ensure AT requirements are incorporated into Master Plans while pursuing other planning goals (such as compact development and sustainable design) that may be spatially interrelated. Determining the facility design basis threat (DBT) is the first step in planning antiterrorism requirements. Consider site-specific threats, the value of assets

within the building, mission-related issues, and constraints that might dictate measures beyond the minimum requirements. Use UFC 4-020-01, *DoD Security Engineering Facilities Planning Manual*, to establish project AT and security requirements and determine if the minimum standards are adequate or if additional mitigation measures are required. The geographic combatant command (GCC) may provide additional prescriptive AT requirements or raise the DBT related to a specific asset, installation, or region. Installation commanding officers, regional commanders, or geographic combatant commanders may raise the DBT for a project, installation, or geographic region. Inhabited buildings within the installation boundary are generally low risk and will not warrant a defined threat or level of protection. In this instance, only the minimum standards in UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*, apply. For the majority of facilities, the Master Plan need only incorporate the 19 minimum antiterrorism construction standards within UFC 4-010-01, regardless of the asset value and without an established threat.

### **2-5.2.1 Antiterrorism Officer (ATO).**

The ATO is responsible for working with the installation planner and other base security personnel in evaluating the local threat environment, the installation's access control screening capabilities, and determining the risk to the asset within the building. This analysis, using the procedures within UFC 4-020-01, will yield a building DBT and mitigation measures that provide a measurable level of protection for the asset(s). The DBT may drive consolidation of parking areas, parking garages, and pedestrian-only areas as well as the consolidation or dispersal of critical assets.

### **2-5.2.2 Site Security Considerations.**

Consider 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. Additional strategies to enhance site security and provide AT mitigation include clustering facilities into compounds or pods providing a higher density core with parking and vehicle circulation on the perimeter. Place low-occupancy facilities within standoff space for other high-occupancy buildings. Provide a pedestrian-friendly space with AT and sustainability benefits. For more information, refer to the master planning considerations chapter in UFC 4-020-01.

#### **2-5.2.2.1 Natural Surveillance.**

To enhance physical security, site buildings to allow for natural surveillance of the built environment. Designate entry placements and window locations to give occupants opportunities to observe the built environment. Site buildings within view of other occupied facilities. Give careful consideration 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 and recreation facilities, and warehouses need not comply with this strategy.

#### **2-5.2.2.2 Territorial Reinforcement.**

Another physical security strategy is territorial reinforcement. Use 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. Cluster facilities that are functionally compatible to reduce the perimeter, limit access points, and provide compact security areas. Arrange buildings in proximity to one another 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. Design streets, sidewalks, and building entries to mark public routes as distinct from private routes. Design landscaping, fencing, and building orientation to naturally and unobtrusively control unauthorized access.

### **2-6 CAPACITY PLANNING.**

Capacity planning is a process to determine an installation's maximum development capacity based on conformance to the 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. Planning precedes project programming, is proactive, and does not just account for current known requirements. Show capacity on Illustrative Plans through the use of "notional buildings" or areas designated for "potential future growth." Account for changes in developable areas over time. Identify currently constrained sites as future developable areas contingent upon resolving factors such as restoring a contaminated site or demolishing out-of-service buildings. Future developable areas may also be limited because of factors such as sea level rise or increases in wetlands as water levels change.

#### **2-6.1 Capacity Planning and Parking.**

Capacity planning addresses organizational and non-organizational parking needs through a combination of parking strategies, including on-street parking, off-street parking, and structured parking. Strive to minimize parking to the maximum extent possible through land-use practices that support shared-use parking, transit, and alternative modes of transportation. Parking for the commissary and exchange is typically 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. Avoid on-street parking on roads 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.

## **2-6.2 Growth Boundary.**

Establish a growth boundary around an installation's cantonment area(s) to focus development toward 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 the growth boundary. This 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. Review the growth boundary every five years; determination of the installation's capacity for growth occurs within the area defined by the growth boundary.

## **2-7 AREA DEVELOPMENT PLANNING.**

As part of the master planning process, divide installations into identifiable and connected districts based on geographical features, land use patterns, building types, and/or transportation networks. Prepare an ADP for each district. This leads to developing the Master Plan in logical planning increments. The number of ADP districts will vary based on the size and geographic features of the installation.

### **2-7.1 District Area Focus.**

By focusing planning at the district level, ADPs can be updated as mission requirements or command priorities change without redoing the entire Master Plan. Planning at the district level allows the ADPs to be incorporated in the installation's Master Plan updates. Complete Illustrative Plans and Regulating Plans for each ADP.

### **2-7.2 Incremental Development.**

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

## **2-8 NETWORK PLANNING.**

While significant planning is at the ADP level, ADPs are linked through network planning. Networks consider linkages and systems that span ADP district boundaries. These include installation-wide utility systems, transportation networks, and parks and open space networks. Network Plans consider holistic approaches to energy-efficient development and installation-level resilience measures. Network planning also includes

coordination and integration of planning with privatized housing or privatized utility partners.

## **2-8.1 Aesthetics and Network Planning.**

**2-8.1.1** When creating Network Plans, aesthetics should be a key consideration. The appearance of an area can be improved by reducing the visual clutter of utility wires. Placing utility wires underground allows communities to highlight their unique beauty without poles and wires in the way. Without overhead utilities, communities can more readily undertake improvement projects such as sidewalk widening and tree planting without having to snake around poles or trim vegetation to make way for power lines.

**2-8.1.2** Burying lines eliminates extreme weather hazards, fire hazards, accidents, and safety risks from power outages due to downed lines. Placing utility lines underground reduces possible health risks from electromagnetic radiation and improves road safety by removing or reducing the chance of motorists striking poles.

**2-8.1.3** Underground cables are insulated, electrically shielded, and out of the way. Underground transmission allows for no electrocution hazard for people or wildlife, no collision or entanglement hazards for aircraft, no risk of line exposure from traffic collisions, and no fire risk to people, wildlife, nature, or homes from arcing power lines during windy conditions.

**2-8.1.4** Using this development strategy minimizes the visual impact of utilities on an installation. As a result, more green space can create biophilic interactions and boost overall morale. Coordinate with the installation maintenance department for successful implementation of this strategy.

## **2-8.2 Coordination of Plan Efforts.**

Various components of underground utilities are often constructed independently without coordination, which results in severe second-order effects including repeated road resurfacing and landscaping. Communications infrastructure is the component most often considered as an afterthought. Additionally, there are network planning considerations where redundancies in both electrical and communications linkage are critical. Develop integrated plans for the components of the various infrastructure networks to prevent such deleterious effects and address these mission and coordination opportunities when developing Network Plans.

## **2-9 FORM-BASED PLANNING.**

Form-based planning guides programming, design, and construction by identifying the form for installation development through the specification of building types, building floor elevations, number of stories or maximum height, set-backs, circulation patterns, orientation, landscaping, and land use. Form-based planning translates that form into a set of specific planning directives based on the specified allowances. The directives use

products typically developed by planners, including Illustrative Plans, Capacity Plans, and street, building, and landscape standards to flexibly guide development. This approach supports mission needs, program requirements, environmental constraints and opportunities, and other development factors, including identifying parcels with significant constraints to future development (e.g., flood hazard areas, cultural resources, explosive safety quantity-distances arcs, airfield and heliport clearances). Form-based planning gives installation commanders the ability to exercise more control in the installation development process by creating planning practices based on a sustainable form that supports the installation's planning vision. This approach provides direction for both short- and long-term development. Form-based planning promotes horizontal and vertical mixed-uses, compact and walkable development patterns, and emphasizes spatial principles that support sustainable and resilient development. Form-based planning uses the components described in paragraphs 2-9.1 through 2-9.5.

### **2-9.1 Illustrative Plan.**

This plan illustrates potential development that supports the overarching planning vision. At a minimum, the Illustrative Plan must show relevant project sites for known projects, notional building footprints for unspecified long-term development, as well as proposed transportation networks, street trees, open spaces, and parks. The detail shown in this plan can vary depending on the scale of the district. In all cases, the Illustrative Plan should reflect the documented installation vision, include parameters as explained in the Regulating Plan, and represent the preferred alternative.

### **2-9.2 Regulating Plan.**

The Regulating Plan identifies the most important elements of the Illustrative Plan such as build-to lines, required entry and/or parking locations, minimum and maximum building heights, building ground elevations, setbacks for constraints, and acceptable uses. Regulating Plans are enhanced land-use plans that define allowable uses as well as building form requirements. The Regulating Plan replaces the traditional land-use plan by addressing land uses and building form together. In addition, the Regulating Plan provides specific guidance to shape development in accordance with the planning vision.

### **2-9.3 Building Envelope Standards (BES).**

The BES regulate acceptable massing, height, fenestration, exterior envelopes, and uses. The BES also addresses requirements for minimum building floor elevations, where appropriate.

### **2-9.4 Street Envelope Standards (SES).**

The SES describe and graphically present allowable street types and circulation elements in plan and section.

## **2-9.5 Landscape Standards.**

The Landscape 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, shrubs, ground cover) and manmade hardscape features (street furniture, signage, lighting). Landscape Standards must meet the requirements outlined in UFC 3-201-01.

## **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 proposed projects conform 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. Site standard designs consistent with the Master Plan. If standard designs are not used, pursue waivers as appropriate.

## **2-11 PLAN-BASED PROGRAMMING.**

Program requirements include all facility needs required to enable mission support. Validate facility requirements and projects 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. Requirements can be developed to ensure compliance with the Regulating Plan and form-based code and requirements identified in associated plans or Functional Annexes. Funding source requirements include all fund sources: major construction, minor construction, operations and maintenance, NAF, the exchange, DeCA, private entities.

Document program requirements on DD Form 1391 in accordance with DoD 7000.14-R, *Department of Defense Financial Management Regulation*, Volume 2B, Chapter 6, and Service-specific processes and procedures. Ensure programming documentation includes holistic programming requirements, including mission facility requirement/facility sizing authorization, and any planning site requirements (parking per the form-based code, on-street parking and curb and gutter, LID practices, energy/water/resiliency practices) as identified in the plan.

## CHAPTER 3 MASTER PLANNING PROCESS AND PRODUCTS

### 3-1 INTRODUCTION.

The installation Master Plan documents a comprehensive planning process using a standard set of products. The planning process is 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 the four primary phases described in the following subsections. The master planning process and the Master Plan result from the application of these phases.

#### 3-2.1 Identification.

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

#### 3-2.2 Evaluation.

In the evaluation phase, development alternatives are prepared and evaluated for all scales of planning, from individual districts to the overall installation.

#### 3-2.3 Implementation.

In the implementation phase, prepare a preferred alternative to implement the vision and prepare detailed documents to guide installation development and implementation of the plan. The products that document this phase are the Installation Development Plan (IDP) and the Installation Planning Standards. Prepare the Installation Development Program and the Plan Summary at the end of this phase.

#### 3-2.4 Monitoring and Amending.

Change is inevitable because of resource constraints, mission changes, or changes in environmental, social, or political conditions. Revise and update the Master Plan to reflect changes to maintain its relevance as a useful planning and management tool. At a minimum, review Master Plans annually and update as mission requirements dictate. Each Service identifies the appropriate level and type of review.

### 3-3 STAKEHOLDER INVOLVEMENT.

During the development of the Master Plan, talk with stakeholders to fully understand the scope of their vision and mission requirements. Stakeholders 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. 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 to walk the sites in each ADP district and talk with users and stakeholders. In addition to internal DoD stakeholders, external stakeholders are also important sources of information and input. These include local municipalities, state governments, transportation agencies, other federal agencies, and federally recognized tribes. Involve relevant stakeholders in all stages of the process.

### **3-3.1 Retail Stakeholder Involvement.**

Retail stakeholders on installations provide invaluable community support to the installation community. Engage retail stakeholders in all phases of the planning process. Their facilities are multi-faceted and require special planning attention. In planning for these facilities, retail stakeholders include the following planning considerations: the business case analysis, convenience for the customer, and parking/traffic/circulation and site layout.

### **3-3.2 Business Case.**

Military retailers need to generate earnings to support the customer and support MWR programs for the Services. If the demographics or location cannot justify the business need, the risk is often too great to invest the capital. When retail or commercial development is desired, engage the military retailer early in the planning process to ensure the business case is met.

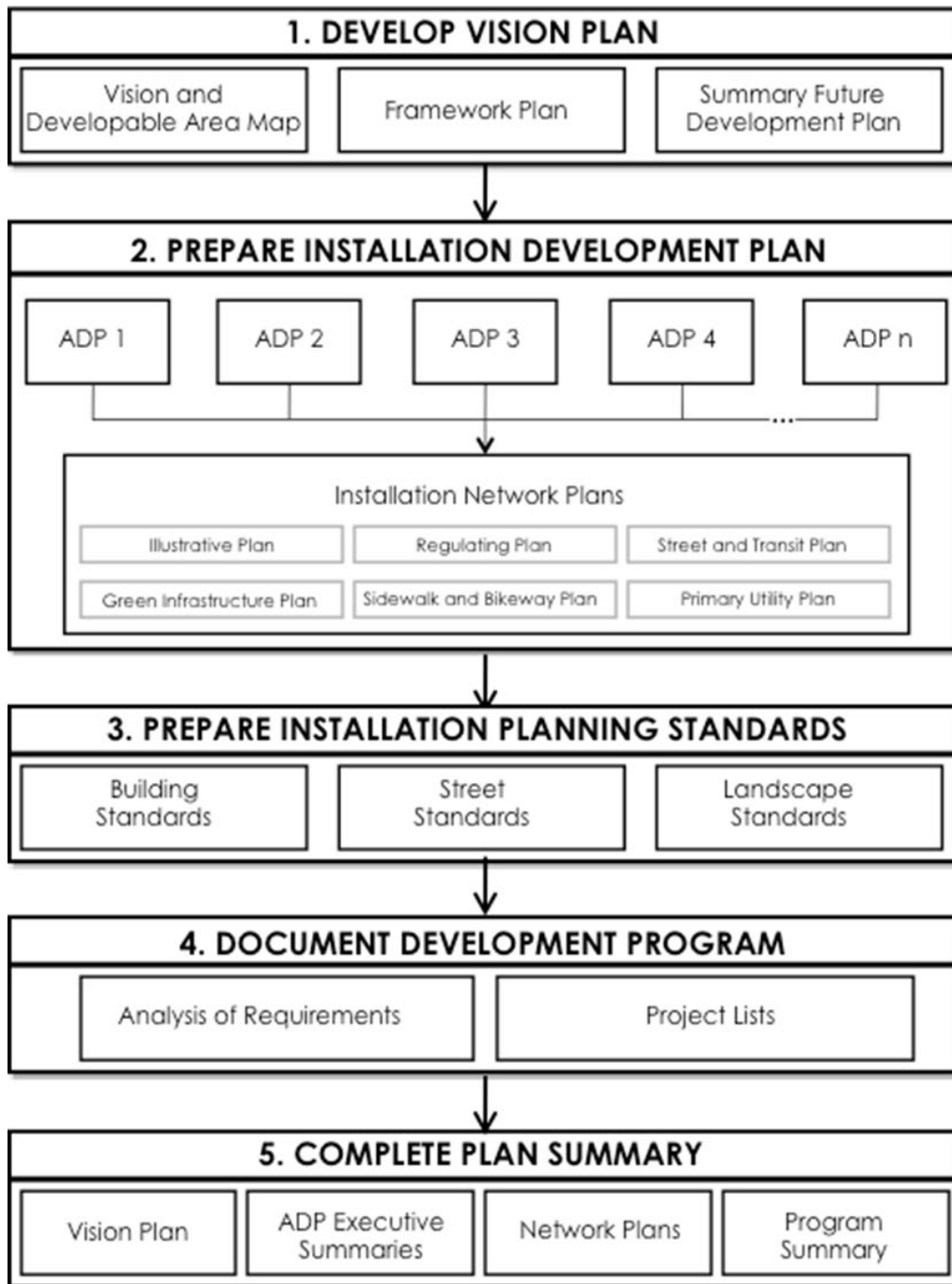
### **3-3.3 Convenience.**

Military retailers focus on customer convenience. Co-locate the exchange and commissary when possible. Locate parking for convenience and accessibility for customers. Consider many customers will drive from off-installation locations. Locate fast food and convenience stores along the outbound lane of traffic leading toward an exit gate or in high-traffic areas for convenient customer access.

### **3-3.4 Parking/Traffic Circulation and Site Layout.**

Convenient, accessible, and safe parking is a primary focus for retail operations. Ensure layouts support safe pedestrian access. The delivery areas should be separate from the building entrance. For functionality and safety, locate customer parking and refueling operations with direct access to the building entry. Locate receiving in the rear of the building. Screen large parking areas from streets and the pedestrian realm with linear buildings and appropriate landscaping. Vehicular access to all sides of the building is necessary for convenience and life safety.

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.**

The Master Plan includes the following products. See Figure 3-1.

#### **3-4.1 Vision Plan.**

The Vision Plan includes a statement of the planning vision, planning goals, and planning objectives, any installation-wide constraints and opportunities map(s), a developable area map, a Framework Plan for the entire installation, and a summary future development plan.

#### **3-4.2 Installation Development Plan (IDP).**

The IDP includes ADPs (including detailed constraints and opportunities maps, Regulating Plans, Illustrative Plans, Implementation Plans, capacity analysis, and supporting sketches and renderings) and applicable Network Plans.

#### **3-4.3 Installation Planning Standards.**

Installation Planning Standards include the BES, the Landscape Standards, and the SES.

#### **3-4.4 Installation Development Program.**

The Installation Development Program is the overall strategy for using and investing in real property. It includes a list of current known projects needed to support installation missions.

#### **3-4.5 Plan Summary.**

The Plan Summary is an executive summary of each the above planning products. Create the Plan Summary in a severable format to facilitate sharing with local communities and the public.

#### **3-4.6 Functional Annexes to the Master Plan.**

The Functional Annexes include stand-alone planning products that support the master planning process, including, but not limited to, Installation Energy Plans (IEP), ICRPs, Area Development Execution Plans (ADEP), Complex Plans, and Project Development Plans (PDP).

### **3-5 VISION PLAN.**

A vision for planning differs from an overall installation mission by defining ideal development principles for maximizing the installation's long-term capabilities. 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 can change as our nation's military requirements change.



### **3-5.1 Installation Mission.**

In order to begin a holistic planning process and build an effective vision statement for planning, it is imperative to understand the installation's missions. Identify principal mission objectives and activity types, such as support, training, administration, and production. Identify installation units, organizations, and their relationships to installation missions. Determine planning end-strengths. 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). Address functional relationships among activities and facilities and identify 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. Engage senior installation leadership and ask for their input into the overall vision and goals for the installation planning process. Be prepared to help the installation leadership understand how to develop a vision to ensure 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 captures the essence of the entire planning effort. A strong vision creates a mental picture of what the installation will look like. Collaborate with stakeholders and decision-makers to create the vision statement. Engage stakeholders in a series of workshops and community surveys, and conduct a visioning charrette that includes mission operators, military members, family members, civilian staff, and installation leadership to create the vision statement. Include stakeholders from non-military, community, and other local and state agencies in the visioning process. Examples of strong vision statements include:

- "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."
- "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 flow from the vision and focus on long-term redevelopment and construction projects necessary to fulfill mission requirements and reshape the installation. Ideally, the key development goals are embedded within the

vision statement. The key development goals are underlined in the vision statements in paragraph 3-5.3.

### **3-5.5 Planning Objectives.**

Planning objectives support the vision and goals and incorporate inputs from the planning process and the planning strategies described in Chapter 2. The objectives define how to achieve the goals in the vision. Each objective is specific and measurable, enabling plan implementation monitoring. In the sample vision statement, the goal of a sustainable community can include planning objectives consisting of compact, mixed-use, multi-story development. Consider the installation mission and analysis of on- and off-post conditions in selection of specific objectives. Incorporate the ten DoD planning strategies discussed in Chapter 2 into the planning objectives. Select other objectives based on installation design themes, developmental opportunities and constraints, potential encroachment situations, weather/climate-related resiliency challenges, and consideration of community planning agencies, groups, businesses, and affected individuals' views and plans.

### **3-5.6 Constraints and Opportunities Maps.**

Collection and analysis of two major types of data, on-installation data and off-installation data, enables a full understanding of the existing landscape and holistically incorporate mission requirements into the Master Plan. Collect this data using a variety of methods, including electronic collection and stakeholder input. Compile and consolidate data to create a narrative and a set of maps indicating the overall site constraints and developable areas (opportunities) as described in the following paragraphs. This analysis helps 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. Identify restrictions on land use due to mission requirements, such as airfield clearances and explosive safety quantity-distance arcs, as well as any environmental contamination (chemical, munitions, asbestos) such as remediation sites or unexploded ordnance areas. Include potential changes in the natural environment due to severe weather or climate change (e.g., risk of erosion, subsidence, desertification) in the evaluation. Identify areas affected by a 1% annual chance flood event and other current and future projected flood hazard areas, to include future 1% annual chance flood events and potential permanently inundated areas. For coastal or tidally influenced areas, evaluate and document multiple sea level change projections using the DRSL database (see paragraph 2-2.17.1.2) to support decision-making. Incorporate sea level change projections reflecting the installation's mission and risk tolerance in base flood elevations (BFE) in coastal or tidally influenced areas. 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, heliports, and other

facilities. Data collected also includes 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/physical conditioning areas, training ranges, maneuver areas, existing facilities and their uses, traffic patterns and intensity, and utility systems use and capacities must all be incorporated.

#### **3-5.6.1.1 Mission Data.**

Mission requirements largely determine land and facility support requirements. Utilize data on current and proposed mission requirements to establish limitations and conditions that directly affect the installation's ability to execute mission support. 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. Analyze existing land uses and land use restrictions and collect and analyze installation-specific and headquarters-driven plans, planning guidance, and facility allowances.

#### **3-5.6.1.2 Demographic Data.**

Develop an understanding of the installation's demographics and identify appropriate principles to meet the needs of each major demographic group. Demographics to consider include personnel working on the installation, personnel living on the installation, personnel living off the installation, and retirees.

#### **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. Use GIS, GeoMapping, or other similar systems. When preparing a Master Plan, incorporate and integrate with local GIS systems. Develop all deliverables in compatible formats to ensure ease of use. Typical layers referenced are in Appendix D. Follow Service-specific guidance for geospatial data requirements (AFI 32-10112, *Installation Geospatial Information and Services (IGI&S)*, USACE ECB 2018-7, *Advanced Modeling Requirements on USACE Projects - Category: Directive and Policy*, or OPNAVINST 11000, *Facilities and Land Management Ashore*, Ser N/420U045).

#### **3-5.6.2 Off-Installation Data Collection.**

Contact local, state, and federal agencies for off-installation data, reports, and plans that may be helpful to the planning process. It is vital to understand regional and vicinity conditions that affect the installation. Leverage these data request interactions to interview local and regional stakeholders for their thoughts on the installation planning process and priorities. In some cases, opportunities to share costs on infrastructure or link to local development initiatives may be available. Review existing regional and

vicinity maps, analyze regional transportation systems (roads, railroads, commuter mass transit systems, airports), and collect data on socioeconomic conditions, demographic patterns, climate projections, 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:

- Federal agencies, including the Census Bureau, National Academy of Sciences, US Geological Survey, US Global Change Research Office (or any similar successor entities), National Weather Service, Environmental Policy Agency, Department of Transportation, including the Federal Aviation Administration.
- 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.
- Local government offices, including City Hall, Public Works, Public Health, Parks and Recreation, school districts, fire and police departments.
- Other local agencies, including utility and power companies, Chamber of Commerce, regional planning agencies.
- Installation staff activities working directly with the local governments, agencies, and departments.

#### **3-5.6.2.1 Off-Installation Personnel.**

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

#### **3-5.6.2.2 Environmental Conditions.**

Where changing external conditions impact planning decisions, seek to understand, monitor, and adapt to these changes. Such conditions include, but are not limited to, changes in land use and population density near 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. Use projections from reliable and authorized sources to anticipate changing environmental conditions during the design life of existing or planned new facilities and infrastructure. Include sources such as the following:

- Census Bureau (for population projections)

- The National Academy of Sciences (for land use change projections and climate projections)
- The U.S. Geological Survey (for land use change projections)
- The U.S. Global Change Research Office including the National Climate Assessment (for weather projections and climate projections) or the National Oceanic and Atmospheric Administration (if such projections are more current)

### **3-5.7 Developable Area Map.**

**3-5.7.1** Planning accounts for known requirements and provides a framework for future undefined requirements. Effective plans identify areas for future requirements on a developable area map. The developable area map highlights and calculates those areas that, given the identified vision, constraints, and opportunities, are open for development and areas for future development to support growth. This plan shows the general overall development capacity of an installation. Developable area maps designate where the type of development may be limited or require special consideration due to specific constraints, such as AT, airfield clearances, explosive safety quantity-distance arcs, or weather- or climate-related impacts. See Figure 3-2.

**3-5.7.2** The Framework Plan is part of the planning visioning process. The Framework Plan is a map of the entire installation showing the ADP districts, key transportation and land use concepts, and other significant features that influence development patterns. The plan can also graphically represent priority ADP districts. To establish ADP boundaries, planners should use geographic features, key transportation systems, open space networks, existing land-use patterns, and boundaries of any identified historic districts or other architectural style. An ADP district may incorporate one or more identified historic districts. See Figure 3-3.

### **3-5.8 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 site selections. See Figure 3-4.

Figure 3-2 Developable Area Map Graphic

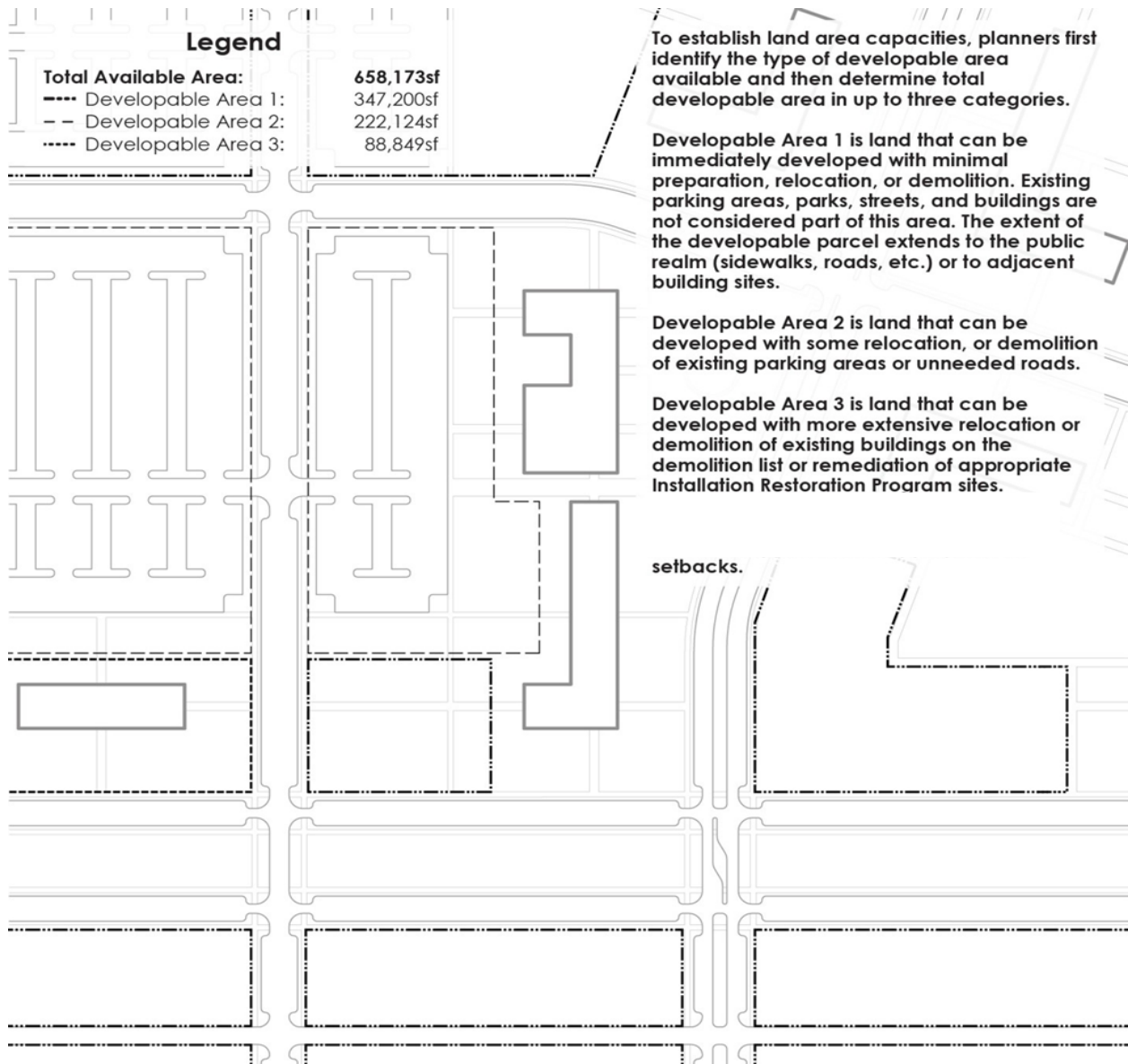


Figure 3-3 Framework Plan Graphic

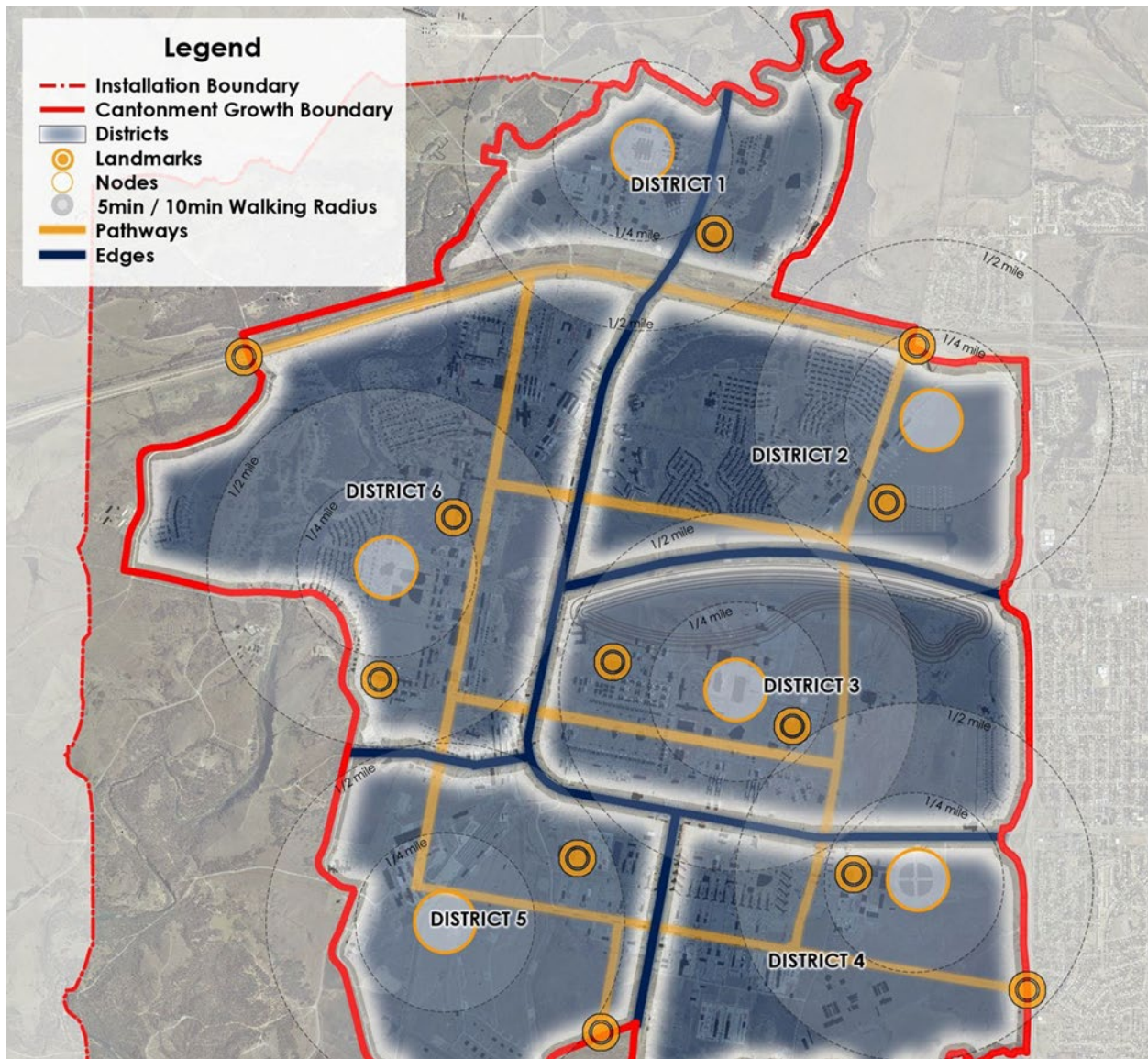
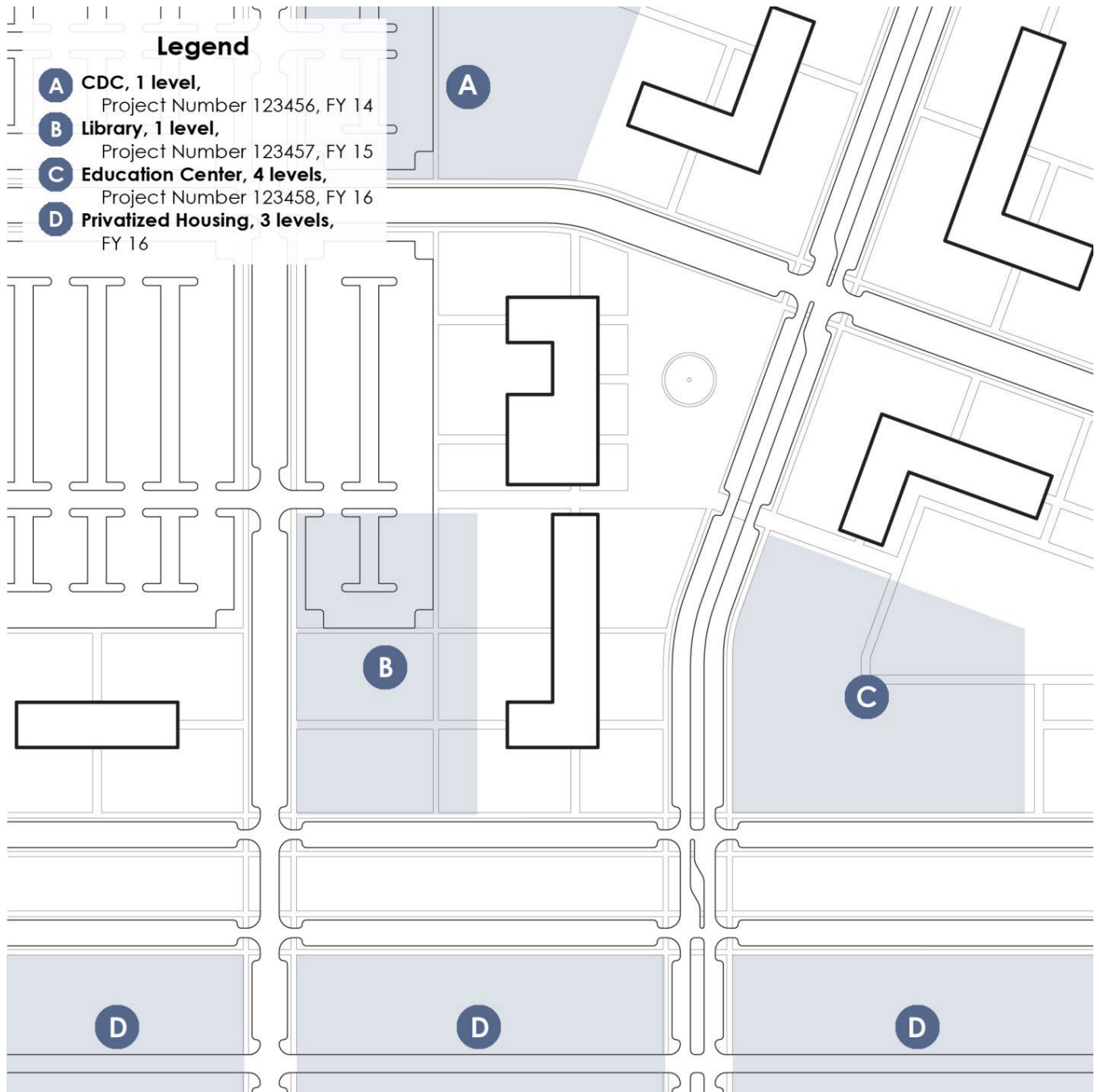


Figure 3-4 Summary Future Development Plan Graphic





### **3-6 INSTALLATION DEVELOPMENT PLAN (IDP).**

The IDP includes ADPs and applicable Network Plans.

#### **3-6.1 Area Development Plan (ADP).**

The bulk of the installation planning effort occurs at the scale of an ADP, which is a detailed plan for a district that includes detailed constraints and opportunities maps, Illustrative Plans, Regulating Plans, Implementation Plans, and capacity analysis. Include other supporting plans, maps, and graphics that illustrate the planning/development intent as needed. ADPs describe constraints and opportunities, system studies, existing facility assessments, program requirements, and alternatives analysis. Master plans must address a level of development appropriate for each installation and are applicable for small- and large-scale development efforts, such as renovation or new construction, respectively. Project programming and funding processes achieve the Master Plan vision. ADPs are ideally suited for the task of identifying, coordinating, and synchronizing competing requirements, and as such, they are useful at installations focused on sustainment, restoration, and modernization (SRM) funding and installations focused on military construction (MILCON) funding. In order to support the Master Plan requirements, scope ADPs to address the methodology set forth in this UFC and meet the specific product requirements. Other related planning documents cited in this UFC are dependent on the information in the ADPs to build a comprehensive planning picture, including the Network Plans and Functional Annexes.

##### **3-6.1.1 ADP Analysis.**

Before beginning the ADP process, perform a thorough analysis of the existing conditions, identify existing program requirements, and a review of the installation's planning vision, goals, and objectives. Assess the constraints and opportunities map to identify existing and potential impacts to developable areas. Review the installation's planning standards and Functional Annexes, including the IEPs and ICRPs, to identify impacts on future development and development guidelines.

##### **3-6.1.2 ADP Design.**

After the analysis, develop conceptual alternatives, evaluate those alternatives against measurable criteria, and then select and design in detail a preferred alternative. Develop an ADP for each district on the installation as determined in the Framework Plan.

##### **3-6.1.3 Developing Alternatives.**

Developing alternatives is a critical component of the master planning process. The National Environmental Policy Act (NEPA) requires considering various alternatives to minimize adverse impacts on the environment. Creating multiple options allows planners, stakeholders, and installation leadership to ensure the ADP best fulfills the

development vision. In developing alternatives, planners review functional and spatial relationship concepts as well as the reality of existing facility locations and the existing off-post and on-post environment. Develop alternatives depicting the long-range development of the ADP district, including arrangement of functional areas, circulation, and utility systems. In documenting this phase of the ADP process, describe and show the alternatives and discuss the results of the alternative evaluation. When preparing alternatives, keep the following in mind:

- Address new mission requirements, improvements to, replacement, or relocation of existing mission support facilities, and implementation of the Installation Planning Standards.
- Each alternative may be based on a theme or point of emphasis to allow comparisons and tradeoffs.
- Consider the constraints associated with future flood hazards and other factors, and evaluate the ability of the installation to adapt to existing or future hazards, including from severe weather, mean sea level fluctuation, wildfires, flooding, and other climate change effects over the time horizons identified during scenario planning for potential climate change.
- Define and evaluate alternatives to satisfy deficiencies, eliminate excess, and preserve room for future growth.
- Include determining the maximum capacity of an installation, or even critical sub-areas of an installation, whether or not there is currently an identified need.
- If appropriate, present the alternatives 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, fully develop a preferred alternative that best meets the planning vision, goals, and objectives for the district. The preferred alternative is a graphical and narrative description of the fully developed plan for the district that emerges from the alternatives analysis phase and consists of the 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 functions as an enhanced land-use plan. This plan designates the locations where different uses or building form standards apply. Instead of solely defining land uses, this method defines building form (e.g., height and frontage) while allowing for a range of possible uses. See Figure 3-5.

#### **3-6.1.6.1 Regulating Plan Designations.**

The Regulating Plan establishes development regulations for specific parcels on the installation. Use existing and planned roads, permanent fence lines and borders, and natural features like riparian corridors to establish parcel lines. Each ADP district will be composed of parcels defined by parcel lines. Parcels may correspond to entire blocks. Blocks may also be subdivided to create smaller parcels in response to site-specific design requirements. The parcels, whether they are entire blocks or portions of a block, have the same accompanying regulations governing building form, placement, and use across the parcel. Refer to the criteria established for that parcel to guide the design process when a building is proposed for a specific parcel.

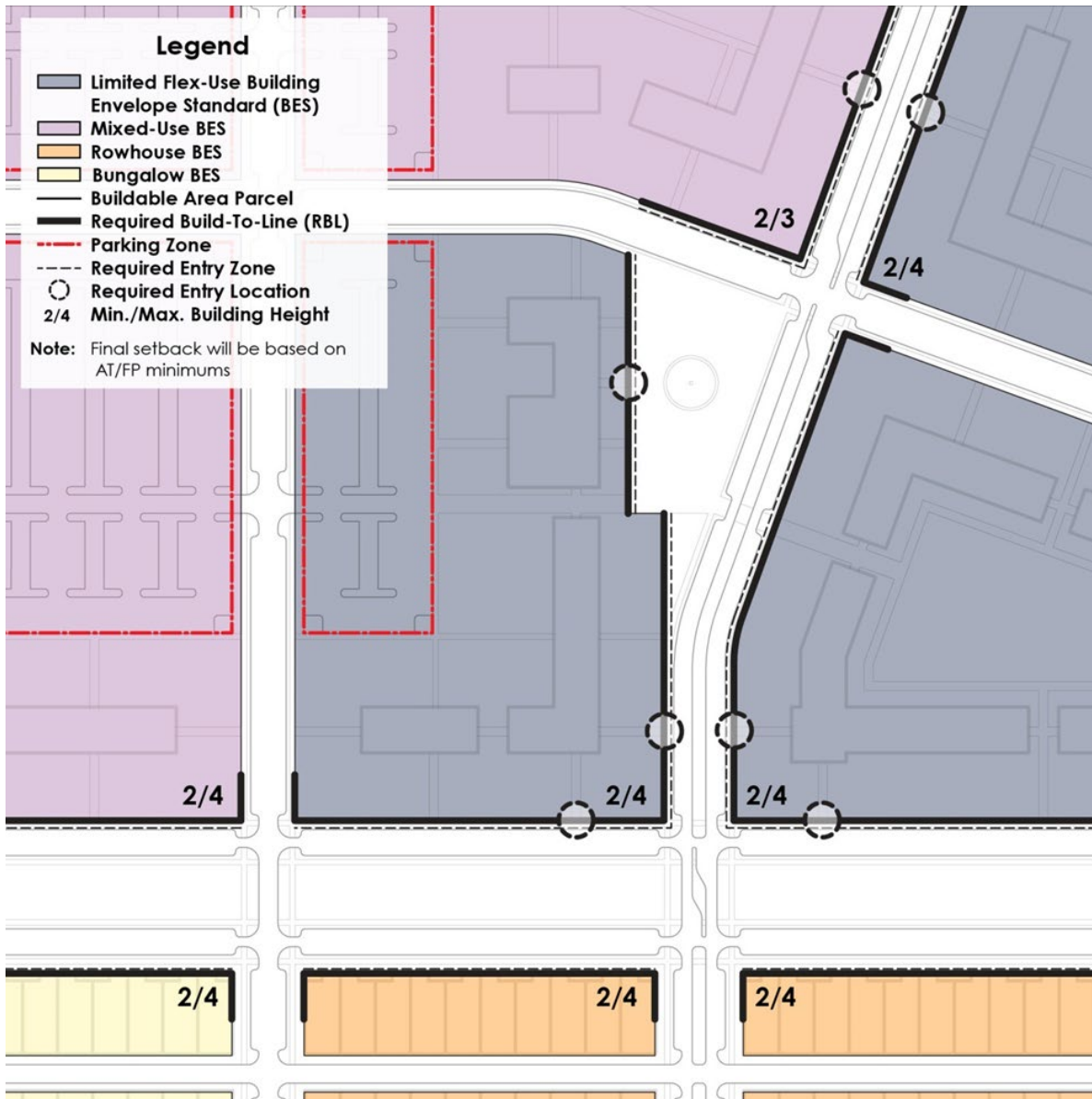
#### **3-6.1.6.2 Regulating Plan Components.**

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, parking and roadway configurations, and any conditions for development based on the constraints analysis. The Regulating Plan identifies the designated BFE within flood hazard areas, accounting for coastal (sea level rise) and riverine flooding risks, as applicable.

#### **3-6.1.6.3 Regulating Plan Functions.**

The Regulating Plan ensures facilities, parks, parking, and other uses are sited in alignment with the overall master planning vision over time. 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 contained in the Installation Planning Standards.

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. The Illustrative Plan shows only one possible outcome allowed by the Regulating Plan; it is a sample diagram and does not imply any policy requirements but graphically shows how to portray planning principles. Figure 3-6 illustrates a sample Illustrative Plan graphic. The Illustrative Plan is a valuable tool for developing the Capacity Plan and Regulating Plan and communicates future development potential. It

can be confusing to installation stakeholders as it only represents one possible outcome, rather than all the possibilities allowed by the Regulating Plan.

#### **3-6.1.7.1 Illustrative Plan Requirements.**

The Illustrative Plan shows project site selections for known projects, notional building footprints for unspecified long-term development 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. Identify short-term stopgaps and recommended long-term solutions to satisfy mission, land-use, and real property requirements.

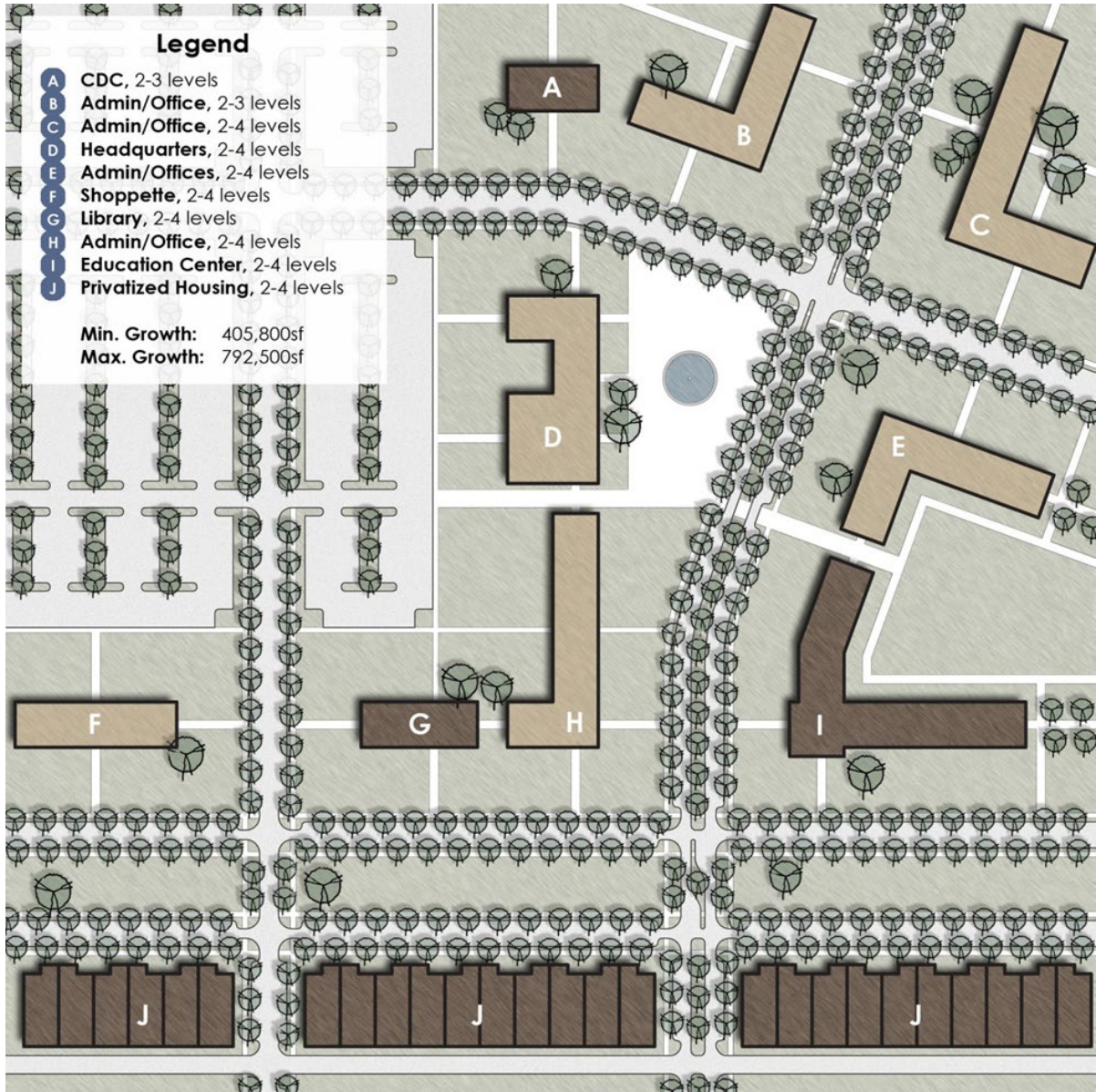
#### **3-6.1.7.2 Relationship Between Regulating Plan and Illustrative Plan.**

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 an Illustrative Plan and serves as an underlay to the Illustrative Plan.

#### **3-6.1.7.3 Capacity Analysis.**

Effective plans identify future requirements and provide room for notional facilities and specific facilities that have not 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.” Calculate additional square footage of future facilities 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.**

Revise environmental documentation as necessary to include an analysis of the anticipated environmental impacts of plan implementation, identification of appropriate mitigation measures, and documentation of the results. Follow all Service-specific environmental regulations and requirements.

### **3-6.4 Network Plans.**

After completion of the ADPs for the priority districts on the installation, combine relevant information into appropriate Network Plans. Network Plans show future development for the installation as a whole, 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, as well as resiliency impacts.

#### **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. Indicate where ADPs have not been accomplished 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. Indicate where ADPs have not been accomplished on the Installation Regulating Plan.

#### **3-6.4.3 Installation Street and Transit Plan.**

This Network Plan identifies and maps all current and proposed streets across the installation and forms 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 identifies current or proposed transit routes and transit stops. Develop and update the transit plan in consultation with the metropolitan planning organization designated for the metropolitan planning area in which the military

installation is located, if one exists. Include considerations of ways to diversify and connect transit systems (if one exists).

#### **3-6.4.4 Installation Sidewalk and Bikeway Plan.**

This Network Plan identifies and maps all current and proposed sidewalks and bikeways across the installation and forms 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 identifies and maps all major parks and open space elements and will include, at a minimum, current and proposed parks, open spaces, riparian corridors, wetlands, and significant bodies of water.

#### **3-6.4.6 Installation Primary Utility Plan.**

This Network Plan identifies all current and proposed primary utility lines across the installation and forms 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. Show all granted easements and rights of way for utilities, as well as central and alternative (e.g., solar, wind) 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 the installation's vision and planning objectives for development are achieved, even if drastic changes to missions or programs occur. These standards are developed to 1) meet sustainability, severe weather and climate resilience, 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, include BES, SES, and landscape standards.

#### **3-7.1 Building Envelope Standards (BES).**

The intent of BES 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 BES, site-planning standards, and building-related force protection standards. Relate the BES 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), allowable 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:

- Mission building types (flightline facilities, hangars, and simulator facilities)
- Industrial building types (warehouses, maintenance facilities, research labs, and production facilities)
- Administrative building types (headquarters facilities and general offices)
- Medical building types (medical centers, hospitals, and clinics)
- Mixed-use building types (mixed-use building types incorporate commercial uses on the ground floor and any other type of approved uses above)
- Flex-use building types (flex-use building types incorporate any approved type of use on any floor)
- Commercial community support building types (large-format retail stores, religious buildings, schools, lodges, restaurants, bowling centers, recreation facilities, clubs, and stand-alone retail)
- Residential building types (single-family homes, row houses, townhomes, apartments, and unaccompanied personnel housing)

### **3-7.2 Street Envelope Standards (SES).**

These standards illustrate typical configurations for all street types on an installation through SES. Each SES addresses 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 type (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), man-made hardscape features (street furniture, signage, lighting), 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. Ensure compliance with UFC 3-201-02, *Landscape Architecture*.

### **3-8 INSTALLATION DEVELOPMENT PROGRAM.**

The Installation Development Program is the overall 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 through a method that ensures infrastructure reliability and contributes to sustainable development.

#### **3-8.1 Program Elements.**

The Installation 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.**

Begin with an executive summary describing the key facility areas requiring the most attention in the near future, including a listing of required facilities and existing surplus or deficits. The program narrative provides a description of key development issues and strategies used to overcome these issues. The program narrative includes all interim steps required to achieve the desired end state.

##### **3-8.1.2 Project Listing.**

Include a list of major projects planned for the installation and identify all funding sources and project types: MILCON, major renovation or recapitalization projects (O&M), military family housing (MFH), non-appropriated funds (NAF), Army and Air Force Exchange Service (AAFES), Navy Exchange (NEX), Marine Corps Community Services (MCCS), Defense Commissary Agency (DeCA), MWR, sustainability, resilience, and energy projects, real estate actions, public-private initiatives, and privatized housing, lodging, or utilities initiatives. Include projects identified in the Functional Annexes in this list and identified as supporting those efforts. Include demolition projects in the listing. Include information such as title, project number, fiscal year, and estimated 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.**

Program development is the process of developing the Implementation Plan for ADPs and allocating resources (funding) to each of the projects. Planners will consult with programmers to identify the program requirements. A portion of programmed requirements on military installations will focus on recapitalization, sustainment, and restoration of existing infrastructure. Program development will be based in part on Service-specific facility evaluation systems and condition assessments.

### **3-9 PLAN SUMMARY.**

Once the above planning processes and products are completed, prepare a Plan Summary that includes the Vision Plan, executive summaries of the ADPs, appropriate Network Plans, and a summary of the Installation Development Program. Prepare the Plan Summary to allow sharing with community partners.

### **3-10 FUNCTIONAL ANNEXES.**

Functional Annexes support the master planning process by providing inputs to planning framework and the Vision Plan, especially with goals and objectives for long-term development and constraints to be considered at all stages of installation planning. Functional Annexes identify gaps in facilities and infrastructure which are addressed in the master planning process. Functional annexes include, but are not limited to, IEPs, ICRPs, ADEPs, Complex Plans, and PDPs. Planners should include the associated updates to the Master Plan core documents for these planning efforts, including constraints and opportunities maps, ADPs, and Installation Development Programs. The IEP and ICRP are required under this UFC to meet the requirements of 10 USC 2864. Follow Service-specific guidance on additional Functional Annexes.

#### **3-10.1 Installation Energy Plan (IEP).**

An IEP is an integration of installation and higher-level strategic guidance, plans, and policies into a holistic roadmap enabling the installation to work constructively toward established goals for energy efficiency, renewable energy, and energy resilience. These goals should consider the installation mission, existing Master Plans, particular circumstances, priorities, opportunities and constraints, and include:

- Meeting projected future energy and water demand to achieve mission assurance on military installations
- Achieving goals set by Congress, the White House (see EO 13834), DoD, or Services for energy use intensity and other energy efficiency, greenhouse gas (GHG), renewable energy, energy resilience, water efficiency, and alternative fuels
- Lowering total operating costs
- Addressing concerns that hinder stakeholder cooperation on energy and water management, including industrial control systems (ICS) and cybersecurity

IEPs incorporate long-range plans for energy resilience capabilities to ensure available, reliable, and quality power for each of the installation's critical missions. Guidance on preparing the energy resilience portion of the IEP is contained in DoDI 4170.11, *Installation Energy Management*. This instruction is supplemented by the guidance provided in the OASD (EI&E) Memorandum, "Energy Resilience: Operations, Maintenance, and Testing (OM&T) Strategy and Implementation Guidance," effective

March 2017. Follow the guidance in these two documents when developing IEPs. IEPs are integral to the installation development process; however, IEPs should be developed to be stand-alone or severable documents from the installation Master Plan.

### **3-10.2 Installation Climate Resilience Plan (ICRP).**

Natural disasters, such as hurricanes, typhoons, flooding, wildfires, and high winds, have damaged or destroyed installations in the past. Installations face rapidly evolving mission assurance requirements that place huge demands on our installation resources. Section 2801 of the FY 2020 NDAA amended 10 USC 2864 to require installation Master Plans to include an installation military resilience component to discuss severe weather and other changing environmental factors.

Base climate change projections on recognized governmental and scientific entities to identify potential future risks and threats to the resilience of the installation as described in paragraph 3-5.6.

Resiliency considerations have always been a cornerstone of sound installation master planning. Master plans should document a deliberate methodology to recognize severe weather and climatic hazards and incorporate within planning recommendations a set of succinct measures to minimize or mitigate the risks of these events in the future. Use the NAVFAC *Installation Adaptation & Resilience Climate Change Planning Handbook* or other Service-specific handbook to identify hazards and evaluate adaptation strategies applicable at the installation or district level. As a best practice, use the NAVFAC *Installation Adaptation & Resilience Climate Change Planning Handbook* to determine and evaluate adaptation strategies specific to capital improvement projects of significant scale which improve the overall resilience of the installation.

Address the following in the ICRP:

**3-10.2.1** Identify existing and projected risks and threats to military installation resilience that exist at the time of plan development and are projected for the future. For planning purposes, climate scenarios should cover a 50-year time horizon. Use additional timeframes as needed. It is important to note, although the scenarios cover 50 years, the Installation Development Program generally identifies investments in the 5- to 20-year timeframe. Scenario planning accounts for the expected service life of an asset, not the initial construction (investment) date. Include risks and threats from extreme weather events, mean sea level fluctuation, wildfires, flooding, high winds, and other changes in environmental conditions that have impacted installation operations or have the potential to impact installation operations. See paragraph 2-2.17 for additional weather and climate phenomenon and available specific tools.

**3-10.2.2** Identify installation assets or infrastructure at risk to climate or weather hazard-related risks and threats. Place special emphasis on assets or infrastructure critical to the mission of the installation (see paragraph 2-5.1.1). Ensure classified information is not included in the plan.

**3-10.2.3** Include in the Installation Development Program, as described in paragraph 3-8, ongoing or planned infrastructure projects to mitigate the impacts of the risks and threats. Include non-infrastructure mitigation strategies that contribute to installation resiliency, including monitoring and specific studies to be completed.

**3-10.2.4** Evaluate previous extreme weather events and application of lessons learned when determining planning constraints and validating planned infrastructure projects. The Plan Summary will include a narrative describing the changes made to the installation to address such impacts since the prior Master Plan update.

**3-10.2.5** Identify community infrastructure and resources located outside the installation necessary to maintain mission capability or that impact the installation's resilience that are vulnerable to the risks and threats. Ensure classified information is not included in the plan.

**3-10.2.6** Identify agreements in effect, or planned with public or private entities at the time of the development of the Master Plan, for the purpose of maintaining or enhancing military installation resilience or resilience of the community infrastructure and resources.

**3-10.2.7** Identify current coordination efforts and plans for additional coordination with public or private entities for the purpose of maintaining or enhancing military installation resilience or resilience of the community infrastructure and resources described in paragraph 3-10.2.5. //

### **3-10.3 Area Development Execution Plans (ADEP).**

Use ADEPs to synchronize project requirements identified in the programming phase. Use Service-specific tools and methods or processes identified during the planning phase as part of the plan-based programming approach. Develop ADEPs at the district level but each Service or installation may develop ADEP plans by parcel or grid. The outcome is a technical plan depicting all projects and a database for integration into the installation's five-year work plan.

### **3-10.4 Complex Plan.**

A Complex Plan, also referred to as a campus plan or nodal plan, bridges the scale between district-wide ADPs and building-specific site plans. These plans are useful when a tenant or user has a need for a grouping of facilities within a district built from the district's Regulating Plan and Planning Standards to synchronize the identified requirements with the district's planning goals. A Complex Plan includes specific building footprints scaled to the program for known projects, existing buildings, buildings under construction, buildings slated for demolition, and existing and proposed horizontal infrastructure, including streets, sidewalks, parking areas, and open spaces.

### **3-10.5 Project Development Plan (PDP).**

The PDP (also known as Customer Concept Documents [CCD] or Planning Charrette Report [PCR]) documents the concept for a proposed new building or renovation project. Designers prepare a PDP following completion of an ADP or Campus Plan to connect the PDP to the planning direction for the district or campus. This allows architecture and planning to work together in support of the installation's planning vision. A PDP results in products planners can relay to designers to complete the design process.

A PDP includes:

- Room-by-room program development
- Construction budget
- Energy model tied to the district's sustainability plan if one is in place
- Weather resiliency analysis
- Site plan tied to the district's Regulating Plan and Planning Standards
- Conceptual floor plans, elevations, building sections and major system narratives to inform the development of follow-on programming documentation which may include DD 1391s or site approval forms
- Rendering(s) to illustrate the quality of the proposed project

Designers can develop PDPs for MILCON, SRM, and other applicable project types with input from a focused group of stakeholders using a participatory planning process in preparation for completion of the programming documentation (i.e., DD Form 1391). The intent is to bridge planning to programming and the design process.

### **3-11 SITE APPROVAL PROCESS.**

Site all facility acquisition or construction projects in accordance with an approved Master Plan. An approved Master Plan siting means the project meets all guidelines and objectives set forth in the Regulating Plan and Installation Planning Standards. All projects must have approved site selections prior to the start of design. Attain site approval during the project programming process for SRM projects and during development of the DD Form 1391 for MILCON projects. All projects must remain in compliance with the Master Plan through the design process. Projects proposed by affiliated agencies, including, but not limited to, privatized housing contractors, MCCS, NEX, AAFES, DeCA, Defense Health Agency, and Department of Defense Education Activity (DoDEA) must also have the sites approved. Refer to Service-specific guidance for the detailed site approval process.

### **3-12 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 the installation's vision for development is met. Apply the Regulating Plan to all forms of acquisition used to implement the Master Plan. Include the Regulating Plan and supporting BES, Landscape Standards, and SES in the solicitation for proposed construction projects and subsequent contract documents for design and development of a project. Include single-line drawings (floor plans, elevations) if they are developed as part of an ADP to illustrate a way to meet the intent of the Regulating Plan. Evaluate project designs on how well they conform to the Regulating Plan and supporting standards.

### **3-13 INSTALLATION PLANNING BOARD (IPB) MASTER PLAN ENDORSEMENT AND APPROVAL PROCESS.**

The IPB (Facilities Board for the Air Force) will approve the installation's Master Plan and it will be endorsed by the appropriate approval authority designated by each Service. The Master Plan is the result of an iterative process and can be approved in parts or as a whole, depending upon completion timelines. Approve the Vision Plan, IDP, Program, and Installation Planning Standards as they are completed. Specific approval procedures are developed by each Service.

#### **3-13.1 Installation Planning Board (IPB).**

Each Service determines the responsible authority to establish and convene an IPB. The IPB will assist the installation leadership to manage, develop, and, in some cases, realign, clean up, and close the installation, supported sites, or area facilities and real estate. Every installation will have an IPB. See Appendix A for recommended roles, responsibilities, membership, and operations of an IPB.

#### **3-13.2 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. Update the endorsement with each change of command. A new commander, however, does not drive the need for an updated Master Plan; do not update Master Plans 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.

#### **3-13.3 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 used to track compliance with the requirements herein. 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 recommends each Service establish 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. Evaluate installation Master Plans against the following key performance indicators.

#### **4-2.1 Tier 1: Product Compliance.**

Each Service will ensure installations have the appropriate planning products that document their planning process. At a minimum, every installation will have a Master Plan that includes:

- Vision Plan and its elements
- IDP, including ADPs, and its elements
- Installation Planning Standards (BES, Landscape Standards, and SES)
- Installation Development Program and its elements
- Plan Summary
- IEP and ICRP as a Functional Annex

An appropriate higher level of authority will evaluate planning products. Per DoDI 4165.70, Master Plans will cover at least a ten-year period and be reviewed and updated at least every five years. Services will report the number of Master Plans with all products complete and current on an annual basis during the Program Objective Memorandum briefings to OSD.

#### **4-2.2 Tier 2: Strategy Compliance.**

All Master Plans will incorporate the appropriate planning strategies identified in Chapter 2 of this UFC. An appropriate higher level of authority will evaluate integration of the strategies into installation Master Plans.

**4-2.3 Tier 3: Principle Compliance.**

Compliance with the planning principles in Appendix B is optional. Planners should, however, incorporate the relevant principles into their Master Plans to support the installation's planning vision. Conformance can be measured using a variety of quantitative methods. For examples, refer to Appendix B.

**4-3 TRAINING REQUIREMENTS.**

Training on installation master planning is an essential function and will be supported by each Service. This includes training for DoD master planners, installation commanders and contractors. The DoD Master Planning Institute, hosted by USACE, is an appropriate source for planning training. See Appendix C for more information.

**4-4 CERTIFICATION.**

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

## APPENDIX A BEST PRACTICES

### A-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.

#### A-1.1 Planning Strategies.

The focus of the effort is on sustainability 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 other strategies in this UFC, including natural and cultural resource preservation, healthy community planning, defensible planning, and capacity planning. 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 DoD. With the plan in place, installation staff are now able to implement plan-based programming.

#### A-1.2 Planning Process.

**A-1.2.1** The process described in this UFC was applied at Joint Base Lewis-McChord.

**A-1.2.2** 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 Service members, families, and the mission, we will create a sustainable community of walkable neighborhoods with identifiable town centers connected by complete streets."

**A-1.2.3** The Vision Plan 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.

**A-1.2.4** Upon completion of the Vision Plan, the team began work on the IDP by focusing first on completing Regulating Plans, Illustrative Plans, Implementation Plans, and supporting sketches and renderings for each district's ADP. When the ADPs were completed, the planning team created overall Network Plans that include an overall Regulating Plan (Figure A-1), Illustrative Plan, Transportation Plan (Figure A-2), Pedestrian and Bikeway Plan (Figure A-3), and Open Space Plan (Figure A-4).

Figure A-1 Regulating Plan

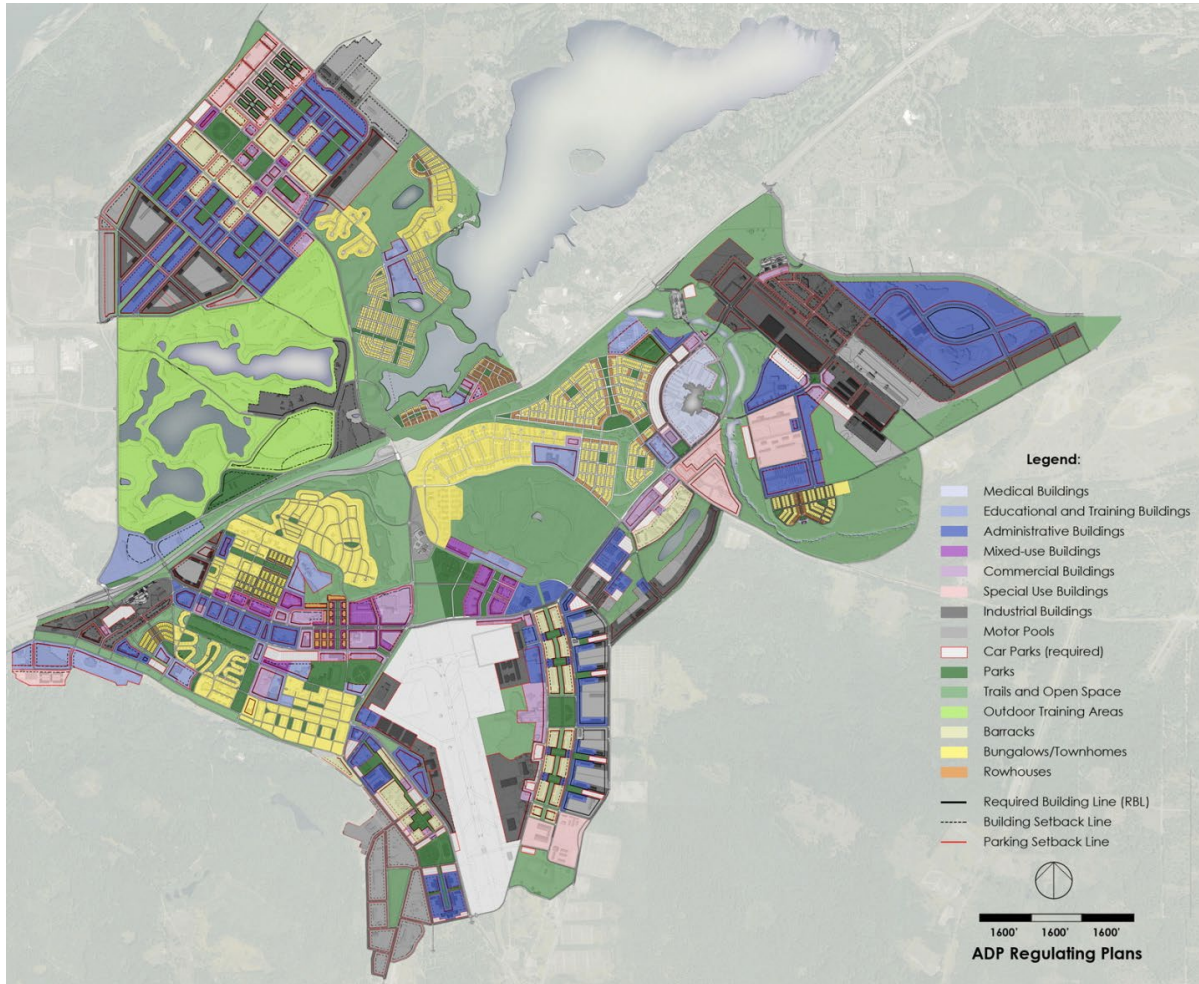


Figure A-2 Transportation Plan

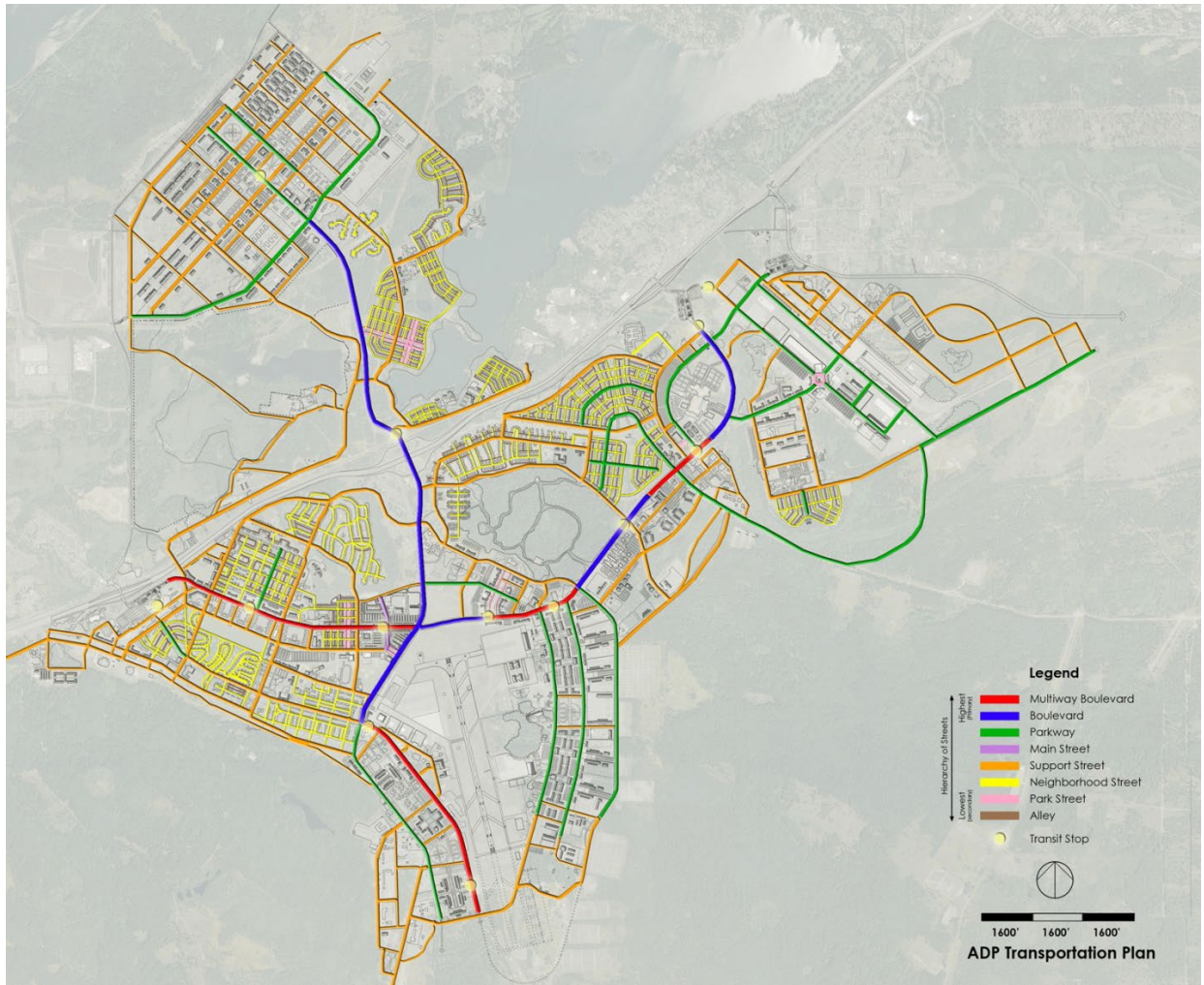


Figure A-3 Pedestrian and Bikeway Plan

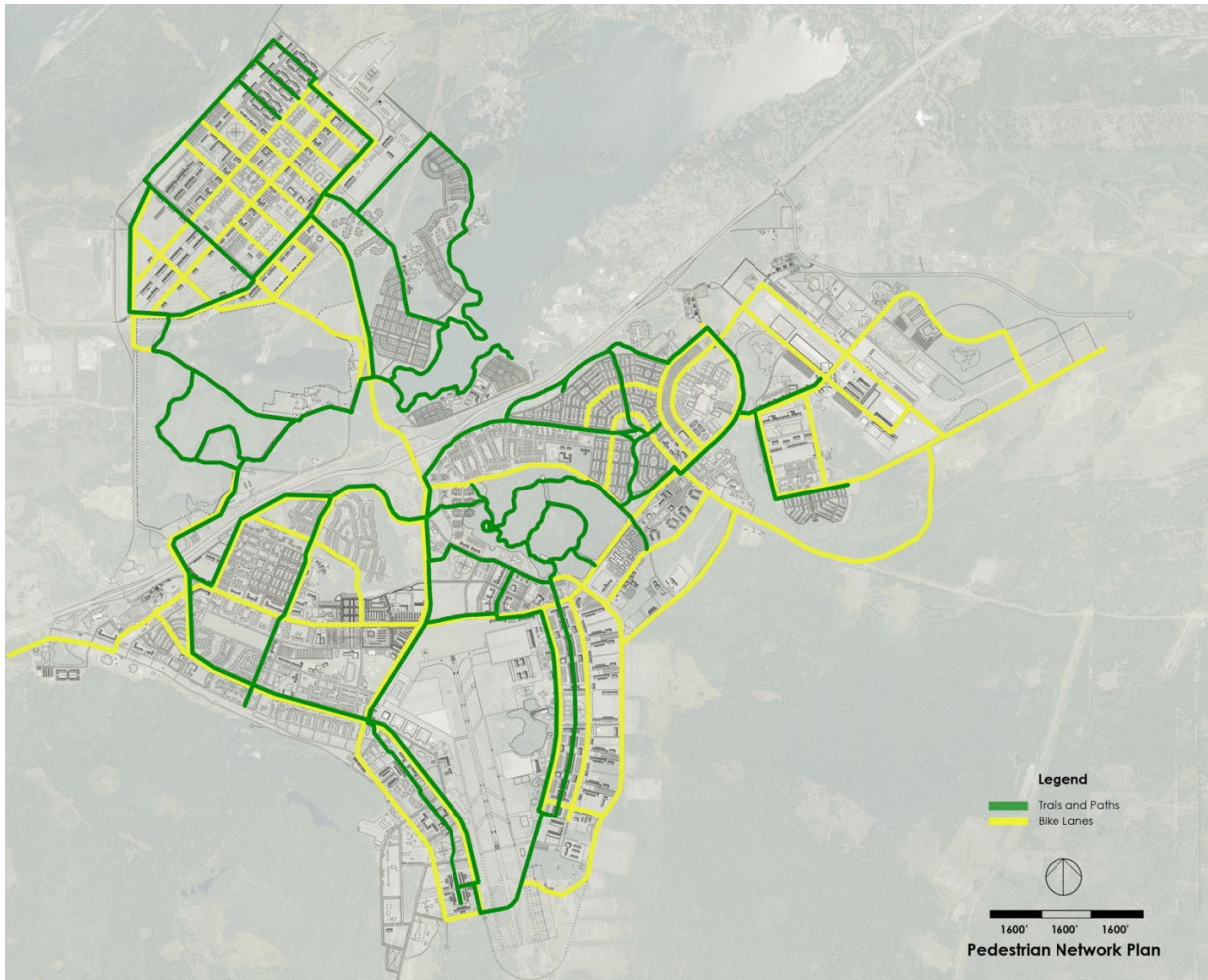
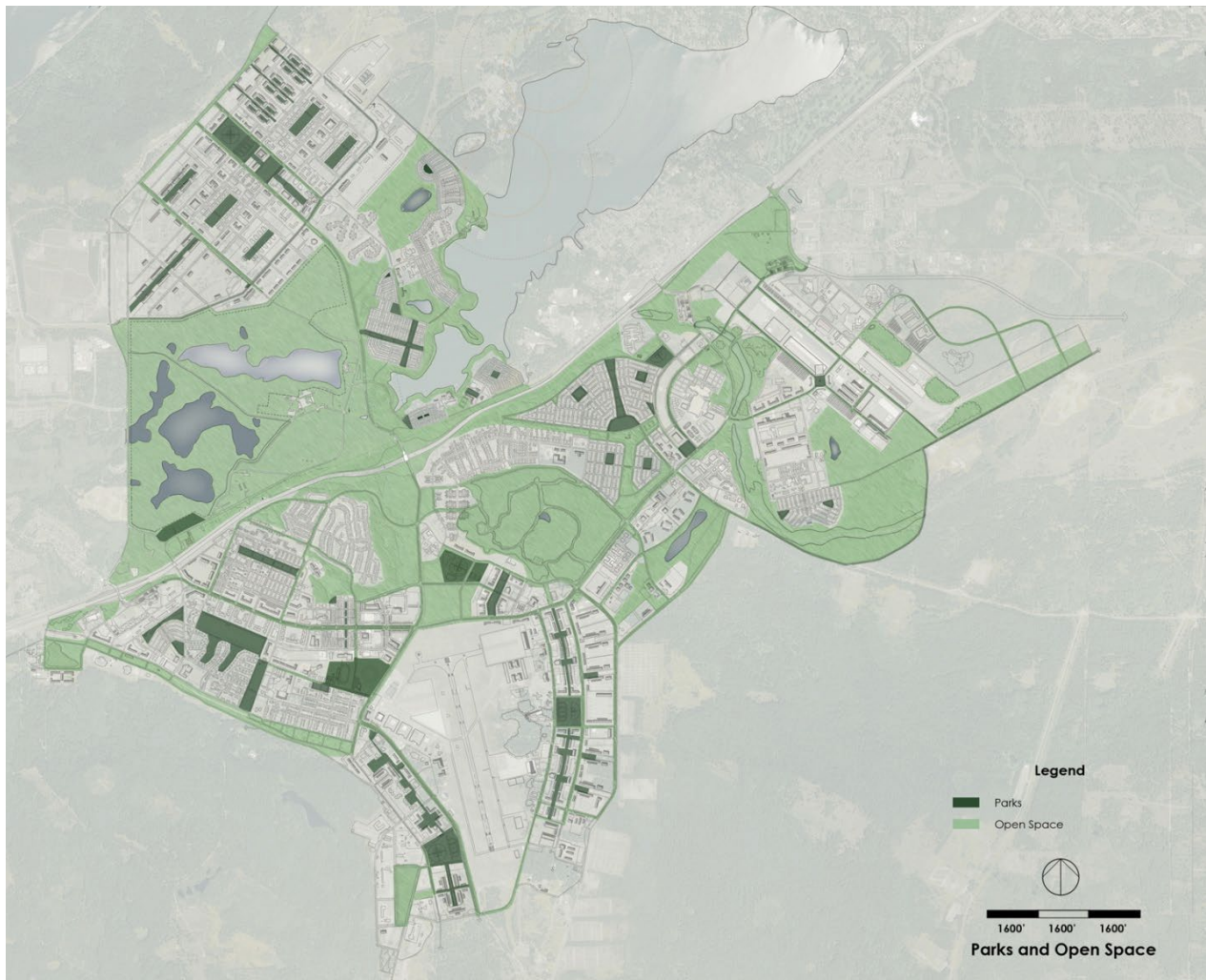


Figure A-4 Open Space Plan

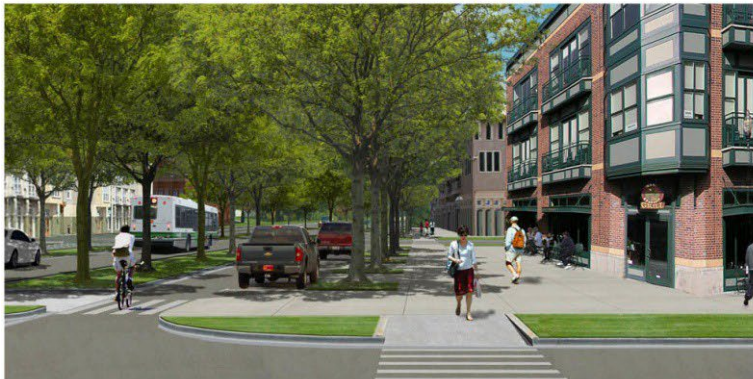


**A-1.2.5** As part of the area development planning process, the planning team developed Installation Planning Standards for streets, buildings, and landscapes. Additionally, within each ADP, the team documented the Installation Development Program. A Plan Summary, referred to by the Army as the Real Property Master Plan Digest, documented the entire effort.

### **A-1.3 Plan Implementation.**

**A-1.3.1** The plan 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 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 IPB and the Installation Sustainability Board.

Figure A-5 Street Transformation



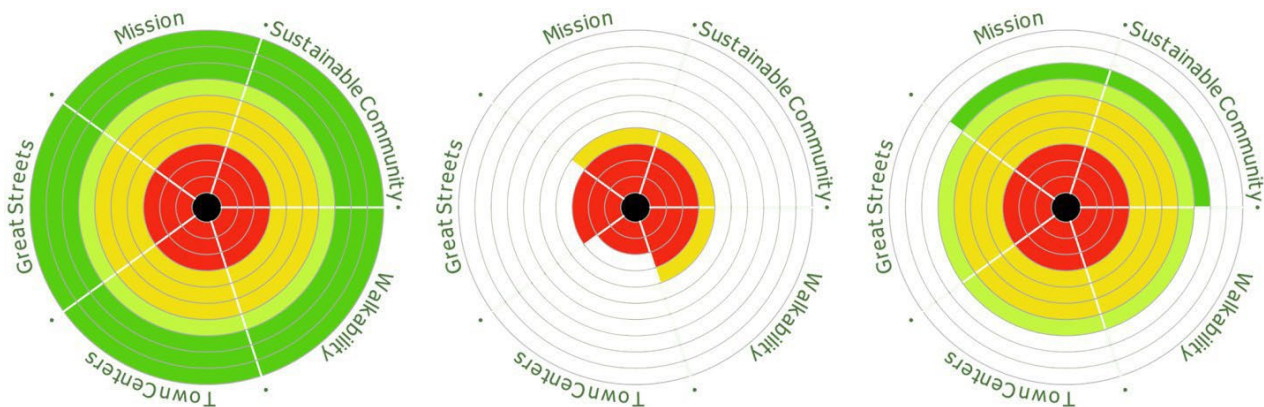


**A-1.3.2** The images in Figure A-5 are from a street transformation at Joint Base Lewis-McChord and demonstrate how planning can be used to synchronize infrastructure and facility investments.

#### **A-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 the LEED *Reference Guide for Neighborhood Development* (LEED-ND) 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 A-6 Target Chart Graphic (Goal/2008/2017)**



#### **A-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 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 cantonment that was previously considered built-out. As a result of incorporating principles of sustainability 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 emissions, and per-household gasoline costs of \$1,500.

## **A-2 FORT HUNTER LIGGETT INSTALLATION DESIGN GUIDE (IDG).**

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 ADPs that conform to this UFC, they drafted a new 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 (RFP). 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 in as few pages as possible. The Fort Hunter Liggett IDG sets the planning standards for streets, buildings, and landscapes.

### **A-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 ADPs. 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.”

### **A-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 sustainability 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; USACE 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. The IDG is organized to facilitate the preparation and execution of projects to improve the visual image on the installation and ensure the design conforms to Army standards, including sustainability. Part I discusses the process, use, and implementation of the IDG. Part II addresses the BES, including setbacks, building form, building heights, and parking requirements. Part III establishes Street Envelope Standards (SES) 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 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.

### **A-2.3 Using the Installation Design Guide (IDG).**

The IDG provides installation-specific design data. The general design concepts, recommendations, and standards addressed therein are applicable to construction and renovation projects at Fort Hunter Liggett, California. Planners use the 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 to develop 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, and maintenance and repair projects on the installation:

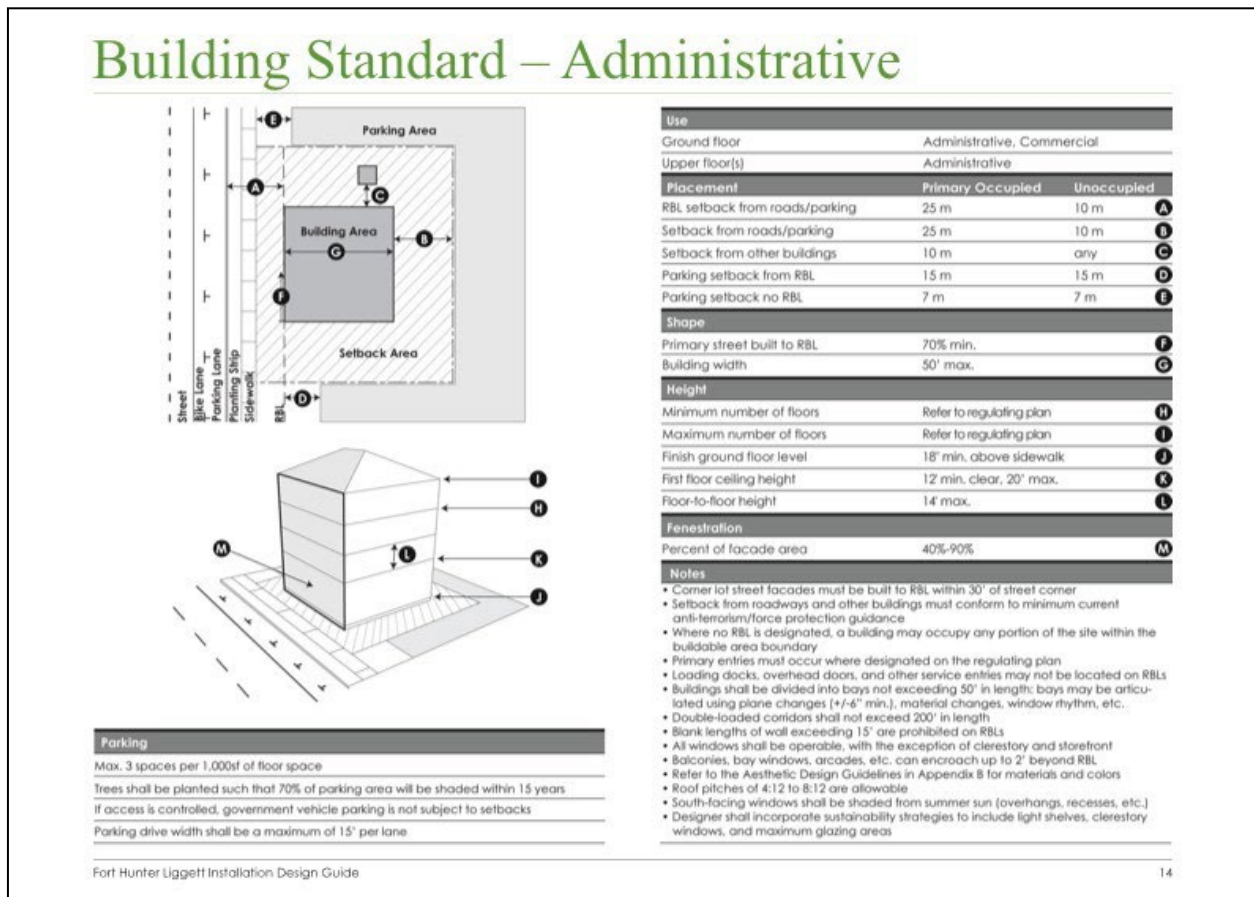
- Step 1: Review the design goals, objectives, and principles included in ADP reports and Appendix C of the IDG.
- Step 2: Consult the regulating plan to determine the applicable standards for buildings, streets, and landscapes.
- Step 3: Review the applicable standards in Parts II through IV of the 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.

### A-2.4 Building Envelope Standards (BES).

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 BES to 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.

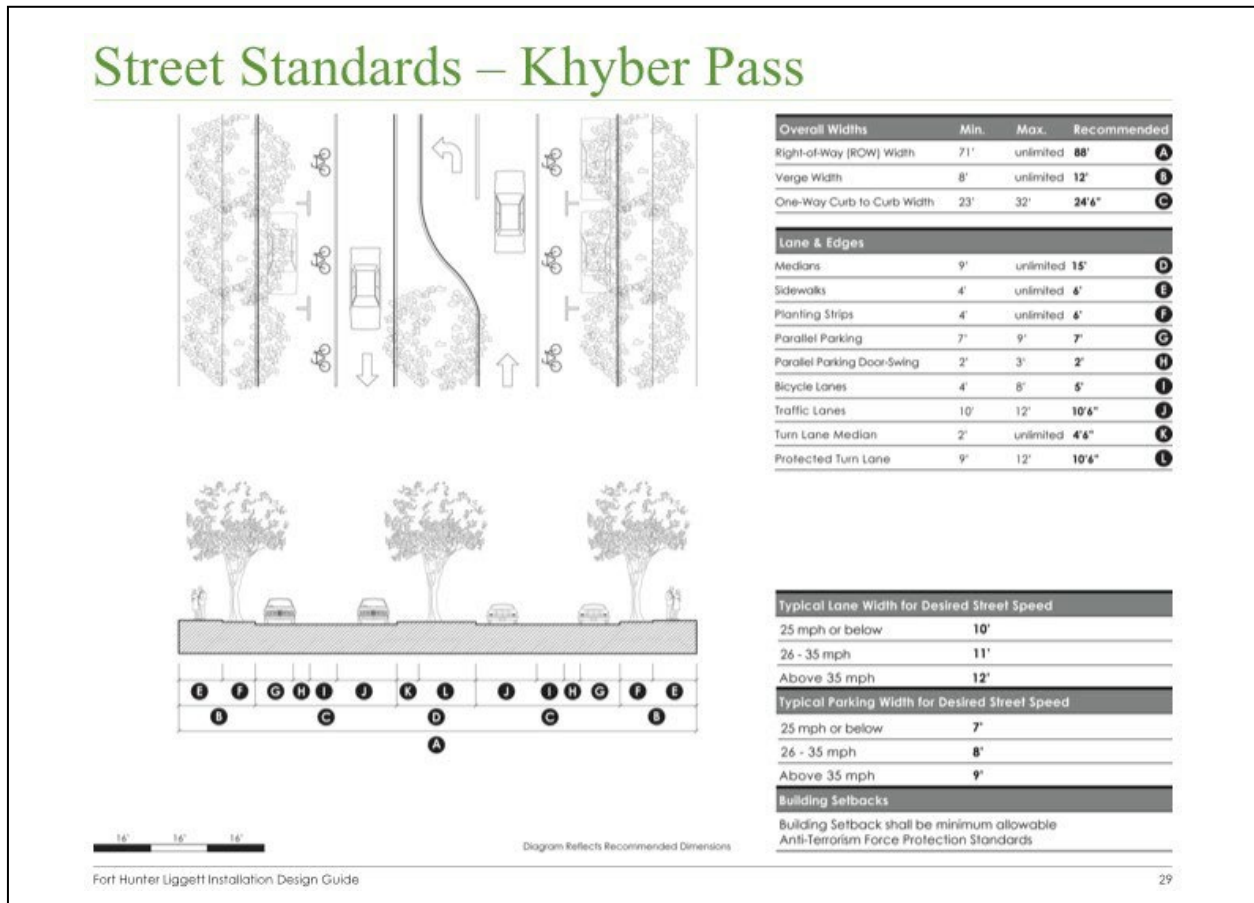
Figure A-7 Building Envelope Standards (BES) Graphic



**A-2.5 Street Envelope Standards (SES).**

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 A-8 Street Envelope Standards (SES) Graphic**



**A-2.6 Landscape Standards.**

The Landscape 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 A-9 Landscape 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/<br>Individual | Shade | Park | Fire-<br>Tolerant | Drought-<br>Tolerant | Spacing     |
|--|-------------|-------------------------|-------|------|-------------------|----------------------|-------------|
| <b>California Sycamore</b><br><i>Platanus racemosa</i>           | ●           | ●                       |       | ●    |                   |                      | 20' o.c.    |
| <b>Coast Live Oak</b><br><i>Quercus agrifolia</i>                | ●           |                         | ●     |      | ●                 |                      | 25' o.c.    |
| <b>Box Elder</b><br><i>Acer negundo</i> var. <i>californicum</i> | ●           |                         | ●     | ●    |                   |                      | 30' o.c.    |
| <b>Hollyleaf Cherry</b><br><i>Prunus ilicifolia</i>              |             | ●                       |       |      | ●                 | ●                    | 15' o.c.    |
| <b>California Laurel</b><br><i>Umbellularia californica</i>      | ●           | ●                       | ●     | ●    |                   |                      | 30' o.c.    |
| <b>Western Redbud</b><br><i>Cercus occidentalis</i>              |             | ●                       | ●     | ●    |                   | ●                    | 10-15' o.c. |
| <b>California Juniper</b><br><i>Juniperus californica</i>        |             | ●                       | ●     | ●    |                   | ●                    | Individual  |
| <b>Valley Oak</b><br><i>Quercus lobata</i>                       |             | ●                       | ●     | ●    | ●                 |                      | Individual  |
| <b>Desert Ironwood</b><br><i>Olneya tesoto</i>                   |             | ●                       |       |      |                   | ●                    | 15' o.c.    |

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### **A-3 OPERATION OF AN INSTALLATION PLANNING BOARD (IPB).**

#### **A-3.1 Primary Responsibilities.**

The IPB (also called the Facilities Board) ensures the orderly development and management of installation real property in support of the planning vision and the installation mission. The IPB guides the development and maintenance of all components of the Master Plan and helps ensure the Master Plan addresses all real property requirements for all agencies and activities on the installation and supported areas, and 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.

##### **A-3.1.1 Coordination.**

The IPB ensures the Master Plan is coordinated with:

- Adjacent and nearby installations

- Other activities and land use of DoD and federal agencies
- Federally recognized Native American tribes, recognized Alaskan native entities, and Native Hawaiian organizations
- 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 typically be followed.)
- Interested non-governmental groups and associations, state recognized tribes, businesses, and concerned individuals
- State historic preservation officer (SHPO)

### **A-3.2 Additional Responsibilities of the IPB.**

The IPB will also:

- 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.
- Develop plans and programs that are in harmony with, protect, and enhance the environment and are observant of sustainability design and development policies and objectives.
- 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.
- Oversee actions to realign, clean up, impose land use controls, and close the installation or locations supported by the installation, as required.
- Resolve Master Plan disputes between competing organizations on the installation.
- Adjudicate variances from the Installation Planning Standards and forward for approval.

### **A-3.3 Composition of the IPB.**

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

- **Chair.** The chair is designated by each Service and could be the senior commander or garrison/base/installation commander.
- **Voting Members:**
  - Chair

- Military or civilian commanders of Civil Engineering, Public Works, or appropriate equivalent. This individual also serves 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, recommend including the installation Cultural Resource Manager as an IPB member.
- **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.

Service-specific requirements may override composition and voting members of the IPB, as appropriate.

#### **A-3.4 Meetings of the IPB.**

Each Service determines the meeting schedule and operations of the IPB. 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.

#### **A-3.5 Approval Responsibilities.**

The IPB will recommend formal approval of:

- All components of the Master Plan and the resources required to prepare and maintain them
- Variances from planning requirements established by the Regulating Plan and the Planning Standards
- Priorities and funding of Master Plan projects and other related resource issues



- Real property utilization and space assignment resolutions
- Other items within the purview of the Board's charter, as designated by the Commander

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## APPENDIX B PLANNING PRINCIPLES

### B-1 PURPOSE.

The purpose of this appendix is to outline specific planning principles applicable to military planning. Below is an example scorecard tool that organizes the principles into categories to support the planning strategies discussed in this UFC. This example of a score card is adopted from the principles in the LEED-ND program and adds appropriate principles tailored to military needs. Using a scorecard as a 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.

### B-2 PROCESS.

To use this scorecard, evaluate the existing condition at each district to determine a baseline score and then evaluate the approved ADP to determine the maximum possible score. In this example, requirements are identified with an “R” in the table and credits are identified with maximum points allowable.

**Figure B-1 Principles for Military Development Criteria Table**

| <b>Military Development Sustainability Credit Designation</b> |  | <b>Credits Available<br/>(note 1)</b> |
|---|--|---------------------------------------|
| <b>SUSTAINABLE PLANNING (SP)</b>                              |  | <b>59 max</b>                         |
| 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             |
| <b>NATURAL AND CULTURAL RESOURCE PRESERVATION (RP)</b> |  | <b>5 Max</b>  |
| 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             |
| <b>HEALTHY COMMUNITY PLANNING (HP)</b>                 |  | <b>17 Max</b> |
| 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             |
| <b>DEFENSIBLE PLANNING (DP)</b>                        |  |               |
| DP1  | AT/FP Compliance   | R             |
| <b>MAXIMUM POSSIBLE SCORE</b>                          |  | <b>81</b>     |

Note 1 – R refers to a required item and credits are indicators of the relative importance of each area.

Note 2 – Deleted

Note 3 – Community outreach and involvement applies to on-installation populations only.

Note 4 – Follow local requirements for accessible housing requirements.

Note 5 – Deleted

### **B-3 APPLICABILITY.**

The principles are applicable at the ADP scale prior to construction. Early in the planning process, establish the planning strategies applicable to the district and in the vision, establish the strategies that are important. In the example criteria above, a successful ADP will score more than 50 points. Districts without housing are exempt from the housing requirements of the criteria.

## **B-4 MILITARY DEVELOPMENT CRITERIA.**

Planners can refer to LEED-ND for detailed explanations for the LEED-ND criteria noted in Figure B-1. However, for military development criteria, refer to the following descriptions.

### **B-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 UFC criteria or approved local guidance on AT.

### **B-4.2 Prerequisite: Range and Training Land Conservation – Required.**

Preserve mission-critical resources by protecting a range complex with associated surface danger zones (SDZ), impact areas, buffer areas, and training land from development. Locate the project such that 0% of the development area is located on installation-designated range and training land.

### **B-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.

### **B-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.

**B-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.

**B-4.6 Prerequisite: Porches – Required.**

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

- Porches are a minimum 6 feet deep and 10 feet wide.
- Porches should be elevated from the street level by at least three risers. Ensure universal access 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 4 feet deep and 6 feet wide and must be at least three risers above the street level.

**B-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.

- Ensure planting strips are a minimum of 5 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.

**B-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 1 square foot per Soldier of open space within a  $\frac{3}{4}$ -mile radius of any company operations facility. The number of Soldiers is determined by the number of occupants currently using (or planned) for that facility.
- Consolidated open spaces are encouraged, provided they fall within the required radius.

**B-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)

**B-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 2 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 2 points can be gained if the paving is pervious surfacing (2 points).

**B-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), or
- 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).

**B-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 C MASTER PLANNING TRAINING**

Master planning training is highly encouraged throughout DoD. Noted below are recommended guidelines for continuing education.

### **C-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.

### **C-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 four hours of master planning training before or within the first six months of assuming command, in a venue determined by each Service.

### **C-3 TRAINING FOR CONTRACTORS.**

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

### **C-4 MASTER PLANNING INSTITUTE (MPI).**

The MPI, hosted by USACE, is a source for master planning training. The MPI coordinates opportunities to provide education and training for personnel working in planning throughout DoD. The MPI coordinates and publicizes courses available for master planners in each Service; refer to [www.dodmpi.org](http://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 Sustainability and Resiliency (163)
- Master Planning Practices (241)
- Master Planning Energy and Sustainability (258)
- Master Planning Programming and Siting (326)
- Master Planning Sustainable Historic Structures (392)

- Master Planning Visualization Techniques (948)
- Master Planning Advanced Techniques (952)

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

- Introduction to Air Force Planning (WENG 519)
- Comprehensive Planning Fundamentals (WENG 520)
- Introduction to Asset Management (WMGT 301)
- Project Programming (WENG 423)

Relevant Naval Civil Engineer Corps Officers School courses include:

- Facilities Planner (A-4A-0016) - Naval Civil Engineer Corps Officers School (CECOS)
- Navy Master Planning – Commander, Navy Installations Command (CNIC)

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 D GIS DATA LAYERS

**D-1** When preparing a constraints map, planners should refer to data embedded in the installation's GIS system. DoDI 8130.01 establishes policy, assigns responsibility and provides governance for the collection and maintenance of geospatial data related to DoD installations. The program is the Installation Geospatial Information & Services (IGI&S). Each Service requires adherence to the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE); refer to Service-specific guidance for the most recent guidance. Geospatial data developed at or for the installation under this guidance and reported to the Service Headquarters is in turn reported and delivered to the Defense Installations Spatial Data Infrastructure (DISDI).

**D-2** Datasets such as those identifying buildings, roads and road networks, utilities and utility networks, and environmental and cultural features such as habitat, nesting sites, and burial grounds, are usually collected via GPS or remotely acquired using appropriate technology. Coordinate with their local geospatial staff to ensure the most current datasets are being used for planning products.

**D-3** A second group of geospatial datasets are a product of analysis. Airfield constraints, quantity distance arcs, noise contours, anti-terrorism and force protection (AT/FP) buffers, and areas proposed for disposal are layers that fit into the above category. These datasets require subject matter expert (SME) input and control. Acquire current and/or validated datasets from the appropriate SME prior to starting a planning project requiring these data.

**D-4** The last group of geospatial datasets are those national datasets governed by non-DoD entities such as soils, wetlands, and floodplains. Coordinate with installation geospatial staff to be sure current and targeted data is acquired for planning projects. For constraints and opportunities maps, typical data layers referenced include, but are not limited to:

- airfield, heliports and isolated helipads, constraints
- at restrictions
- quantity-distance arcs (munitions safety)
- noise contours
- safety buffers (setbacks required)
- former firing ranges and impact areas
- impact areas (duded and non-duded)
- chemical storage areas
- topography
- wetlands

- threatened/endangered species habitat
- protected natural/cultural areas
- flood hazard areas
- soil restrictions
- environmental contamination
- desirable and undesirable land use features off the installation
- land use controls
- landfills
- historic districts
- transportation systems
- open space systems
- utility systems
- encroachment areas
- areas proposed for disposal/deconstruction
- cultural resource/archeological sites
- pesticide storage areas
- pesticide-sensitive application facilities and areas
- surface and subsurface hazardous material storage
- existing facility assessment
- future development
- in/out grants
- overall real estate boundaries (borders, easements)
- access control points
- open and closed installation restoration program (irp) sites.
- high-resolution aerial photography/lidar contour mapping
- range complex surface danger zones

## APPENDIX E GLOSSARY

### E-1 ACRONYMS

|                 |  |
|-----------------|--|
| AAFES           | Army Air Force Exchange Services         |
| ADEP            | Area Development Execution Plan          |
| ADP             | Area Development Plan                    |
| AFI             | Air Force Instruction                    |
| AICP            | American Institute of Certified Planners |
| AICUZ           | Air Installations Compatible Use Zones   |
| AT              | Anti-Terrorism                           |
| AT/FP           | Antiterrorism/Force Protection           |
| BES             | Building Envelope Standard               |
| BFE             | Base Flood Elevation                     |
| BFE             | Building Flood Elevation                 |
| CO <sub>2</sub> | Carbon Dioxide                           |
| CONUS           | Continental United States                |
| DBT             | Design Basis Threat                      |
| DCI             | Defense Critical Infrastructure          |
| DeCA            | Defense Commissary Agency                |
| DoD             | Department of Defense                    |
| DoDD            | Department of Defense Directive          |
| DoDDS           | Department of Defense Dependent Schools  |
| DoDEA           | Department of Defense Education Activity |
| DoDI            | Department of Defense Instruction        |
| DRSL            | DoD Regional Sea Level Database          |
| EO              | Executive Order                          |

|         |  |
|---------|--|
| GIS     | Geographic Information System  |
| ICRP    | Installation Climate Resilience Plan                                     |
| IDG     | Installation Design Guide  |
| IDP     | Installation Development Plan  |
| IEP     | Installation Energy Plan   |
| IMP     | Integrated Management Practices  |
| IPB     | Installation Planning Board  |
| LEED-ND | Leadership in Energy and Environmental Design – Neighborhood Development |
| LID     | Low-Impact Development   |
| LIDAR   | Light Detection and Ranging  |
| MA      | Mission Assurance  |
| MCA     | Military Construction, Army  |
| MCCS    | Marine Corps Community Services  |
| MEDCOM  | US Army Medical Command  |
| MILCON  | Military Construction  |
| MPI     | Master Planning Institute  |
| MWR     | Morale, Welfare, and Recreation  |
| NAF     | Non-Appropriated Funds   |
| NAVFAC  | Naval Facilities Command   |
| NDAA    | National Defense Authorization Act                                       |
| NEPA    | National Environmental Policy Act  |
| NEX     | Navy Exchange  |
| O&M     | Operations and Maintenance (Funding)                                     |
| OCONUS  | Outside Continental United States  |

|        |  |
|--------|--|
| OSD    | Office of the Secretary of Defense           |
| PDP    | Project Development Plan                     |
| RAICUZ | Range Air Installations Compatible Use Zones |
| SES    | Street Envelope Standard                     |
| SRM    | Sustainment, Restoration, and Modernization  |
| USACE  | U.S. Army Corps of Engineers                 |
| USC    | United States Code                           |

## **E-2 DEFINITION OF 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 includes an Illustrative Plan, Regulating Plan, and Implementation Plan. The ADP supports the Master Plan by addressing and resolving localized comprehensive planning issues. ADPs are created for geographically identifiable districts.

**Base Flood Elevation (BFE):** The computed elevation to which floodwater is anticipated to rise during the base flood. BFEs are shown on flood insurance rate maps (FIRMs) and flood profiles. The BFE is the regulatory requirement for the elevation or floodproofing of structures.

**Biophilic:** Relating to, showing, or being the human tendency to interact or be closely associated with other forms of life in nature. Biophilic design recognizes how much human physical and mental well-being relies on the quality of our relationship to the natural world.

**Biomass:** Plant materials and animal waste used as a source of fuel.

**Bioswale:** A long, channeled depression or trench that receives rainwater runoff (as from a parking lot) and has vegetation (such as grasses, flowering herbs, and shrubs) and organic matter (such as mulch) to slow water infiltration and filter out pollutants

**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.

**Charrette:** An intensive creative work session in which a design team focuses on a particular design problem and arrives at a collaborative solution with stakeholders from the project area. A charrette can be a breakthrough event that helps create a meaningful Master Plan or facility design. Properly executed, this technique can produce a Master Plan or facility design that is more useful, better understood, and more quickly produced than one formed by any other method.

**Climate Change:** Per DoDD 4715.21, *Climate Change Adaptation and Resilience*, variations in average weather conditions that persist over multiple decades or longer that encompass increases and decreases in temperature, shifts in precipitation, and changing risk of certain types of severe weather events.

**Defense Critical Infrastructure (DCI):** Mission Assurance (MA) is a DoD 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. The DCI public works sector ranges from the commercial utility provider to the installation distribution system.

**District:** A district is an identifiable geographic area based on compatible uses. For example, a single district may contain administrative, commercial, and residential uses. All installation real estate should be assigned to a district.

**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). Paths (e.g., roads) may be considered edges unless they clearly mark a demarcation between geographic areas.

**Expansion Capacity:** 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.

**Flood hazard area:** A geographic area that has been or could be inundated with water. Water inundation can be caused by multiple sources, independently or in combination, such as precipitation, snowmelt, or riverine, coastal, or tidal flooding. Common types of flood hazard areas are floodplain designations such as the 1% annual chance event (ACE) or 100-year floodplain and the 0.2% ACE or 500-year floodplain. Flood hazard areas can also represent past flooding events (e.g., storm of significant impact) or future inundation areas reflective of sea level change scenarios.



**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) 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 IDP 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 § 106 of the National Historic Preservation Act, a 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 IDP is a combined plan that integrates all the installation's ADPs, 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 Energy Plan (IEP):** The IEP is an integration of installation- and higher-level strategic guidance, plans, and policies into a holistic roadmap enabling the installation to work constructively towards its goals in energy efficiency, renewable energy, and energy resilience.

**Installation Military Resilience:** The capability of a military installation to avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events or from anticipated or unanticipated changes in environmental conditions, that do, or have the potential to, adversely affect the military installation or essential transportation,

logistical, or other necessary resources outside of the military installation that are necessary to maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions.

**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 to manage, develop, and, in some cases, realign, clean up, and close 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) and manmade landscape features (street furniture, signage, lighting).

**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). Walking radii of 0.25 mile and 0.5 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.

**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.

**Resilience:** Resilience is the ability to anticipate, prepare for, and adapt to changing conditions; and withstand, respond to and recover rapidly from disruptions.

**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 are also referred to as Street Standards.

**Sustainability Planning:** Sustainability 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 designed and developed to preclude permanent damage to the future environment. In context of a military installation, sustainability planning includes preserving the land and operating space for future mission requirements while meeting today's mission requirements.

**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 operating, managing, and developing the installation.

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## APPENDIX F REFERENCES

### US LAWS AND CODE OF FEDERAL REGULATIONS

<https://www.govinfo.gov/>

10 USC 2801(c)(4), *Scope of chapter; definitions (Military Construction)*

10 USC 2864, *Master planning for major military installations*

16 USC 470, National Historic Preservation Act

36 CFR 800 § 106 of the National Historic Preservation Act

FY20 National Defense Authorization Act (NDAA)

Energy Independence and Security Act of 2007

National Environmental Policy Act (NEPA)

### EXECUTIVE ORDER

EO 11988, *Floodplain Management*, <https://www.archives.gov/federal-register/codification/executive-order/11988.html>

EO 13834, *Efficient Federal Operations*, <https://www.fedcenter.gov/programs/eo13834/>

### DEPARTMENT OF DEFENSE

DoD 7000.14-R, *Department of Defense Financial Management Regulation*,  
<https://comptroller.defense.gov/fmr.aspx>

**DoD Directives:** <https://www.esd.whs.mil/Directives/issuances/dodd/>

DoDD 3020.40, *Mission Assurance (MA)*

DoDD 4715.21, *Climate Change Adaptation and Resilience*

**DoD Instructions:** <https://www.esd.whs.mil/Directives/issuances/dodi/>

DoDI 3020.45, *Mission Assurance (MA) Construct*

DoDI 4165.70, *Real Property Management*

DoDI 4170.11, *Installation Energy Management*

## UNIFIED FACILITIES CRITERIA

<https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc>

UFC 1-200-01, *DoD Building Code*

UFC 1-200-02, *High Performance and Sustainable Building Requirements*

UFC 1-300-01, *Criteria Format Standard*

UFC 3-201-01, *Civil Engineering*

UFC 3-201-02, *Landscape Architecture*

UFC 3-210-10, *Low Impact Development*

UFC 3-260-01, *Airfield and Heliport Planning and Design*

UFC 3-410-01, *Heating, Ventilating, and Air-Conditioning Systems*

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UFC 4-010-06, *Cybersecurity of Facility-Related Control Systems*

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## AIR FORCE

AFI 32-10112, *Installation Geospatial Information and Services (IGI&S)*, <https://www.e-publishing.af.mil/>

## ARMY

USACE ECB 2018-7, *Advanced Modeling Requirements On USACE Projects - Category: Directive And Policy*, <https://www.wbdg.org/ffc/dod/engineering-and-construction-bulletins-ecb/usace-ecb-2018-7>

## NAVY

OPNAVINST 11000, *Facilities and Land Management Ashore*, Ser N/420U045, <https://www.secnaw.navy.mil/doni/opnav.aspx>

NAVFAC *Installation Adaptation & Resilience Climate Change Planning Handbook*, <https://www.fedcenter.gov/Documents/index.cfm?id=31041>

**US GREEN BUILDING COUNCIL**

LEED *Reference Guide for Neighborhood Development* (LEED-ND),  
<https://www.usgbc.org/guide/nd>

**AMERICAN SOCIETY OF CIVIL ENGINEERS**

ASCE 24, *Flood Resistant Design and Construction*,  
<https://ascelibrary.org/doi/book/10.1061/asce24>