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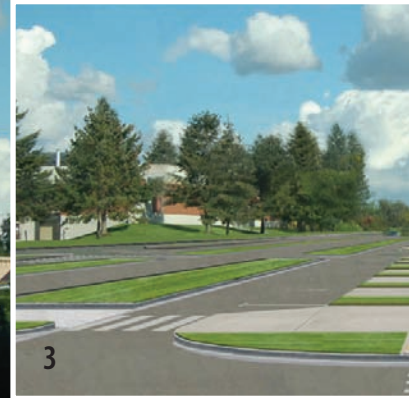
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Planners at Joint Base Lewis-McChord, Wash., have applied the new United Facilities Criteria for Installation Master Planning strategies to transform Pendleton Avenue from a static environment (photo 1) into a complete street that now fosters infill development (photo 5).

Master Planning for our Changing Environment

A new set of planning criteria to guide engineering and design solutions for military installations has arrived—nearly 30 years after the previous version was updated.

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On May 15, 2012, the approach to military master planning changed significantly. That day, the Department of Defense (DOD) issued a new Unified Facilities Criteria (UFC) for Installation Master Planning (2-100-01). The new UFC replaced a version last updated in 1986. While the world has changed dramatically since the mid-1980s, DOD's planning approach remained static. The result has been installations filled with energy and land-inefficient, auto-oriented, low-density development patterns. The costs in terms of wasted land, excessive energy use, reduced air quality, and higher personal and organizational transportation costs have been significant.

Moreover, new issues have emerged since 1986, including a focus on energy efficiency and sustainability, an increasing commitment to joint operations and joint bases, a new approach to force protection and a much greater reliance on innovative private sector financing models.

Recognizing the need for new guidance, Dorothy Robyn, Ph.D., Deputy Under Secretary of Defense (Installations and Environment), tasked the Multi-Service Comprehensive Planning Working Group, which contained representatives from each of the armed forces, to develop a UFC that was relevant for today.

Developed after much collaboration and a broad, holistic effort, the new UFC stresses the importance of creating a planning vision for an installation as the first step. It replaces vague "concept plans" with "framework plans" that identify major planning districts and themes. It replaces

overly simplified "long-range plans" with "installation development plans" (IDPs) that use area development plans to guide short- and long-term growth. IDPs also broaden the use of network plans to include more than just roads and utilities. The new UFC comprises plans for pedestrian networks and open space networks. And it introduces the concept of form-based planning: Start with a vision, craft a plan based on a sustainable form, then write rules to achieve it.

As a result, across DOD, master plans now will have greater consistency through the development of five components. The services may call these components by different names, but each service's master plans will contain: a vision; installation planning standards; an installation development plan that includes area development plans; an investment strategy; and a summary plan.



PHOTOS COURTESY THE URBAN COLLABORATIVE

KEY STRATEGIES FOR SUSTAINABILITY

The planning strategies described in the new UFC are at the heart of the document and actually give real guidance to military planners. These include a focus on: Sustainable Planning; Natural, Historic and Cultural Resource Management; Healthy Community Planning; Defensible Planning; Capacity Planning; Area Development Planning; Network Planning; Form-Based Planning; appropriate Facility Standardization; and Plan-Based Programming.

In terms of sustainable planning, the UFC calls for the use of several guiding principles.

Compact, Transit-Oriented Development. Research reveals that more-dense development uses less energy and emits less greenhouse gas by a factor of 2.0 to 2.5 than less-dense neighborhoods. At Joint Base Lewis-McChord, Wash., by following sustainable development principles, vehicle miles travelled could be reduced by 11.4 million-mi per year—a carbon dioxide emission reduction of 12.9 million-lbs per year and a per-family annual savings of more than \$1,500.

Density matters in terms of sustainable development. Doubling density beyond

30 employees per acre, or 13 residents per acre, is associated with more than a 30 percent decrease in vehicle miles traveled and total air pollution. With more compact development patterns, Rutgers University researchers found construction costs are reduced. Specifically, road costs were reduced by 25 percent and utility costs were reduced by 10 percent.

Transit-oriented development focuses compact, mixed-use development around transit corridors. On military bases, such development will typically take the form of three- to five-story buildings for administrative, commercial and residential uses. Transit-oriented developments also promote healthy communities by focusing on the pedestrian realm and encouraging more walking and cycling. With appropriate building typologies (rowhouses, apartments, multi-level office buildings) and with sufficient transit intervals, vehicle miles traveled can decrease by up to 50 percent.

Infill, Mixed-Use Development. Military installations should support building up rather than out. This strategy of infill supports increased densities and reduced utility runs. Mixed-use development reduces parking demands by as much as 30

percent, because parking can be shared among uses with different peak demand periods. Dense or mixed-use zones, facilitating combined heat and power district systems, can double the efficiency of primary energy use in a district. According to the Federal Energy Management Program, concentrated mixed-use development can support district energy systems, reducing carbon generation by 30 percent and energy consumption by as much as 50 percent. Mixed-use districts also balance out energy use.

Green Buildings. Though planning generally does not consider the specific design of a particular building, there are critical design strategies that can significantly reduce energy consumption. Siting and constructing solar-ready buildings can prepare installations for a more efficient future. Buildings that combine compatible uses in one footprint can reduce energy use. More floor area can be provided under one roof. Connected buildings, like attached dwellings as opposed to separate dwellings, reduce the external envelope exposed to the outside environment and thus reduce heat loss and gain—lowering heating and cooling loads. Rowhouses, for example, use up to

BUILDING A PLAN

The Multi-Service Comprehensive Planning Working Group began their assignment with a review and visioning session. Senior planners from each service—including Mike Bryan from the U.S. Navy, Steve Anderson from the U.S. Marine Corps, Jerry Zekert, Kathryn Haught, Al Carroll and Andrea Wohlfeld Kuhn from the U.S. Army, and Geno Patriarca and Mark Sanchez from the U.S. Air Force—identified common planning practices that are successful and best city planning practices that are applicable to military installations. With facilitated assistance from The Urban Collaborative, they established a common vision for DOD installation planning.

The team members worked to facilitate a broad, holistic planning effort that relied on collaboration. They held working group meetings in Eugene, Ore.; San Antonio; and Washington, D.C. They held webinars and review workshops to get feedback from professionals in the field. They had outreach meetings with interested agencies including the U.S. Green Building Council, the National Capital Planning Commission and the Exchange. They facilitated review sessions with students world-wide in Air Force, Army and Navy master planning classes. And they distributed drafts to a wide audience, which resulted in roughly 700 comments that were addressed in the process.

35 percent less energy than similar sized single-family homes.

In administrative buildings, which account for a sizable percentage of military installation facilities, energy consumption for artificial lighting can account for nearly half of all energy use. Additional air conditioning capacity also is needed to remove the heat generated by artificial lighting. The first strategy to make buildings like this more sustainable is to reduce the demand for artificial lighting, and the best way to do this is to create narrow wings

of about 50-ft that allow natural light into the buildings. Many European countries limit building widths to less than 50-ft, which can reduce energy use by half. Many buildings built before the 1930s in the United States meet this limit; but with the rise of air conditioning, building widths grew substantially. In some cases, floor plate widths have increased to more than 120-ft. As a result, access to natural light and ventilation was compromised.

PROTOTYPE FIRST, THEN IMPLEMENT

These strategies and concepts in the new UFC were prototyped, tested and refined at real installations. The focused use of area development plans has been a key part of the planning process in the Air Force and has been perfected at bases across the globe, including Ellsworth AFB, S.D.; Youngstown ARB, Ohio; Aviano AB, Italy; and Lackland AFB, Texas.

The use of form-based planning was first used to guide new development at Camp Pendleton, Calif., and the integration of energy strategies into the planning process was first used in a significant way at Marine Corps Air Station Miramar, Calif. The implementation of all 10 strategies and the development of the primary products was first done at Fort Lewis, Wash., now Joint Base Lewis-McChord.

The robust use of Capacity Planning was first tested at Fort Hunter Liggett in central California. The first significant use of plan-based programming was implemented by the Navy at Joint Base Pearl Harbor-Hickam, Hawaii, through the use of area development execution plans. These plans synchronize work across the enterprise—from small-scale sustainment, restoration and modernization projects like parking lot upgrades and sidewalk additions to large-scale MILCON projects. As all of these projects unfolded, the lessons learned were used to refine and improve the UFC.

Finally, the new UFC strongly recommends that all services maintain professional competencies and expertise in planning and that they use more regulated site approval processes to ensure consistent planning throughout DOD. This ensures all installations will adopt the best planning practices that cities and towns

throughout America have been using for decades. The new DOD Master Planning Institute coordinates existing and new planning courses and has become a key resource for planners from all agencies. Its training opportunities are open to all DOD and federal professionals, consultants and the general public. It can be viewed at www.dodmpi.org.

IMPACT ON DESIGN AND ENGINEERING

DOD's updated planning approach sets a more regulated set of planning criteria for installation project development that will guide engineering and design solutions. Project designers will be required to address sustainable, energy-efficient holistic planning solutions that are prescribed in the plan. They will have to respond to form-based planning codes, just like their peers who provide similar support in cities and towns across America. They will use more succinct Installation Design Standards that focus on planning standards for buildings, streets and landscapes. When projects are designed, they will have to consider the context of the installation to include factors such as transit oriented solutions, creating more healthy complexes and making great places.

Simply put, designers will have to use the plan as a critical tool to help forge great facilities that meet our nation's military missions while preserving military capabilities and resources for the future.

While making new rules is not easy, the benefits can be great. In a remarkably short 18 months, DOD has produced guidance that will be immediately useful in the field. The requirements in the new UFC will not only help preserve the long-term resilience and capacity of installations, they will meet today's critical mission needs while embracing the tenets of energy efficiency and sustainability.

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