

NAVFAC ATLANTIC 2011 INDUSTRY FORUM

Latest Developments in Sustainable & High Performance Buildings

NAVFAC Panel

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Session Content

- DoD Criteria
- Sustainable and high performance building” (HPB)
Current:
 - Goals
 - Requirements
 - Strategies
- Interactive discussion

Unified Facility Criteria

MILSTD 3007

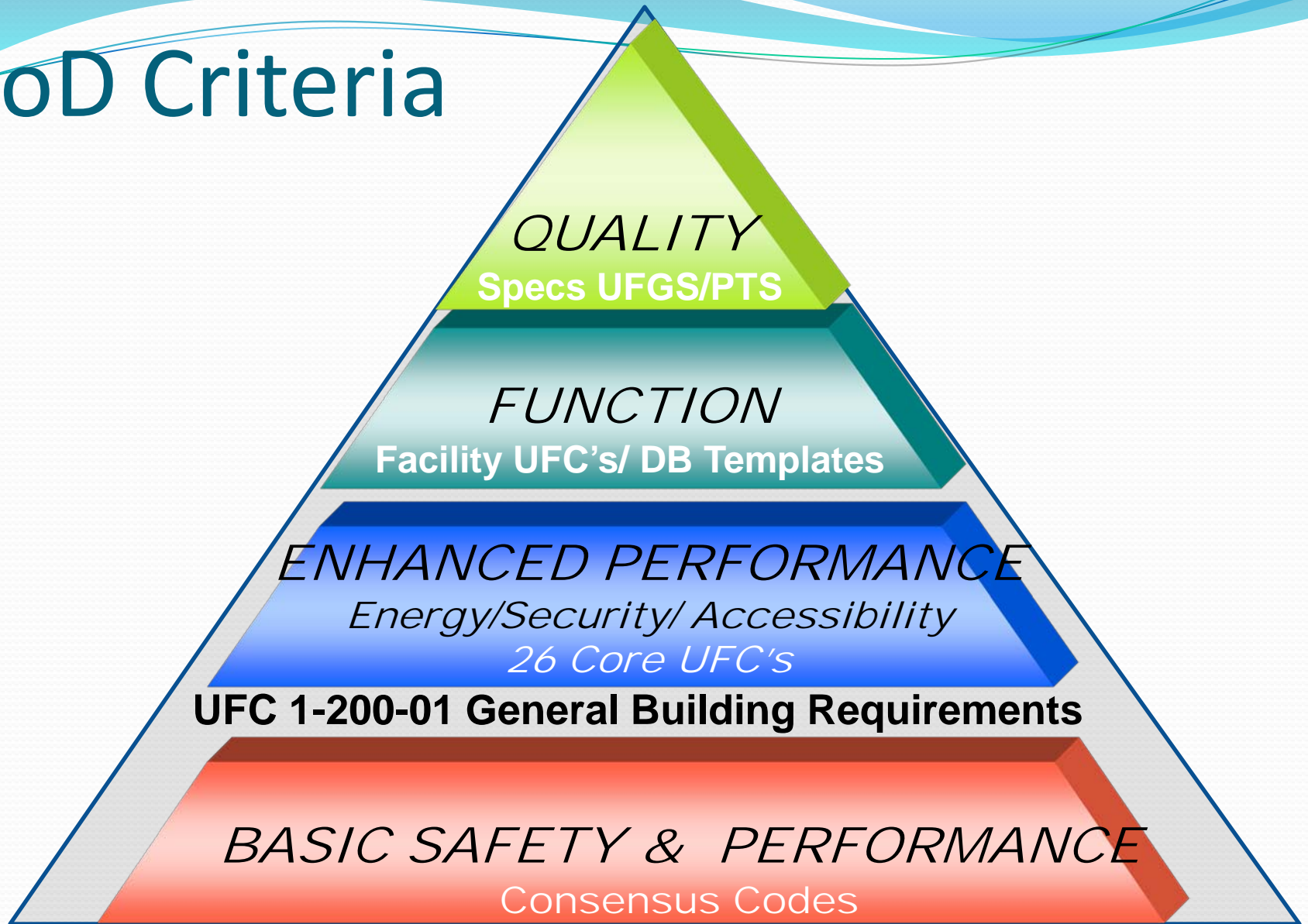


Engineering Senior Executive Panel

Maximize Use of Consensus Codes and Standards

Unify Government Criteria

DoD Criteria



Change in Expectations

EPA Act, EO 13540, EISA, EO 13514

2004

- Basic quality & performance
- Established systems and technologies
- Best Value - first cost focus
- Energy rates
- Sustainable – Certified
- IBC, NFPA, ASHRAE 90.1

2011

- High performance
- Early enabler & innovation
- Best Value -TOC
- Energy security & renewables
- LEED Gold
- ASHRAE 189.1 & IGCC

Overall HPB Strategies

Finding the right mix of requirements!

- Set whole building **performance** requirements
(30% below ASHRAE 90.1)
- **Prescribe** mandated features
(Air barrier)
- Identify **desirable** features and enhanced performance requirements as contract options
(Photo voltaic roof technology)
- Require **sustainable registration** and **certification**
(Mandatory credits, commissioning, metering)

HPB Goals

❖ Conserve Water

❖ Conserve Energy

❖ Reduce Fossil Fuel Consumption

❖ Minimize Environmental Impact

❖ Have a Sustainable Facility



Good planets are hard to find.

Conserve Water

Require Water Sense Labeled Fixtures

Require Water Reduction 30%

- Specification Changes (UFGS and PTS)
 - Toilets (1.28 GPF or Dual Flush)
 - Urinals (0.5 GPF or 0.125 GPF)
 - Shower heads (2.0 GPM)

Other Designer Choice of Strategies

- Rainwater harvesting for landscape irrigation
- Graywater recycling for flushing

Conserve Energy

Require 30% solar hot water

UFC 3-400-01 Energy Conservation and DB Templates

Require ~~30%~~ ^{40%} below ASHRAE 90.1-2007

Strategies: REDUCE LOAD FIRST

- ASHRAE 189.1 & ASHRAE 50% Energy Guides
- Envelope (40 - 50% *contribution)
- Lighting (30-40%*)
- Ventilation (20-30%*)
- Domestic Hot Water (10%*)
- Internal Loads (10-20%*)

Reduce Fossil Fuel Consumption

EISA 2007 – Section 433

Reduce Fossil Fuel Consumption by 55% (2010) to 100% by 2030 (Net Zero Fossil Fuels)

- Final Rule due out August 2011 - 1 year to begin compliance
- Does NOT say “if LCC effective” !!
- Includes Plug & Process Loads
- Electric energy calculated at the source (2.4 x site energy)
- Will require renewables PLUS significant load reduction

Provide Design Requirements for Renewable Technologies

UFC 2-400-03 Renewable Energy Systems (October 2012)

Conserve Energy

Require Increased Insulation of the Building Envelope

UFC 3-101-01 Architecture (Final Draft)

- The building envelope must be designed to comply with or exceed ANSI/ASHRAE/ USGBC/IES 189.1 2009 paragraph 7.4.2.1.
- Insulation values are in 189.1 Normative Appendix A tables.

Prescriptive Option (Building Envelope)

■ Example comparisons:

Example:

Climate zone 3

Std 90.1

Std 189.1

Insulation above deck

R-20

→

R-25

Conserve Energy

Require an Air Barrier

UFC 3-101-01 Architecture (Final Draft)

- Design, construct and test the building enclosure with a continuous air barrier in accordance with the requirements of ANSI/ASHRAE/USGBC/IES 189.1 – 2009 Normative Appendix B, “Prescriptive Continuous Air Barrier”.
- For semi-heated spaces, provide the continuous air barrier in climate zones 3 to 8.
- Clearly identify air barrier components on construction documents and detail the joints, interconnections and penetrations of the air barrier
- Clearly identify the boundary limits of the building air barriers and of the zones to be tested on the drawings.
- Include the statement of the calculated six-sided area of the air barrier envelope on the drawings for each test area.

Conserve Energy

Require Air Barrier Performance Testing

UFC 3-101-01 Architecture (Final Draft) & UFGS under development

- Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed **0.25 cfm/ft²** at a pressure differential of 0.3" w.g. (.75)Pa) in accordance with ASTM E-779(2003) and E-1827-96 (2002)
- Test the completed building using **infrared thermography** testing. Use infrared cameras with a resolution of 0.1 deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90(1997)



Conserve Energy

Provide Design Requirements for Sustainable Roof Strategies

UFC 3-110-03 Roofing (Revision)

- Cool roofs
- Vegetative roofs
- Photovoltaic's



Conserve Energy

Improve Interior lighting (energy & quality)

UFC 3-530-01 Design: Interior, Exterior Lighting and Controls, Change 1, 10 Dec 2010

- Reduce Energy
 - Reduce ambient lighting levels
 - Illuminate task
 - Utilize energy efficient lighting
 - Require daylight harvesting
(Required LEED credit) w/ mandatory controls
 - Require occupancy sensors for certain spaces
- Improve Lighting Quality
 - Improve uniformity, illuminate surfaces, and reduce glare
 - Require indirect/direct



Conserve Energy

Improve exterior lighting (energy & quality)

- Reduce Energy
 - Effective luminance levels
 - Introduced LED technology
 - Defined controls strategies
- Lighting Quality
 - Require full cutoff/fully shielded
 - Require white light sources
 - Defined uniformity levels & minimize glare
- Focus on reducing maintenance
 - Technology Selection
 - Reduce Equipment Quantities
 - Controls



Conserve Energy

Provide criteria for SSL / light emitting diode (LED) for exterior lighting applications

Interim Technical Guidance (ITG)

ITG 2010-03, *Application of Solid State Lighting (SSL) / Lighting Emitting Diode (LED) for Exterior Lighting.*

- Allows LED for exterior lighting
- Provides design guidance
- Provides exterior lighting retrofit guidance
- Provides technical specifications

Minimize Environmental Impact

**Reduce Stormwater
Runoff**

**Require Low Impact
Development**



UFC 3-210-10 Low Impact Development

- Integrate Low Impact Development (LID) to the Maximum Extent Technically Feasible (METF)
- Applies to:
 - Increases in impervious area > 5,000 SF
 - Navy Policy -New Construction > \$750K & Major Renovation > \$5M

Civil Engineering Criteria

New Unified Facility Criteria

- UFC 3-201-01 Civil Engineering (March 2012)
- UFC 3-230-01 Water Supply (October 2011)
- UFC 3-230-03 Water Treatment (October 2011)
- UFC 3-240-01 Domestic Wastewater Collection (Sept 2011)
- UFC 3-240-02 Wastewater Treatment (Sept 2011)

Sustainable Facilities

Require LEED Gold Certification



- Navy & Marine Corps New Construction over \$750K & Major Renovations
 - FY11 & FY12 projects – Desirable (within programmed amount)
 - FY13 & beyond - Requirement



BEQ, NS Everett, WA – LEED Gold

LEED Gold Impact



POINTS



Current Navy Sustainable Inventory

More LEED Gold Certified than Silver!

LEED Gold Strategies

- Integrated design – team, process & project
- Features achieve multiple credits
 - Gray water & rainwater harvesting
 - Daylight harvesting
- High point categories & credits
 - Sustainable Sites
 - Energy & Atmosphere
- Innovation & Design credits
- Regional Priority credits



NAVFAC Energy & Sustainable Data Record Card Required for projects

Data Collection:

- LEED Data
- Energy data
- Water Data
- LID Data

D/B

SECT 01 33 10.05 20

Design Submittal
Procedures

- DOR at 100% Design
- DOR at BOD

DBB

- SAES (DOR)
- Sect 01 78 00 (KTR)

NAVFAC SUSTAINABLE & ENERGY DATA RECORD CARD					
PROJECT DATA					
Project Name		Project Location			
Project Number		UIC			
Contract Number		NAVFAC Project Manager			
General Contractor		Contract Award Date			
A/E Firm		Planned Beneficial Occupancy Date			
Contractor LEED Coordinator		A/E LEED Coordinator			
FACILITY DATA					
Category Code		Category Code Description		Construction Type	
Primary Facility Cost (ECC from 1391)		Primary Facility Area		<input type="checkbox"/> New Construction	<input type="checkbox"/> Major Renovation
LEED / EPA Cost (from 1391)		Facility Area Units		<input type="checkbox"/> Minor Renovation	<input type="checkbox"/> PPV / Lease Construct
				<input type="checkbox"/> Other	
SUSTAINABLE DATA					
Design LEED Rating Level		LEED Level Achieved		LEED Rating System	NC (New Construction)
				LEED Version	
Number of Credits Earned		Construct Waste Percentage (MR2)		Low VOC Sealants (EQ4.1)	<input type="checkbox"/> Thermal Comfort (EQ7.1)
Storm Water Quantity (SS6.1)	<input type="checkbox"/> M & V (EA5)	Certified Wood (MR7)	<input type="checkbox"/>	Low VOC Paints (EQ4.2)	<input type="checkbox"/> Daylight & Views (EQ8.1)
Storm Water Quality (SS6.2)	<input type="checkbox"/> Recycled Content 10% (MR4.1)	Const. IAQ During (EQ3.1)	<input type="checkbox"/>	Low VOC Carpets (EQ4.3)	<input type="checkbox"/> Moisture Control Plan
Enhanced Refrigerant (EA4)	<input type="checkbox"/> Rapidly Renewables (MR6)	Const. IAQ Before Occ (EQ3.2)	<input type="checkbox"/>	Low VOC Composites (EQ4.4)	<input type="checkbox"/> EPA Bio Based Products
DESIGN ENERGY DATA					
Design Energy Consumption	Units	Percent Savings Below Energy Code for EPA05		Percent Energy Cost Savings for LEED EA1	Energy Code Applied
Solar DHW %	Solar DHW Capacity (gal/day)	Annual Savings (BTU/yr)		LEED EAT Credits Earned	Energy Code Year
Solar PV Area (Sq. Ft)	Solar PV KW Capacity	Annual Savings (kWh/yr)		Energy Cost Savings for LEED EA1	Energy Star Products
WATER DATA					
Design Water Consumption		Water Consumption Units		Percent Water Savings (LEED WE 3)	
				Water Cost Savings/Yr.	
				Water Consumption Savings (Gal./Yr)	
General Instructions: - Save File As: Contractnumber.pdf - Contractor shall submit this form to the NAVFAC PM at the Final Design submittal and an updated copy at end of construction contract.					
Instructions To NAVFAC PM: - Red Shaded Data is to be recorded in e-Projects in the applicable fields. - This form should also be e-mailed to dennis.talton@navy.mil for records keeping purposes					
<input type="button" value="Submit by E-mail"/>			<input type="button" value="Save Form"/>		<input type="button" value="Print Form"/>
			Saves File in Proper Filename		BDC/10-10-09

NAVFAC Energy & Sustainable Data Record Card

Require LID project data submission

LOW IMPACT DEVELOPMENT DATA					
PLANNING STAGE			CONSTRUCTION STAGE		
Development Type	<input type="text"/>	Construction Value > \$750,000?	<input type="text"/>	LID O&M Data Submitted?	<input type="text"/>
LID Construction Cost From 1391 \$	<input type="text"/>	Renovation Value > \$5,000,000?	<input type="text"/>	Final LID Construction Cost \$	<input type="text"/>
		New Impervious Area > 5,000 Square Feet?	<input type="text"/>	Post Construction Analysis (Name)	<input type="text"/>
DESIGN STAGE					
Change in Impervious Area	<input type="text"/>	SF	EISA Technical Constraints	<input type="text"/>	Waiver Requested?
95% Storm/Water Quality Depth	<input type="text"/>	IN	EISA 'Other' Technical Constraints	<input type="text"/>	Waiver Authority (Name)
LID Volume (From NRCS CN)	<input type="text"/>	Ac-Ft	LID Design Fee \$	<input type="text"/>	Waiver Approved (mm/dd/yy)
Increase in Runoff for 10-yr Storm	<input type="text"/>	Ac-Ft			
Integrated Management Practices Employed					
<input type="checkbox"/> Bioretention	<input type="checkbox"/> Infiltration Basin/Trench	<input type="checkbox"/> Green Roof	<input type="checkbox"/> Water Quality Structure	<input type="checkbox"/> Other: _____	
<input type="checkbox"/> Biofiltration	<input type="checkbox"/> Vegetated Practices (Low Slope Swales, Filter Strips, Vegetated Filters, etc)	<input type="checkbox"/> Water Reclamation	<input type="checkbox"/> Traditional Detention/Retention Basin	<input type="checkbox"/> Other: _____	
<input type="checkbox"/> Bioswales		<input type="checkbox"/> Tree Box Filter	<input type="checkbox"/> Designed Wetlands	<input type="checkbox"/> Other: _____	
LID Notes:					
Instructions to Designer of Record (DOR) & Construction Contractor: <ul style="list-style-type: none"> - Submit Draft copy of this form to the Contracting Officer (DB Projects) or the NAVFAC PM (DBB Projects) at the Final Design - RPUID & PW Building Number are available from Contracting Officer during construction - Submit Final copy to the Contracting Officer at the completion of the construction contract. 					
Instructions to NAVFAC PM & Contracting Officer: <ul style="list-style-type: none"> - Record the Red Shaded Data into NAVFAC e-Projects in the applicable fields. - E-mail this form to NAVFAC HQ (dennis.talton@navy.mil) for data collection & record keeping. 					
Note: Save File in the following filename format... ProjectNumber_EnergyDataCard.pdf					
NAVFAC_Sustainable_Energy_Data_Record_Card_v1.4.pdf					
(Vers 1.4) 8008-24-10					

Challenges (Interactive Discussion)

- New Technologies to meet energy requirements?
 - Mandate the technology or use as an option
 - Avoiding risk
- Difficulties in reaching the Fossil Fuel reductions?
- New Energy Codes/Standards (ASHRAE 189.1 & IGC)
- Achieving LEED Gold (credits to pursue)
- Sustainable Certification (Value, Cost, Verification)
- LID - Defining METF & maintainability of systems
- Total Ownership Costs (Afternoon Session)

