Pentagon Renovation Program

Northeast Waste Management Officials' Association
Greening the Government Conference

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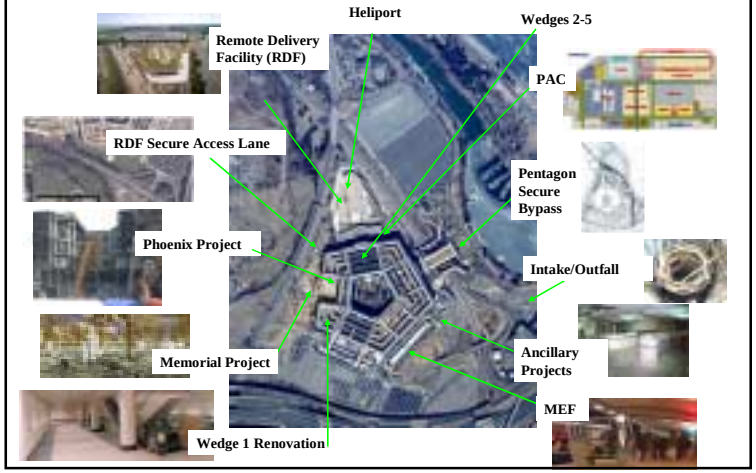
Integrated Sustainability, Environmental,
and Safety IPT

The Pentagon - A Small City

- 34 acres
- 6.5 million sq. ft.
- 3 Empire State Bldgs.
- 7,748 windows
- 17.5 miles of corridors
- 25,000 personnel
- 1,000,000 calls each day
- Police force
- Metro station
- Fire Station
- Health Facilities
- Post Office
- Mini-mall
- Heliport

Has never undergone a major renovation in its 60-year history.

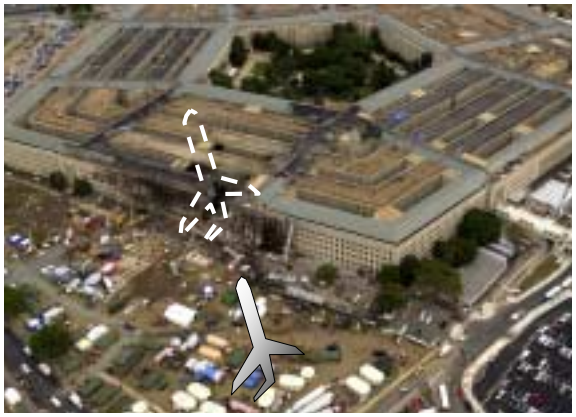
Pentagon Renovation Projects



The Need for Renovation

Major building systems beyond repair, non-compliant with current building codes and ADA, hazardous materials present throughout, poor energy efficiency

A Change in Plans - September 11, 2001



GOALS

Recover

Rebuild

Renovate

Reoccupy

Challenges at the Pentagon Renovation Program

- Diverse projects - Renovation, new Construction
- Rebuild from 9/11 tragedy
- Force-Protection: DoD Personnel & Real Property
- Logistical & Organizational Challenges

- How to address these challenges and build ***sustainable*** facilities, in a fiscally responsible manner?

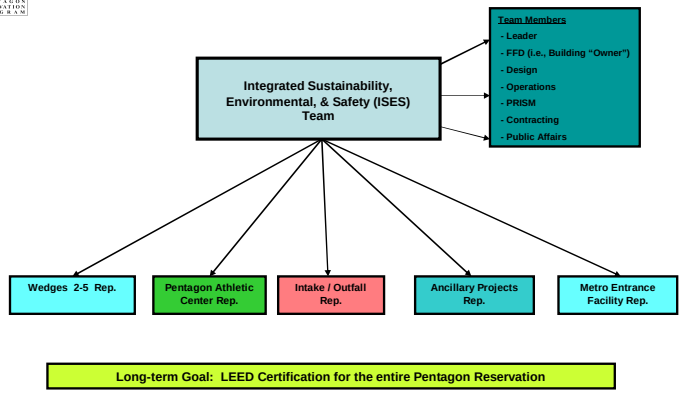
Challenges in Sustainability

- Studies in 1994 and 1999 made recommendations and addressed energy, heating, ventilation, and air conditioning, materials, indoor air quality, water, landscaping and grounds, recycling and waste disposal, pollution prevention, and human factors
- Based on these studies, some recommendations were implemented in partnership with WHS

Integrated Sustainability, Environmental, & Safety (ISES) Team

- ISES team was formed to be an "ongoing source of information, guidance and direction for the reasonable integration of sustainable design and construction for all Pentagon Renovation projects."
- Develop guidance for implementation, outline process for integration of sustainable design into *every* project, and develop metrics to gauge Program and project achievements.

ISES Team



Long-term Goal: LEED Certification for the entire Pentagon Reservation

Improve Performance With Improved Contracting Methods

- Hire better contractors
- Give them incentives to achieve your goals
- Set clear goals
- Operate as a team
- Measure progress against goals
- Reward Achievement

Operate as a Team

Integrated Product Teams (IPTs)

- Integration of contractor personnel onto teams
- Contractors working with us to write the RFP
- Design Teaming
- Integration of customers/maintainers onto teams
- Opens lines of communication

GEOGRAPHIC IPTs

FUNCTIONAL IPTs	WEDGE 1	WEDGE 2	WEDGE 3	BASEMENT 1	BASEMENT 2	BASEMENT 3	ETC.
REQUIREMENTS							
PLANNING & DESIGN							
ACQUISITION							
ISES Team							
CONSTRUCTION							
SECURITY							
PRISM							
ETC.							

Each person belongs to at least two teams

Set Clear Goals

Performance Requirements

- Tell contractor what you want, not how to get there!
  - Cost
  - Performance
  - Schedule

Set Clear Goals

Integrated Sustainable Design

- Goals
  - Energy efficiency improvements
  - Enhanced indoor environmental quality (IEQ)
  - Greenhouse gas reduction
  - Water use reduction
  - Waste prevention
  - Maintainability
  - Environmentally preferred products (EPP)
  - Waste management

"A building that is not maintainable is not sustainable."

Integrated Sustainable Design (in contract)

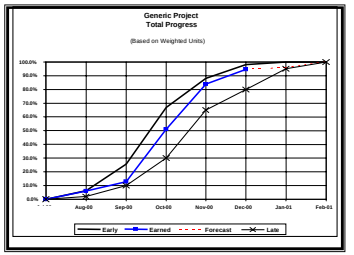
Performance Criteria Matrix (mechanical excerpt)

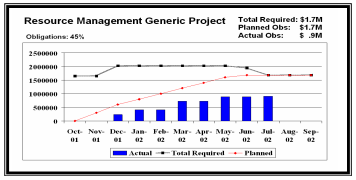
CRITERIA			OFFICES SUITES			SPECIAL SPACES		
			O-1 Senior Executive Office Suites	O-2 Executive Offices	O-3 General Office Area	SP-1 Laboratory	SP-2 Food Service	SP-4 Automatic Processing (ADP)
		TYPE	1	1	1	1	1	1&2
MECHANICAL								
Occupancy Schedule	Monday-Friday		0600-1800	0600-1800	0600-1800	0600-1800	0600-2000	24
	Saturday		Closed	Closed	Closed	Closed	Closed	24
	Sunday		Closed	Closed	Closed	Closed	Closed	24
	Holidays		Closed	Closed	Closed	Closed	Closed	24
Temp. (°C) (Occupied)	Cooling Summer		24 (+-2)	24 (+-2)	24 (+-2)	24 (+-2)	25 (+-2)	21 (+-2
	Heating Winter		21 (+-2)	21 (+-2)	21 (+-2)	21 (+-2)	21 (+-2)	21 (+-2
Humidity (%RH)	Summer		50%	50%	50%	50%	50%	50%
	Winter		-	-	-	-	-	30%
O.A. Ventilation Rate			20 CFM/Person	20 CFM/Person	20 CFM/Person	20 CFM/Person	15 CFM/Person	20 CFM/Pe
Space Pressure			Positive	Positive	Positive	Negative	Negative	Positiv
Total Air Flow (ACH-Minimum) During Occupancy			6	6	6	12	12	6
Redundancy			no	no	no	no	no	yes
Filtration (% Efficient Pre-Filter / After Filter)			30/80	30/80	30/80	30/80	30/80	30/80
Noise Criteria (NC)			35	35	45	35-40	55	45

Measure Progress Against Goals

Monthly Metrics

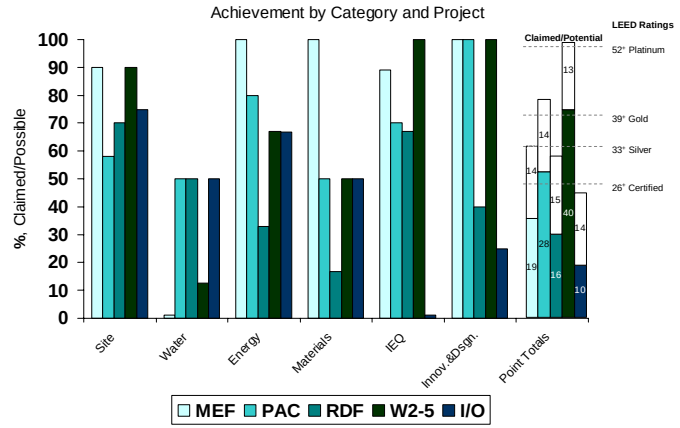
- Useful for identifying trends & developing rules-of-thumb
- Award Fee plan includes many rating criteria to measure performance and reward contractor
- Criteria naturally lend themselves to metrics
- Provides confidence intermediate goals are being met
- Shows trends and identifies problems
- Contractor participates in developing the metrics





ISES IPT

LEED™ Point Status for Overall Program



Approach to Sustainable Design and Construction

Design/ Owner Driven approach:

- **RFP/ Acquisition**
  - Performance based contracting
  - RFP states LEED Certification as a goal (future)
  - Integrated sustainable design requirements (Section 2.5)
  - EPP Project/ Program goals
  - Sustainability efforts help determine the Award Fee amount

EPP Project/ Program Goals*

- No ozone depleting compounds (including CFCs and HCFCs)
- No PVC
- No VOC
- Reduce greenhouse gas emissions by specifying recycled materials (35% target), bio-based, and/or industrial by-products vs. virgin materials
- Use FSC certified wood

*Does not prohibit use of materials or products.

Approach to Sustainable Design and Construction

- **Design**
  - PenRen/ LEED™ Rating System Matrix
  - Cx Agent involvement
  - Material Specification Development
  - Product Database
- **Construction**
  - ISES Team/project counterparts
  - Material Selection Process – submittal review
  - QC/QA Involvement

Approach to Sustainable Design and Construction

Example: LEED-based tracking matrix

LEED EXISTING BUILDINGS EVALUATION- PENTAGON WEDGE 2

LEED EB PREREQUISITES/ CREDITS	Possible Points	LEED EB Requirement	Project Compliance: Yes	Project Compliance: No	Project Compliance: Maybe	Documentation Requirement	Responsibility	Comments
SUSTAINABLE SITES								
Prerequisite 1: Erosion and Sedimentation Control		Develop and implement as policy a site sedimentation and erosion plan that conforms to best management practices in the EPA's Storm Water Management for Construction Activities, EPA Document No. EPA-833-R-92-001, Chapter 3, OR local Erosion and Sedimentation Control standards and codes, whichever is more stringent. The plan shall meet the following objective: Prevent loss of soil by stormwater runoff and/or wind erosion during any landscaping or building improvements that disturb the site.	x			For any construction projects carried out at the building over the last year: 1. Declare whether the project follows local erosion and sedimentation control standards or the referenced EPA standards and provide a brief listing of the measures implemented. If local standards and codes are followed, describe how they meet or exceed the EPA best management practices. 2. Provide the erosion control plan (or drawings and specifications) with the sediment and erosion control measures highlighted. Provide a copy of the site and erosion control policy that specifies inclusion of these erosion and sediment control requirements in contract documents for any construction projects for the building.	HP	Eben Hamilton will obtain a copy of the Erosion and Sedimentation Control Plan for Wedge 2. FFD will supply a copy of the reservation policy.
Credit 1: Site Selection	1	Continue to occupy an existing building.	1			Provide a signed written statement that your organization continues to occupy the existing building for which certification is being requested.	PenRen/FFD	PenRen to obtain a letter per documentation requirements.

ISES Implementation

Four PenRen Projects registered with USGBC for LEED Certification

Wedges 2-5

Metro Entrance Facility

Pentagon Athletic Center

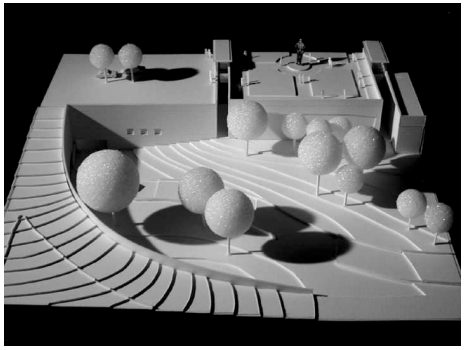
Remote Delivery Facility

Pentagon Athletic Center Sustainable Highlights

Indoor Environmental Quality – A clerestory window system has been designed to channel natural daylight into this underground facility

Pentagon Athletic Center Sustainable Highlights

- Green Roof - outdoor garden space, improved insulation, natural water filtration system, reduced storm water runoff



- Building materials - low VOC emissions, recycled content, regional manufacture
- Open Floor Plan - Fewer walls - ease in circulation, requires less finish material

Pentagon Athletic Center Sustainable Highlights

- 75% heat recovery from heat exchanger for lap pool and spa
- Ceramic wall tiles will have 55% recycled glass content
- Salvaged limestone will be used on 50% of exterior façade
- Auditorium stage and waiting area will have bamboo flooring
- Seating and acoustical wall panels will be made from recycled polyester
- Over the 50-yr. life of the facility, an est. $1.1M in energy cost savings in today's dollars

Metro Entrance Facility Sustainable Highlights

- Over 50% of construction waste diverted from landfill
- 21% of wood used for this project was FSC certified
- High-reflectance Energy Star roofing installed at breezeways
- Over 50% of building materials had recycled content
- Electric Vehicle Outlet
- Permanent CO_2 monitoring included in HVAC system

Wedge 2 Sustainable Highlights

- 90% (est.) of all concrete and metal construction debris is being diverted from landfills
- Synthetic (100% post-industrial) gypsum wall board is being used
- HVAC system, FPIU, requires less ductwork
  - This allowed ceiling height to be raised 23-inches to improve daylighting
  - Only 9 Mechanical Rooms needed for W2; W1 has 118
- Carpeting has recycled content
- Smartwall System components are fabricated off-site; reduces construction waste and field work

Integrated Sustainable Design

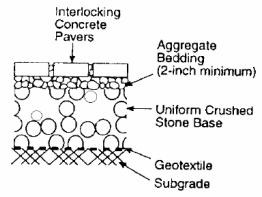
Smartwall System

- Universal Partition
- Hybrid of Wall and Panel Attributes
- Accommodate both Low and Full Height Conditions
- Unlimited Ratio of Open to Closed Space
- Minimal Cost of Change
- Easily Modified by In-house Staff
- Simple and Uncomplicated
- 0.45 STC at Full Height Condition
- Reduces Time Required to Achieve Change

Greater Flexibility/Adaptability

Common Characteristics

- Force Protection - Photo luminescent exit signs require no backup power supply, no conduit, no battery and allow for a very simple installation.
- Pervious paving systems allow rainwater to pass through the pavement and be absorbed naturally by the ground. This reduces the need for storm water collection systems, catch basins, storm water piping and storm water detention ponds.



PenRen Green Initiatives by the Numbers

- 420,000 sq.ft. of gypsum wallboard contains 15% (est.) recycled material by weight and has 100% recycled paper facing
- 273,222 sq.ft. of acoustical ceiling tiles have recycled content
- 47,215 linear feet of millwork and 449 doors are made from FSC certified wood
- 3,279,000 sq.ft. of surface area is finished with no-VOC, low-VOC, or recycled paint

Sustainable Design Product and Process

- Defines a consistent and coherent set of values and goals for all projects
- Stimulates innovation and design/construction excellence
- Facilitates value-based acquisition process and Design-Build Delivery
- Facilitates balancing sustainable factors with building codes, force-protection measures, cost, schedule, and personnel

Pentagon Renovation Program
On Cost, On Schedule, Built for the Next 50 Years

http://renovation.pentagon.mil