

"Working With What You Have"

Sustainable Design and Historic Buildings



*Michael G. Chapman, AIA
11 August 2004*

What I'll Cover Today



- ❑ **NAVFAC's Sustainable Design and Whole Building Approach**
- ❑ **Historic Preservation Guidance**
- ❑ **U.S. Naval Academy Modernizations**
- ❑ **Washington Navy Yard**
 - ❑ **Naval Sea Systems Command**
 - ❑ **Building 33**
- ❑ **Conclusions**

NAVFAC Approach



Sustainable Design: Key to Making Effective Life Cycle Design Decisions That Manage Cost and Deliver Best Value.

- ❑ Employs USGBC LEED™ Green Building Rating System for Certifiable Strategy towards Sustainable Design
- ❑ Integrated Design Approach for Optimal Performance
- ❑ Reduces Energy Demand and Consumption
- ❑ Reduces Operating and Maintenance Costs
- ❑ Enhances Employee Health and Safety That Impacts Employee Productivity
- ❑ Enhances Our Homeland Energy Security
- ❑ Reduces Environmental Impact

✦ **Reduces the Total Cost of Ownership**

Integrated Design Approach



Whole Building Perspective

- ❑ All Stakeholders Partner to Set Performance Goals
- ❑ Continuous Collaboration Through Planning, Design, Construction, Occupancy
- ❑ Encourages Constructor Participation in Design
 - ❑ Design-Build is 60% - 70% of our Contracts
- ❑ Enhances Integration and Assures Performance of the Whole Through Total Building Commissioning

NAVFAC Instruction on Sustainable Design



- ❑ Purpose Is to Reduce the Total Cost of Ownership of Navy Shore Facilities
- ❑ Adopts US Green Building Council's Leadership in Energy and Environmental Design (LEED™) Green Building Rating System As a Tool and Metric
- ❑ Facility Performance Is Energy Efficiency, Worker Productivity and Life-cycle Cost Focused
- ❑ Minimum Performance Level Is Self-assessed for LEED™ "Certifiable", With Encouragement to Submit for USGBC Certification

National Historic Preservation Act of 1966



- ❑ We must "take into account" effect of activities on historic properties
- ❑ We must provide Advisory Council on Historic Preservation (ACHP) opportunity to comment
- ❑ ACHP regulations require consultation with others
- ❑ *Preservation not mandated* – but adherence to process is

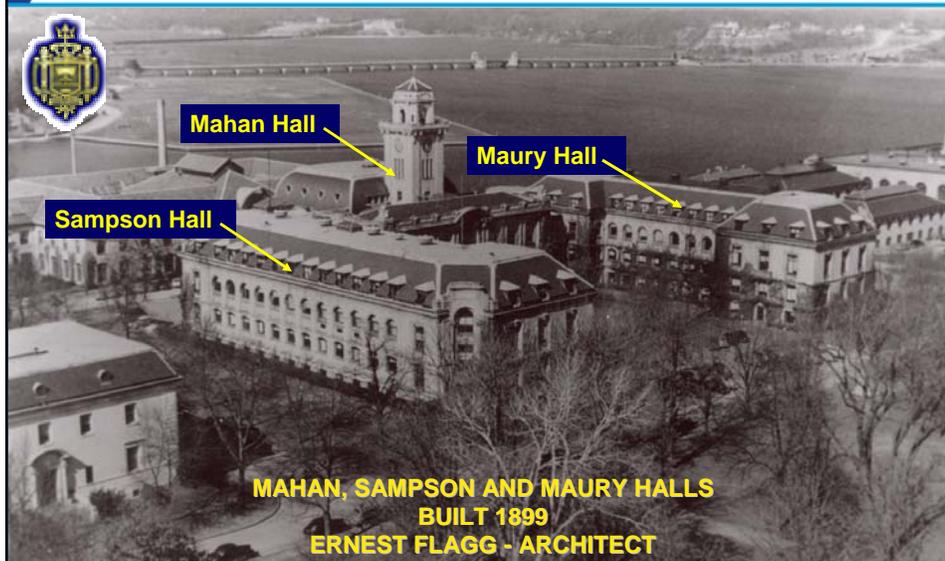
National Historic Preservation Act of 1966



Department of the Navy Strategy

- ❑ Full compliance
- ❑ Consult early
- ❑ Integrated Cultural Resources Management Plans (ICRMPs)
- ❑ Adopt programmatic approaches when appropriate

U.S. Naval Academy

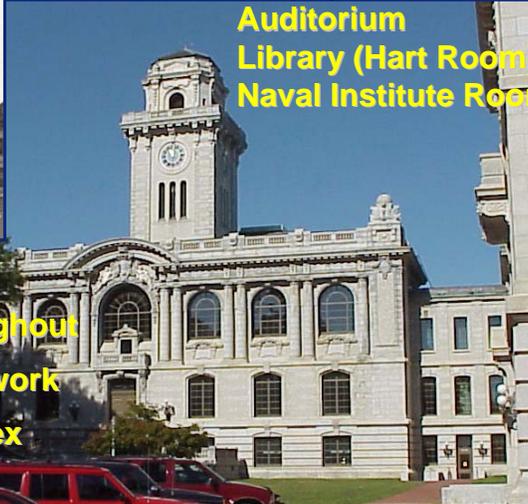


**MAHAN, SAMPSON AND MAURY HALLS
BUILT 1899
ERNEST FLAGG - ARCHITECT**

Mahan Hall



**Trophy Hall
Auditorium
Library (Hart Room)
Naval Institute Room**



**Historic Features Throughout
Campus Telephone Network
Central Plant for Complex
Electronics Laboratory**

Mahan Hall



**Trophy Hall
Main Stair Access
Access to Classroom
Buildings either side**

**Accessibility Modifications
Fire Egress & Protection Requirements
Collection of Trophy Flags, Banners
Respect for Historic Features**

Mahan Hall



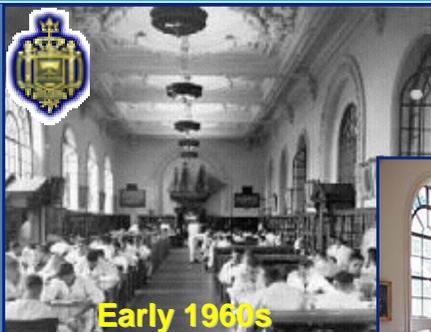
Early 1960s

Main Stair to Second Deck
Daylight to Building Interior
Main Egress Route
Fire Protection Issues



2001

Mahan Hall



Early 1960s

Library Moved in Late 1960s
Original Stacks, Tables Gone
Use Was Reception Space,
Generally Empty
Revitalized as Active, Central
Space for the Complex

Hart Room on Second Deck
Original: Campus Library
Now: Student / Staff Activity
Required Egress Route for Complex



2001

Refurbished Government Furniture
Incorporated

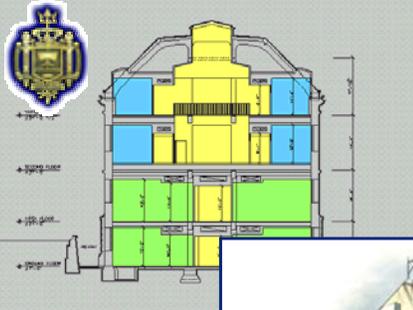
Sampson & Maury Halls



- Classrooms on Ground, 1st Decks
- Staff Offices on 2nd and 3rd Decks
- Several Modernizations, Last: 1968
- Few Historic Interior Features Remain
- Leveraged Historic Attributes to Enhance Energy Efficiency
- Improved Enclosure Performance
- Modernized All Systems and Equipment



Sampson & Maury Halls



Sampson Hall Atrium
Historic Precedent For Skylights

STRATEGIES

- Daylighting
- Natural Ventilation
- Low VOCs
- Flexibility



Sampson & Maury Halls



View to
Maury Hall Atrium



STRATEGIES

- Daylighting
- Natural Ventilation
- Low VOCs
- Flexibility



- Operable Windows
- Stepped Lighting Controls
- Occupancy Sensors
- Individual HVAC Controls

Sampson & Maury Halls



Historic Spiral Staircases



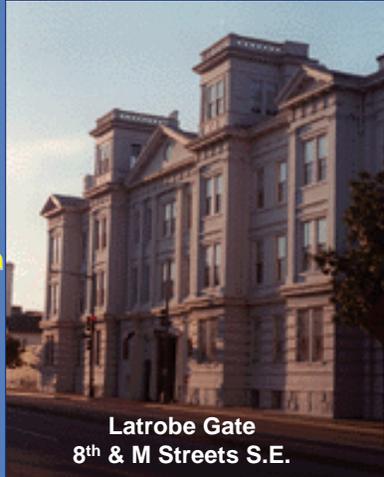
Historic Washington Navy Yard



**Land Set Aside by
George Washington**

Authorized 1799

**Today:
Headquarters for
Navy Commands**



Latrobe Gate
8th & M Streets S.E.

**Headquarters,
Naval District
Washington**

**“Quarterdeck of
the Navy”**

**Ceremonial
Gateway to the
Nation’s Capital**

Washington Navy Yard - 1862



**Shipbuilding,
Ordinance,
Technology
1815 – 1962**



U.S. NAVY YARD

Washington Navy Yard - 1918



**Armament for
the Great White
Fleet**

**WW I: 14-inch
Naval Railway
Guns**

19

8/8/2004

Washington Navy Yard - 1949



**World's Largest Naval
Ordnance Plant**

**WW II: 16-Inch Guns
for Battleships**

20

8/8/2004

Washington Navy Yard - 1997



Naval Sea Systems Command



Naval Sea Systems Command



Naval Sea Systems Command



1 Million Square Feet In Three Structures

Adaptive Reuse Of Naval Gun Factories With New Additions



USS Balao Con Tower



View North along Isaac Hull Avenue

Naval Sea Systems Command



**Retaining Building Features
To Preserve Legacy And Heritage**

**Using Historic Attributes
To Enhance Performance**



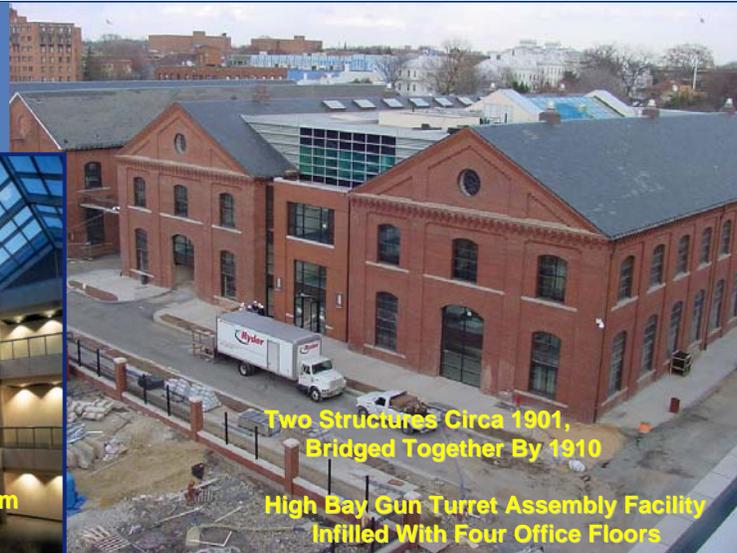
**Bldg 197 Atrium
(One of Two)**



**Old Bldg 197
Infilled With Five
Office Floors**

Bldg 197 Addition

Naval Sea Systems Command



**Two Structures Circa 1901,
Bridged Together By 1910**

**High Bay Gun Turret Assembly Facility
Infilled With Four Office Floors**



Bldg 164 Atrium



**Sanger Quadrangle:
Adaptive Reuse of Four Historic Buildings
Sustainable Development Pilot Project**



**High Bay Ordnance Factory Infilled
With Three and Four Office Floors**



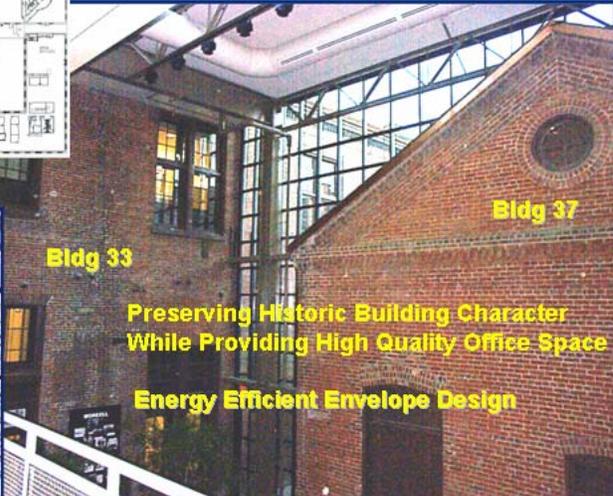
**Sanger Quadrangle: Only New Envelope Constructed
Bridges Buildings 33, 37, 39 and 109**



Bldg 33 Plan



Bldg 109



Bldg 37

Bldg 33

**Preserving Historic Building Character
While Providing High Quality Office Space**

Energy Efficient Envelope Design

Naval Facilities Engineering Command



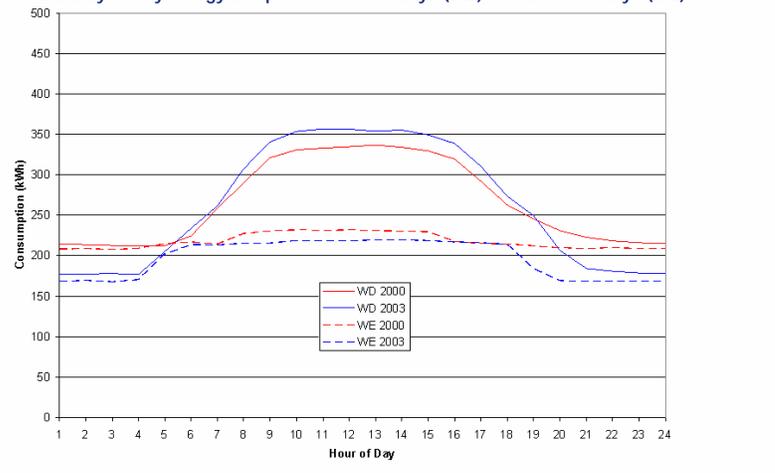
Annual Energy Savings Estimate for Building 33 from Sustainable Design Concepts

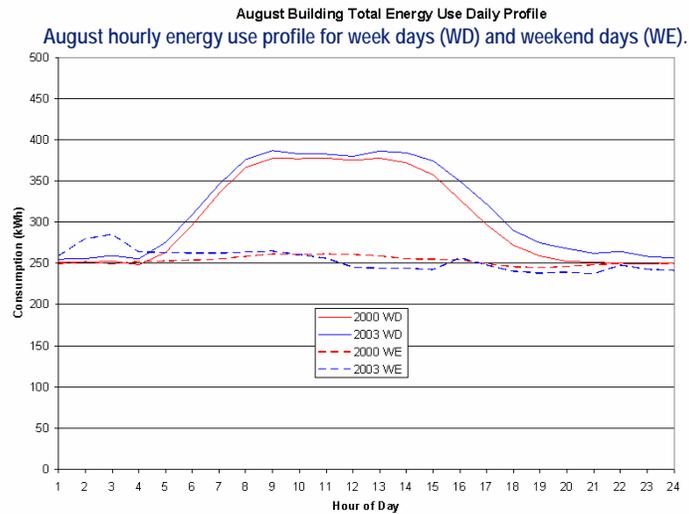
END USE	BLDG 33	BASELINE BUILDING	SAVINGS
Electric (kWh)	3,999,648	4,723,584	15%
Plugs (kWh)	397,788	397,788	0%
Overhead Lighting (kWh)	565,380	580,284	4%
Task Lighting (kWh)	112,692	93,324	-21%
Chiller (kWh)	2,593,200	3,234,000	20%
Mechanical System (kWh)	330,588	418,188	21%
Steam (MMbtu)	422,777	422,777	0%

Naval Facilities Engineering Command



January Building Total Daily Energy Use Profile
January hourly energy use profile for week days (WD) and weekend days (WE).





Energy Trend Assessment Results: 2000 - 2003

- ❑ No significant change in Energy Use attributable to degradation or inappropriate modifications.
- ❑ Heating Season set point was modified (lower night setback temperatures) that reduced energy use without increasing morning warmup energy use.
- ❑ Spring and Fall increases in energy use are suspect.
- ❑ Fine tuning of controls may be justified.



Conclusions

- **Use of Historic Facilities Promotes Cultural Identity, Leverages Passive Strategies of Traditional Building, Reduces Material Consumption**
- **Use of Navy Historic Facilities Should Support Current & Future Navy Mission: Durable and Adaptable ... Agile and Innovative**
- **Sustainable Design: Key to Making Effective Life Cycle Design Decisions, Performance Focused**

- ▣ **Goals and Objectives are Mutually Compatible Within the Whole Building Context**
 - **Energy Consumption**
 - **Environmental Impacts**
 - **Worker Productivity**
 - **Total Cost of Ownership**

Building for a Secure Future



Contact Information



- ◆ **Chief Engineer, NAVFAC HQ – 202.685.9167**
 - James W. Wright, PhD, PE (james.w.wright2@navy.mil)

- ◆ **Engineering Innovation & Criteria Office – 757.322.4200**
 - Dave Curfman, PE, Director (david.curfman@navy.mil)