

Maintaining the Balance: Security and Sustainability

A Case Study in Government LEED Certified Design

SAME Charleston

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Jennifer R. Olson, AIA ♦ Architect

Stanley Consultants



Discussion Points

- Government Design and LEED
 - History
 - Priorities
 - Current State
 - Challenges
- Project Case Study: Building 403
 - Project Background
 - Initial LEED Scoresheet
 - Design Challenges and Triumphs
 - Final Silver Certified LEED Scoresheet
 - Lessons Learned and Project Conclusions



Rendering of Main Entrance to Building 403 demonstrating campus architecture compatibility

Government Design and LEED - History

- The concept of Green Building and Sustainable Design entered the design industry in the 90s.
- The government issued UFC 3-400-01 Energy Conservation in July 2002
 - It has been superseded by UFC 1-200-02 High Performance and Sustainability
- The Energy Policy Act of 2005:
 - “Requires Federal agencies to increase efficiency, optimize performance, eliminate unnecessary use of resources, and protect the environment.”
- The Federal requirements are collectively referred to as the “Guiding Principles for Federal High Performance and Sustainable Buildings” originally authored in 2008, and updated in February 2016.
- UFC Standards went away from LEED Silver certification in June 2014.
 - The UFC began following GBIs DoD Guiding Principle Compliance
 - Dec 2016 version opened designs up to any federally approved Third Party Certification (TPC)



Government Design and LEED – Priorities

- HPSB Spreadsheet
 - Mimics the LEED Design Checklist
- Applies to all New and Existing DoD Building Projects
 - Required to implement “to the greatest extent practical” for OCONUS locations, contingency support operations, Non-Permanent and austere buildings, Military Operations in Urban Terrain (MOUT) mock training villages.
 - Only exclusions: Buildings with a status of Report of Excess (ROE), or determination to dispose
 - Unoccupied buildings: occupied less than 1 hour or less per person per day on average AND meet the identified energy and water consumption limits.
- Primary Focus Areas
 - Energy Efficiency (ASHRAE 90.1)
 - Water Conservation (ASHRAE 189.1)
 - Indoor Environmental Quality
 - Ventilation and Thermal Comfort
 - Daylighting and Lighting Controls
 - Moisture Control (Air Barriers)
 - VOC Reduction - Low Emitting Materials
 - Reducing Environmental Impact - Recycling and Biologically-Based Products
- Design Exclusions: Life Cycle Cost Effectiveness and Mission Compatibility



Two-Story glass curtainwall at main entrance on East Façade

Government Design and LEED – Current State

- Ultimate goal of 15% HPSB Guiding Principle Compliance of the existing federal building inventory by 2025.
- Facilities have 3-Levels of compliance
 - Fully Compliant - all HPSB Checklist fields are marked “Yes”
 - Partially Compliant - Compliant to the greatest degree possible based on the LCCE, missions exclusion, location/regional exclusion, or safety.
 - Not Applicable - The requirement is not applicable based on the LCCE, missions exclusion, location/regional exclusion, or safety.
- The federal guides and UFC standards provide several “loop holes” not applicable for LEED Certification.
- As of December 2016, Third Party Certification (TPC) is required for all CONUS DoD Facilities with a construction cost over 3 million.
 - TPC can be obtained from any system approved for federal use.



Aerial rendering of Building 403, secure elevated walkway, and existing Building 401

Government Design and LEED - Challenges

Sustainable Design	Government Design Conflicts
Daylighting and Views	Mission Security
Water Efficient Landscaping	Base Design Standards
Materials and Sourcing Credits	Base Design Standards and Campus Appearance
Mechanical Energy Efficiency	UFC Requirements/Air Exchanges for Secure Environments
Stormwater Control	Lack of Space for Retention Basins
Public Transportation Access	Many Options are not available on military installations
On-Site Renewal Energy/Green Power	Often not permitted on military installations or not Life Cycle Cost Effective

Case Study: Building 403 Administration Facility

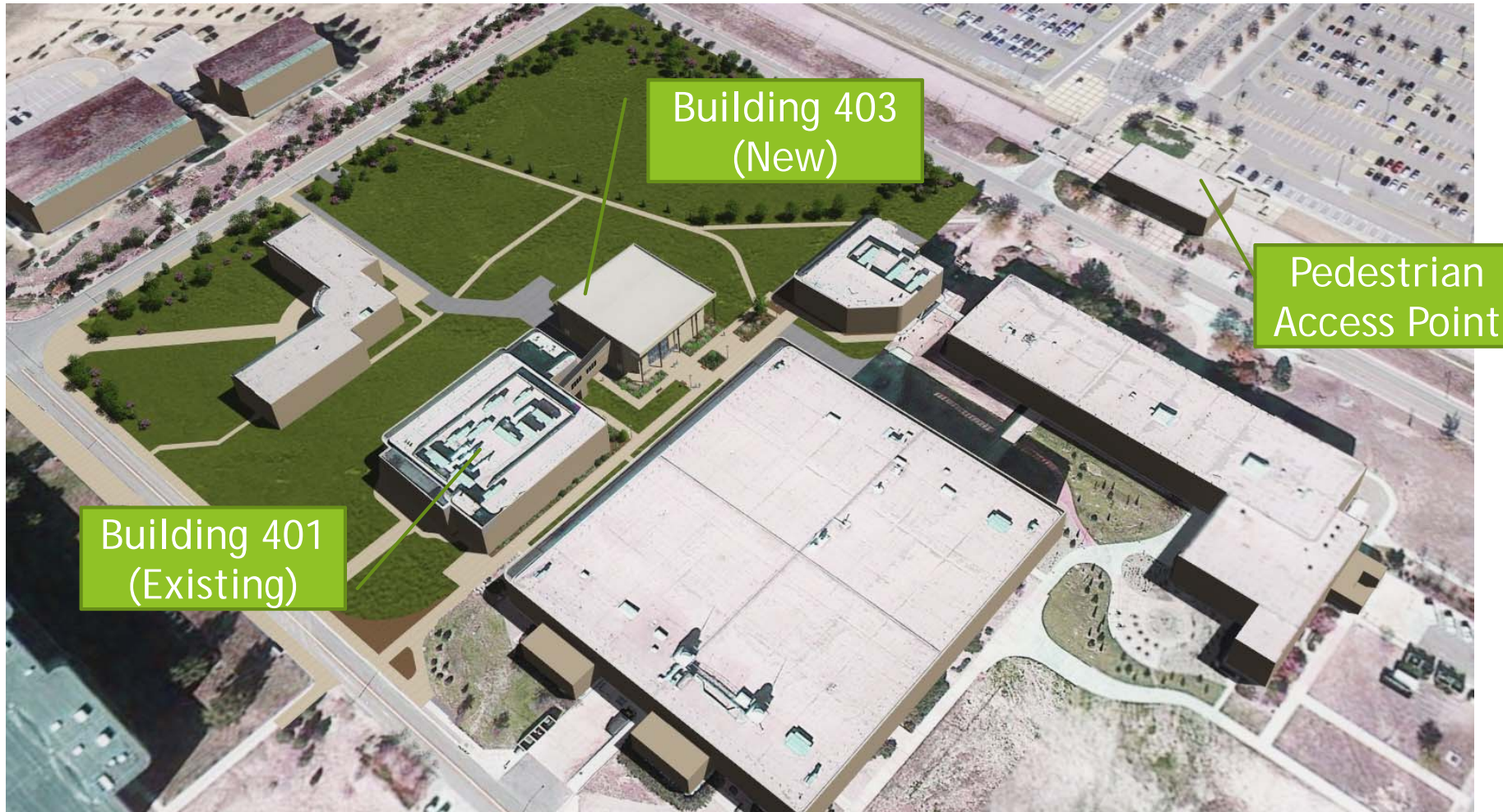
Project Background

- New Construction, with elevated walkway connection to existing Building 401
 - 2-Stories
 - 20,000 sf
- Design-Build
- Administration facility for 73 FTE squadron command, admin and support staff
- Various security levels within the facility
- Strict adjacency requirements
- Mission Critical Facility
- Uninterrupted utility requirements for all adjacent facilities on the campus throughout construction
- Flexible workspaces for future missions
- Part of a well established campus, exterior materiality was pre-defined.



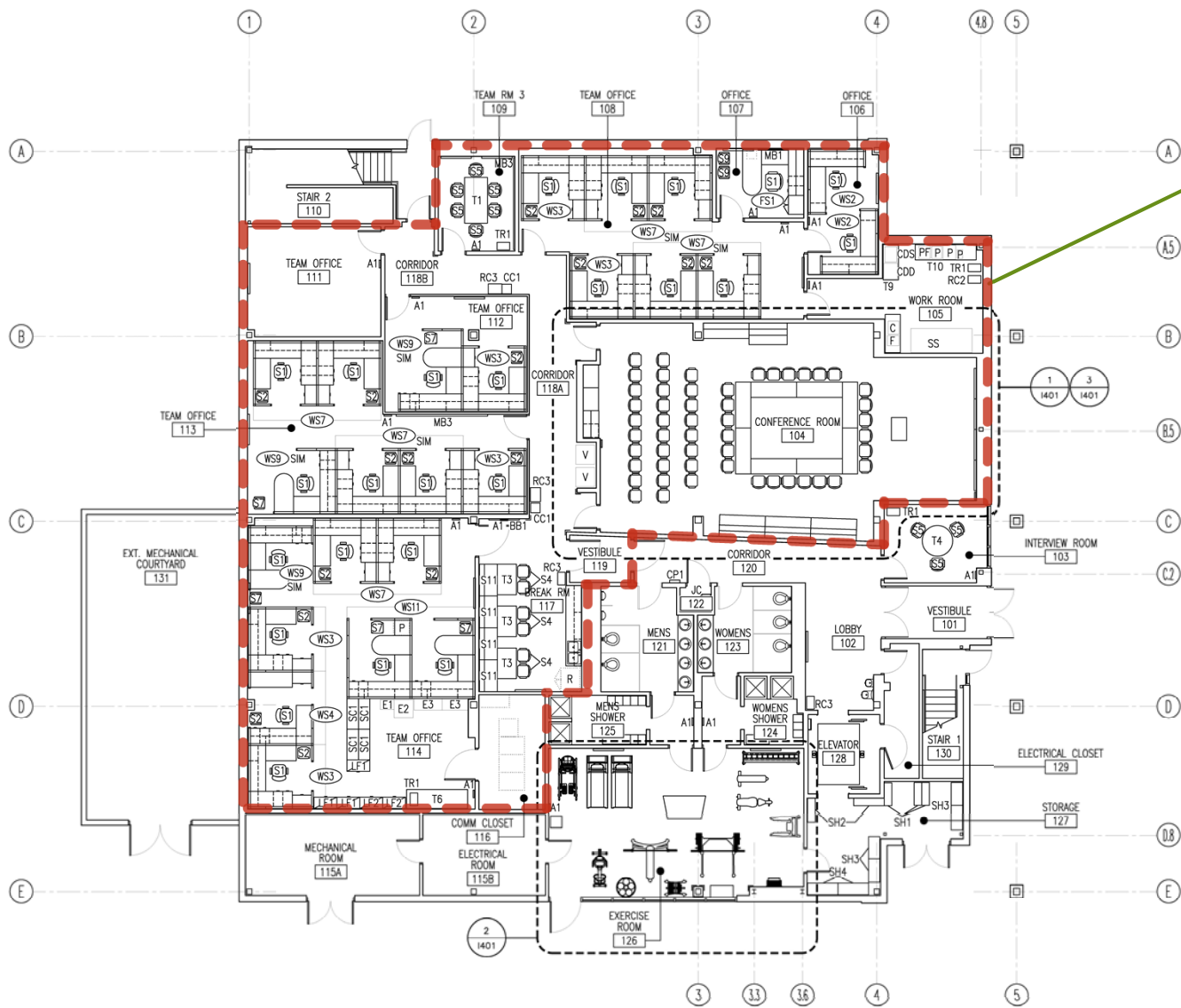
Secure elevated walkway connecting new Building 403 to existing Building 401 improves efficiency

Case Study: Building 403 Administration Facility Campus Environment



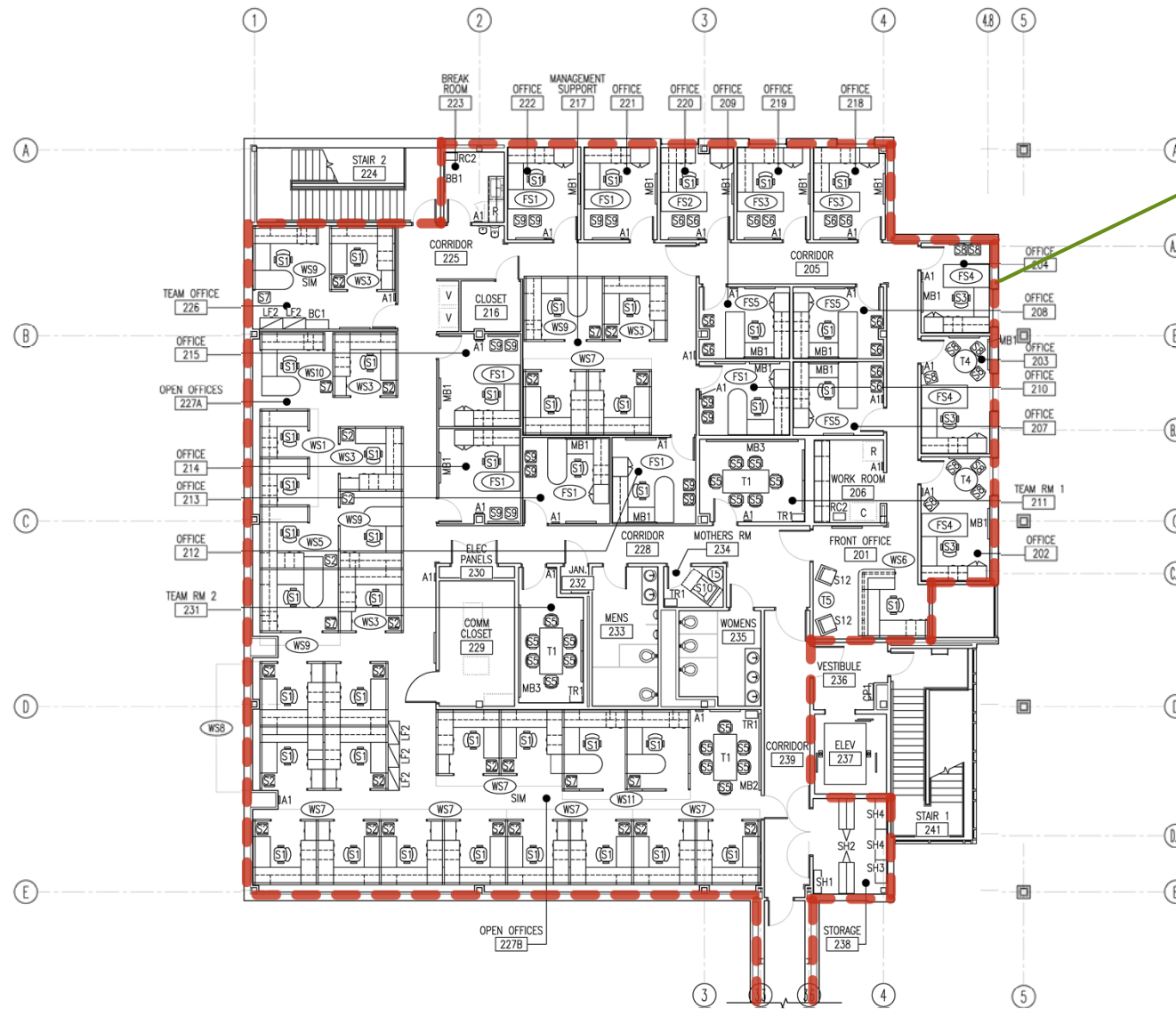
Facility is part of a secure pedestrian campus within the installation

Case Study: Building 403 Administration Facility Floor Plan - First Floor



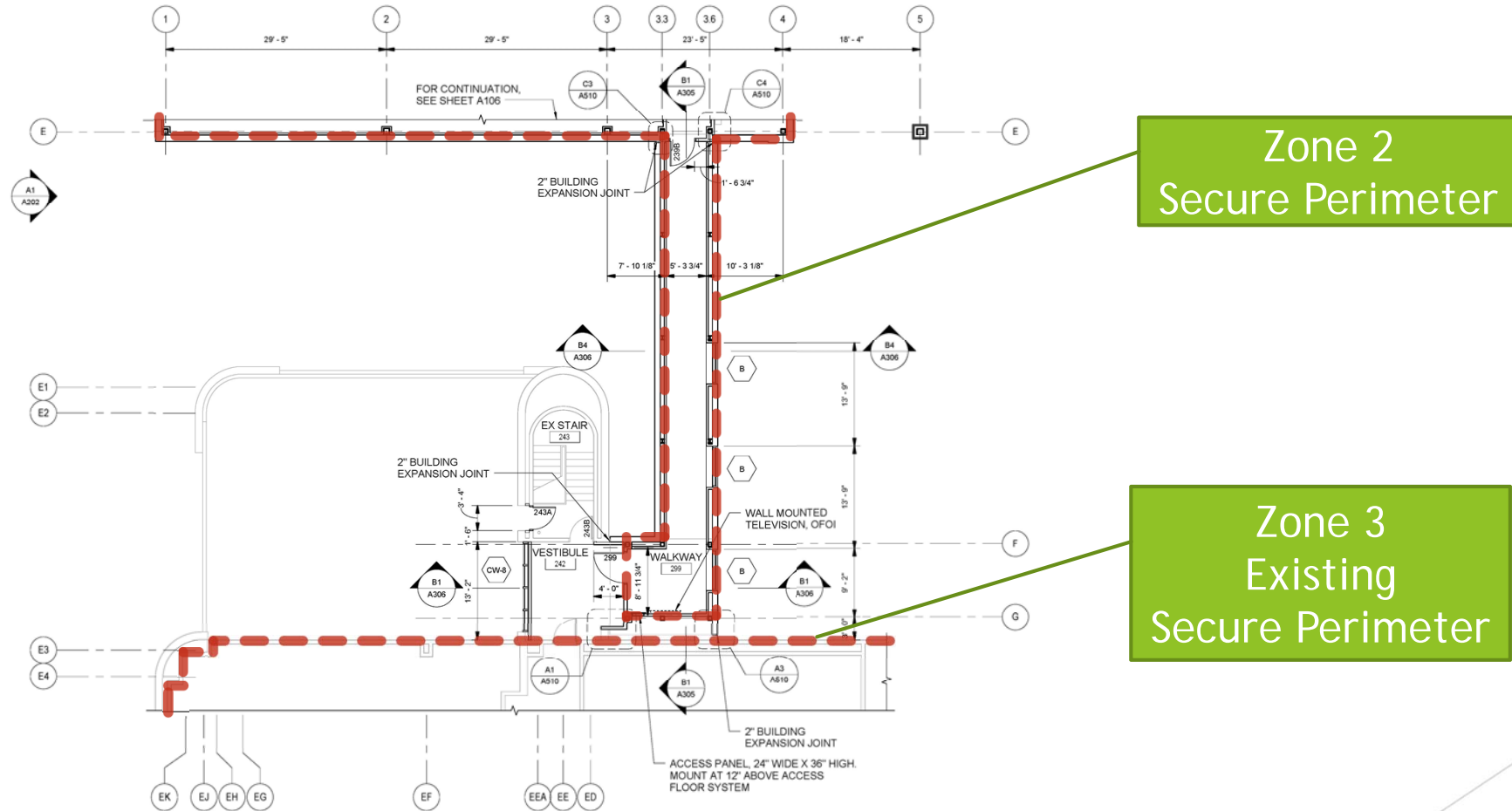
Zone 1
Secure Perimeter

Case Study: Building 403 Administration Facility Floor Plan - Second Floor



Zone 2
Secure Perimeter

Case Study: Building 403 Administration Facility Floor Plan - Second Floor Elevated Walkway



Case Study: Building 403 Administration Facility

Initial LEED Scoresheet

LEED 2009 for New Construction and Major Renovations				Project Checklist		NOPS Building 403 Annex, Shriever AFB	
11 3 12		Sustainable Sites	Possible Points: 26		Materials and Resources, Continued		
Y	?	N			Y	?	N
1			Prereq 1	Construction Activity Pollution Prevention	1	1	
	5		Credit 1	Site Selection			1
			Credit 2	Development Density and Community Connectivity		1	
			Credit 3	Brownfield Redevelopment			1
	6		Credit 4.1	Alternative Transportation—Public Transportation Access			6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms			1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles			3
2			Credit 4.4	Alternative Transportation—Parking Capacity			2
	1		Credit 5.1	Site Development—Protect or Restore Habitat			1
1			Credit 5.2	Site Development—Maximize Open Space			1
1			Credit 6.1	Stormwater Design—Quantity Control			1
	1		Credit 6.2	Stormwater Design—Quality Control			1
1			Credit 7.1	Heat Island Effect—Non-roof			1
1			Credit 7.2	Heat Island Effect—Roof			1
1			Credit 8	Light Pollution Reduction			1
5 3 2		Water Efficiency	Possible Points: 10		Indoor Environmental Quality		
Y			Prereq 1	Water Use Reduction—20% Reduction			
2	2		Credit 1	Water Efficient Landscaping			2 to 4
			Credit 2	Innovative Wastewater Technologies			2
3	1		Credit 3	Water Use Reduction			2 to 4
13 6 16		Energy and Atmosphere	Possible Points: 35		Innovation and Design Process		
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems			
Y			Prereq 2	Minimum Energy Performance			
Y			Prereq 3	Fundamental Refrigerant Management			
6	2	11	Credit 1	Optimize Energy Performance			1 to 19
	2	5	Credit 2	On-Site Renewable Energy			1 to 7
2			Credit 3	Enhanced Commissioning			2
2			Credit 4	Enhanced Refrigerant Management			2
3			Credit 5	Measurement and Verification			3
	2		Credit 6	Green Power			2
6 1 7		Materials and Resources	Possible Points: 14		Regional Priority Credits		
Y			Prereq 1	Storage and Collection of Recyclables			
	3		Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof			1 to 3
	1		Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements			1
2			Credit 2	Construction Waste Management			1 to 2
	2		Credit 3	Materials Reuse			1 to 2
53 16 41		Total	Possible Points: 110				

Design Contract Required
LEED Silver Certification
(50 Points Minimum)

Initial LEED Application
Pursued 58 "Yes" and 4
"Maybe" for a Total of 62

Case Study: Building 403 Administration Facility

Sustainable Design Challenges and Triumphs

- Stormwater quality and quantity control was a difficult credit to achieve
 - AT/FP requirements limited the possible choices for detention
 - Limited site area to provide a large basin
 - Utilized a sand filter detention basin and grass swales to obtain zero post-development discharge and remove all total suspended solids.
- Light Pollution concerns
 - Pedestrian campus environment with numerous walkways surrounding the site
 - High Security Area
- Daylighting and Views - not compatible with the secure area requirements
 - First floor could not have any windows within the secure perimeter
- Design flexibility for a changing force and mission
 - Full height demountable partitions
 - 28" raised access flooring throughout the secure areas
 - Provided an opportunity for an Innovation Design credit



Sand Filter Extended Detention Basin
Retained the entire volume of the 1-year and 2-year post-development runoff, reducing the peak runoff from those events to zero.

Case Study: Building 403 Administration Facility

Sustainable Design Challenges and Triumphs

- Bike rack was provided even though bikes weren't permitted in the campus
- Facility was part of a campus with set exterior materials
 - Precast concrete aggregate mix had to be tweaked to find availability within a 500 mile radius
- Landscaping design had to follow base standards, with very little annual rainfall
 - Irrigation was required for plant start-up
 - Revised the planting design to more hardy species so they could survive after temporary irrigation was removed
 - AT/FP Requirements also affected plant selection
- Energy Efficient Mechanical Design
 - ECM Motors with built-in inverter and magnet rotors provided greater efficiency and long-term energy savings.
 - On-base central plant with free cooling technology generated low-cost chilled water in winter.
 - Dedicated outdoor air system with fan coil units were used to more efficiently satisfy the 100% outside air requirement
 - FCUs modulating and cycling individually with the load, resulted in significantly less fan energy
- The Heavy Repairs Shop on base was able to accept 30,000 lbs of reinforced concrete pipe, diverting the waste from local landfills



Exterior mechanical yard with air handling unit, placement provides excellent clearance for maintenance

Case Study: Building 403 Administration Facility

Final Silver Certified LEED Scoresheet

LEED 2009 NEW CONSTRUCTION

ATTEMPTED: 52, DENIED: 0, PENDING: 0, AWARDED: 50 OF 110 POINTS

SUSTAINABLE SITES		19 OF 28	MATERIALS AND RESOURCES		5 OF 14
SSp1	Construction Activity Pollution Prevention	Y	MRp1	Storage and Collection of Recyclables	Y
SSc1	Site Selection	1 / 1	MRc1.1	Building Reuse-Maintain Existing Walls, Floors and Roof	0 / 3
SSc2	Development Density and Community Connectivity	0 / 5	MRc1.2	Building Reuse - Maintain 50% of Interior Non-Structural Elements	0 / 1
SSc3	Brownfield Redevelopment	0 / 1	MRc2	Construction Waste Mgmt	2 / 2
SSc4.1	Alternative Transportation-Public Transportation Access	0 / 6	MRc3	Materials Reuse	0 / 2
SSc4.2	Alternative Transportation-Bicycle Storage and Changing Rooms	1 / 1	MRc4	Recycled Content	1 / 2
SSc4.3	Alternative Transportation-Low-Emitting and Fuel-Efficient Vehicles	3 / 3	MRc5	Regional Materials	2 / 2
SSc4.4	Alternative Transportation-Parking Capacity	2 / 2	MRc6	Rapidly Renewable Materials	0 / 1
SSc5.1	Site Development-Protect or Restore Habitat	0 / 1	MRc7	Certified Wood	0 / 1
SSc5.2	Site Development-Maximize Open Space	1 / 1			
SSc6.1	Stormwater Design-Quantity Control	1 / 1	INDOOR ENVIRONMENTAL QUALITY		9 OF 15
SSc6.2	Stormwater Design-Quality Control	1 / 1	IEQp1	Minimum IAQ Performance	Y
SSc7.1	Heat Island Effect, Non-Roof	1 / 1	IEQp2	Environmental Tobacco Smoke (ETS) Control	Y
SSc7.2	Heat Island Effect-Roof	1 / 1	IEQc1	Outdoor Air Delivery Monitoring	1 / 1
SSc8	Light Pollution Reduction	1 / 1	IEQc2	Increased Ventilation	0 / 1
			IEQc3.1	Construction IAQ Mgmt Plan-During Construction	1 / 1
			IEQc3.2	Construction IAQ Mgmt Plan-Before Occupancy	0 / 1
			IEQc4.1	Low-Emitting Materials-Adhesives and Sealants	1 / 1
			IEQc4.2	Low-Emitting Materials-Paints and Coatings	1 / 1
			IEQc4.3	Low-Emitting Materials-Flooring Systems	1 / 1
			IEQc4.4	Low-Emitting Materials-Composite Wood and Agrifiber Products	1 / 1
			IEQc5	Indoor Chemical and Pollutant Source Control	1 / 1
			IEQc6.1	Controllability of Systems-Lighting	1 / 1
			IEQc6.2	Controllability of Systems-Thermal Comfort	0 / 1
			IEQc7.1	Thermal Comfort-Design	1 / 1
			IEQc7.2	Thermal Comfort-Verification	0 / 1
			IEQc8.1	Daylight and Views-Daylight	0 / 1
			IEQc8.2	Daylight and Views-Views	0 / 1
			INNOVATION IN DESIGN		4 OF 6
			IDc1.1	Innovation in Design	0 / 1
			IDc1.1	Innovation in Design	0 / 1
			IDc1.2	Innovation in Design	0 / 1
			IDc1.2	Innovation in Design	0 / 1
			IDc1.3	Low Mercury Lighting	1 / 1
			IDc1.3	Innovation in Design	0 / 1
			IDc1.4	Design for Flexibility	1 / 1
			IDc1.4	Innovation in Design	0 / 1
			IDc1.5	Innovation in Design	0 / 1
			IDc1.5	Exemplary Performance MR Credit 5 - Regional Materials 30%	1 / 1
			IDc2	LEED® Accredited Professional	1 / 1
			REGIONAL PRIORITY CREDITS		2 OF 4
			SSc6.1	Stormwater Design-Quantity Control	1 / 1
			WEc1	Water Efficient Landscaping	1 / 1
			TOTAL		50 OF 110

Case Study: Building 403 Administration Facility

Breakdown of Credit Discrepancies

LEED Credit	Planning Phase	Actual Result	Net Gain/Loss
SSc6.2 Storm Quality	Maybe	Sand Filter Basin design pushed this to a "Yes"	+1
SSc8 Light Pollution	Maybe - Unsure given the nature of the campus and UFC required lighting levels	Design was able to achieve	+1
WEc1 Water Efficient Landscaping	Expected 2Y/2M due to arid climate and base planting standards	Careful plant selection and temporary irrigation allowed us to achieve all 4 credits	+2
EAc1 Optimize Energy Performance	Expected 6Y/2M due to limiting design factors for secure areas, and existing campus utility tie-ins	Final mechanical design achieved 10 credits	+4
EAc3 Enhanced Commissioning	Credit was Planned and Implemented	Contractor did not pursue documentation due to other credit gains	-1
EAc4 Enhanced Refrigerant Management	Planned, but not required		-1
EAc5 Measurement and Verification	Planned as a back-up credit	Contractor did not pursue documentation due to other credit gains	-1
MRc7 Certified Wood	Planned, but not required	Design Team did not pursue given limited quantities of wood in casework and blocking	-1
IEQc3.2 Construction Management Plan Before Occupancy	Planned as a back-up credit	Contractor did not pursue documentation due to other credit gains	-1
IEQc6.2 Controllability of Systems - Thermal	Stretch Credit - Not Pursued	Unable to achieve due to open office areas	-1
IEQc8.1 Daylighting	Stretch Credit - Not Pursued	Too many spaces were unable to have daylighting due to security requirements	-1
IEQc8.2 Views	Stretch Credit - Not Pursued	Too many spaces were unable to have views due to security requirements	-1
IDc5 Educational Program	Planned as a back-up credit	Design Team did not need to pursue	-1
IDc6 Integrated Pest Management	Base had a natural non-pesticide pest management plan already in place	Implemented, but credit not submitted	-1
RP - Water Efficient Landscaping	Stretch Credit	Careful plant selection and temporary irrigation allowed us to achieve all 4 credits	+1

Lessons Learned and Project Conclusions

- Sustainable Design can still be attained while maintaining a high level of security.
- Planning for ample “stretch” or “back-up” credits allowed for flexibility during the design and construction credit reviews.
- Creative thinking and “alternative compliance” paths can push a maybe credit to a yes.
- Be realistic in your planning and programming for sustainability
- Ask the installation what programs they already have in place that could be submitted as an Innovation Design credit.



Secure conference room provides flexible seating arrangements for mission support

Thank you for Attending

Questions?

