

Duke Sustainability

Duke Lemur Center Habitat Enrichment

Building Information

Tenant: Duke Lemur Center

Architect: Lord Aeck & Sargent

Construction: Barnhill

Purpose: Releasable and non-releasable habitat for lemurs and other prosimian species at the Duke Lemur Center

Footprint: 35,289 sq ft

LEED™ Certification Standard: Silver, 34 points

LEED™ Version: NC v. 2.2

The Duke Lemur Center is a renowned research and education facility focusing on the conservation of a variety of prosimian species. The Center is located on 85 acres in the Duke Forest, housing close to 250 lemurs. In 2005, the Center made a commitment to site improvement including two buildings: a releasable building allowing access to natural habitat enclosures and a non-releasable building for non-free ranging animals. The project highlights described briefly below illustrate sustainable features that demonstrate sensitivity to the environment through construction and design initiatives.

View the [Duke Lemur Center Habitat Enrichment LEED™ Scorecard](#)



Sustainable Site Features

The site was selected so that development did not encroach on the 100-year Federal Emergency Management Agency (FEMA) defined floodplain, threatened or endangered species habitat, or within 100 feet of wetlands. The project design includes preferred parking for low emitting and fuel efficient vehicles, accounting for over 5% of the total parking. In addition, 7% of new spaces were designated for high-occupancy vehicles. Bike commuting is encouraged through the addition of racks located within 300 feet from the building entrance. Shower and changing facilities are provided for these commuters. The habitat enrichment was designed to maximize open space; approximately 200,000 sq. feet of open space is provided around the development footprint. Much of this space is wooded area, with brush, shrub, and grasses accounting for the rest. This area will remain undeveloped for the life of the Lemur Center.

High-albedo roofing with a solar reflectance index of 78 was selected to decrease the heat island effect produced by the roof. All of the low-sloped installed roofing materials achieve this solar

reflectance index.

Water and Energy Efficiency

In order to reduce water needs for irrigation, drought-resistant native plant materials were selected. Remarkably, the need for an irrigation system was eliminated, necessitating only hand-watering for a maximum of 1 year to establish plant material.

The habitat enrichment was designed for low refrigerant impact. To meet the credit for enhanced refrigerant management under LEED™, a score of fewer than 100 is needed. The project achieved a score of 92.

Indoor Air Quality

During the construction phase, an Indoor Air Quality (IAQ) management plan was taken to prevent jeopardizing IAQ. This included the installation of filter media when heating and air conditioning systems were started, cleaning crews throughout the construction phase, temporary barriers, and material storage in protected/enclosed areas. In addition, a flush-out was performed for a 2-week period prior to use.

Indoor adhesives, sealants, and sealant primer products were selected for low Volatile Organic Compound (VOC) levels. In addition, PPG provided paint and coating products with low VOC levels. Ventilation systems greatly exceed the LEED™-specified standard of achieving over 30% of the ASHRAE set standards. For example, the non-releasable animal holding wings exceed this standard by over 600% via a high outdoor air intake.

Each of the four dedicated work areas has individual thermostats to control HVAC systems and thereby attain the ability to decrease usage based on occupancy. Similarly, there is a 1:1 ratio of occupants to lighting controls, resulting in 100% controllability and reductions in energy usage.

Resource Management

Selected steel and metal-based products included recycled content as high as 99%. For example, steel beams are 60% post-consumer and 38% pre-consumer recycled material. Similarly, steel-based structural angles are 93% post-consumer and 6% pre-consumer recycled. The materials used for enclosing habitats are high in recycled materials as well; animal cage/keeper run fencing is comprised of 75% recycled material.

Regional materials were selected for sustainable design. Concrete was harvested between 360 and 480 miles from the project site, while masonry block and brick was within a 150-mile harvest distance. These three materials comprise most of the building materials, and the three are within a 220-mile manufacturing distance to the project location.

Integration of Sustainability in Design & Construction Process

Storm water from the non-releasable building is captured by either a swale or a piped drainage system, depending on the side of the building. During construction, storm water and erosion were also accounted for through silt fences and diversion ditches to trap sediment. Inlet protection was implemented to control for construction disturbance.

Innovation in Design

The project achieved recognition for exemplary performance in two categories: water use reduction and maximizing open space. A reduction of 42.3% of water usage over baseline was achieved through fixture selection. Over 200,000 square feet of open space promotes biodiversity.

Duke University Lemur Center - Habitat Enrichment

LEED NC v2.2 Scorecard :

EARNED	D=Design C=Construction	Sustainable Sites
7		Construction Activity Pollution Prevention Site Selection Development Density and Community Connectivity Brownfield Redevelopment Alternative Transportation, Public Transportation Access Alternative Transportation, Bicycle Storage & Changing Rooms Alternative Transportation, Low-Emitting and Fuel Efficient Vehicles Alternative Transportation, Parking Capacity Alternative Transportation, Protect or Restore Habitat Site Development, Maximize Open Space Stormwater Design, Quantity Control Stormwater Design, Quality Control Heat Island Effect, Non-Roof Heat Island Effect, Roof Light Pollution Reduction
4		Water Efficiency
1	D	Water Efficient Landscaping, Reduce by 50%
1	D	Water Efficient Landscaping, No Potable Use or No Irrigation
1	D	Innovative Wastewater Technologies
1	D	Water Use Reduction, 20% Reduction
1	D	Water Use Reduction, 30% Reduction
5		Energy & Atmosphere
Y	C	Fundamental Commissioning of the Building Energy Systems
Y	D	Minimum Energy Performance
Y	D	Fundamental Refrigerant Management
4	D	Optimize Energy Performance
	D	On-Site Renewable Energy
	C	Enhanced Commissioning
1	D	Enhanced Refrigerant Management
	C	Measurement & Verification
	C	Green Power
Total Points Achieved:		34
Certification Level:		SILVER

EARNED	D=Design C=Construction	Materials & Resources
4		Storage & Collection of Recyclables Building Reuse, Maintain 75% of Existing Walls, Floor, and Roof Building Reuse, Maintain 95% of Existing Walls, Floor, and Roof Building Reuse, Maintain 50% of Interior Non-Structural Elements Construction Waste Management, Divert 50% From Disposal Construction Waste Management, Divert 75% From Disposal Materials Reuse, Specify 5% Materials Reuse, Specify 10% Recycled Content, Specify 10% (post-consumer + 1/2 pre-consumer) Recycled Content, Specify 20% (post-consumer + 1/2 pre-consumer) Regional Materials, 10% Extracted, Processed, and Manufactured Regionally Regional Materials, 20% Extracted, Processed, and Manufactured Regionally Rapidly Renewable Materials Certified Wood
11		Indoor Environmental Quality
Y	D	Minimum IAQ Performance
Y	D	Environmental Tobacco Smoke (ETS) Control
1	D	Outdoor Air Delivery Monitoring
1	D	Increased Ventilation
1	C	Construction IAQ Management Plan, During Construction
1	C	Construction IAQ Management Plan, Before Occupancy
1	C	Low-Emitting Materials, Adhesives & Sealants
1	C	Low-Emitting Materials, Paints & Coatings
1	C	Low-Emitting Materials, Carpet Systems
1	C	Low-Emitting Materials, Composite Wood and Agrifiber Products
1	D	Indoor Chemical & Pollutant Source Control
1	D	Controllability of Systems, Lighting
1	D	Controllability of Systems, Thermal Comfort
1	D	Thermal Comfort, Design
1	D	Thermal Comfort, Verification
1	D	Daylight & Views, Daylight 75% of Spaces
1	D	Daylight & Views, Views for 90% of Spaces
3		Innovation & Design Process
	D	Innovation in Design:
	D	Innovation in Design:
1	D	Innovation in Design: Exemplary Performance - Open Space
1	D	Innovation in Design: Exemplary - Water Use
1	C	LEED™ Accredited Professional
Project Totals		
34		Total Documented

Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points