



◀ south facade

NOAA

Center for Weather and Climate Prediction

Riverdale Park, Maryland, USA

Project Synopsis

NOAA’s Center for Weather and Climate Prediction is the centerpiece of the largest planned research park in the Washington, DC, region. To support the organization’s mission of understanding and predicting changes in the earth’s environment, the design reduces the Center’s impact on the environment and physically embodies man’s relationship to nature.

Just as natural systems do not operate in straight lines, the building is configured in a series of curving wings that intersect in a central atrium. The building form is organic, with “waves” of space.

The north elevation features continuous horizontal bands that allow sweeping views into the woodland preserve. The south elevation consists of a curtain wall with sunscreens that reduce solar heat gain and act as light shelves that bounce daylight deep into interior spaces. Visible from the interior, the lower roof surfaces are vegetative planes. These surfaces surround the sweeping, inclined central roof that rises from the building entry to an apex at the cupola. Here, within the facility’s highest occupied space, NOAA researchers collect atmospheric data.

Designed as a central gathering space, the five-story atrium encourages the informal interaction between scientists and administrators that is crucial to the development of science. With the main stairs and amenities clustered around it, this atrium becomes the building’s social and emotional center.



◀ study model







◀ sunshade detail

Project Information / Descriptive Data

NOAA's mission is "To understand and predict changes in the earth's environment and conserve and manage coastal and marine resources to meet our nation's economic, social and environmental needs." Architecture can support that mission.

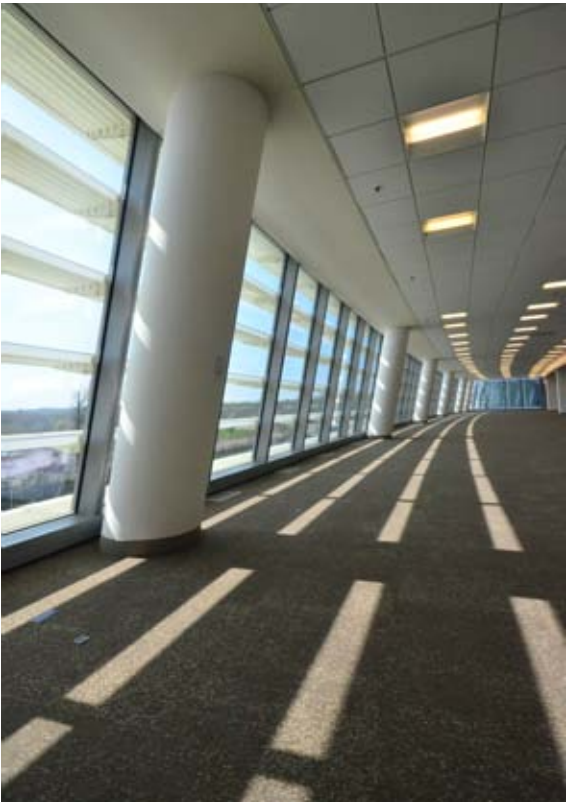
The design of the National Center for Climate and Weather Prediction does much more than reduce the Center's impact on the environment. The building actually becomes a physical embodiment of our relationship to nature. The underlying design concept is the notion of a building that actively responds to the environmental conditions its users observe and predict.



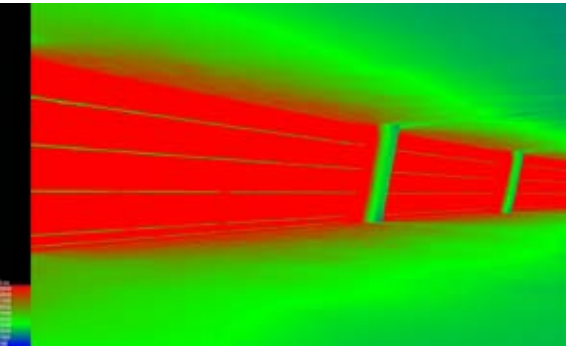
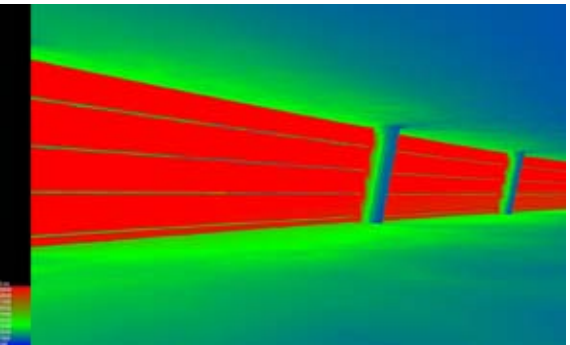
▲ aerial rendering



▲ south façade detail



▲ open office space



▲ daylight analysis march 21st 9am/3pm

Because natural systems do not operate in straight lines, the building is configured in a series of curving wings that intersect in a central atrium. The layered, curved facades are fluid and dynamic. The overall building form is organic, creating “waves” of interior and exterior space across the site and communicating to people entering the site that something important is going on here.

The integration of the building and its site extends from the landscape through the interior spaces to the top of the structure. Visible from inside the building, the lower roof surfaces are planes of vegetative green roofs. These intersect with a sweeping inclined roof plane that rises from the building entry to an apex at the cupola, where atmospheric data is collected in the high point of the Center.



▲ south elevation detail

▼ north elevation detail



Each façade responds to its solar orientation:

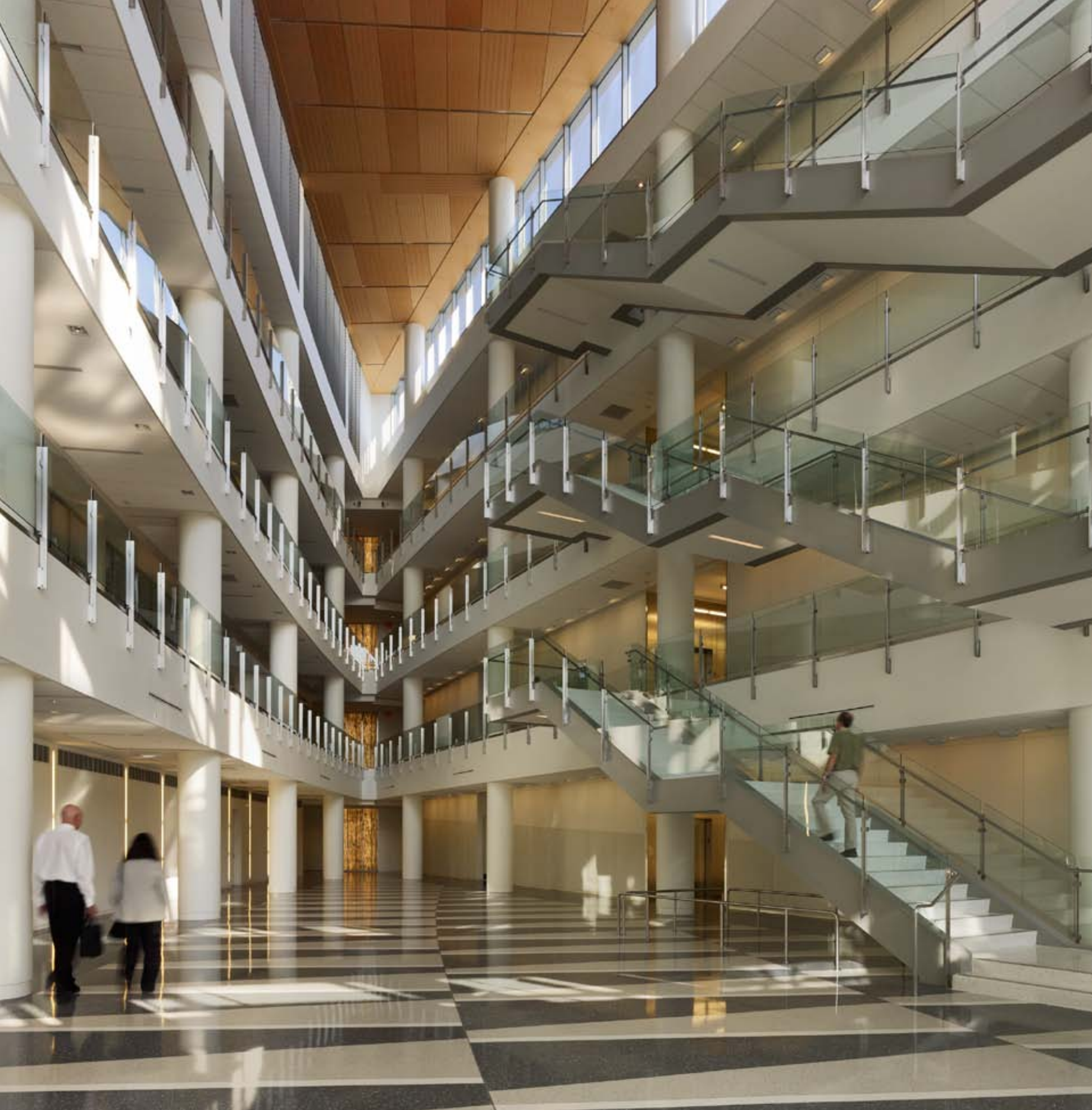
- The north-facing elevation features continuous horizontal bands of windows that provide sweeping views into the woodland preserve and do not encounter direct sun.
- The south-facing elevation at the building entry is a curtain wall with a system of sunscreens that reduce solar heat gain. These horizontal blades act as light shelves that bounce daylight deep into interior spaces. This highly articulated facade is sloped and faceted around a long graceful arc to catch and reflect light throughout the day. The sun animates this piece of the building as a constantly changing interplay of shadow and light.



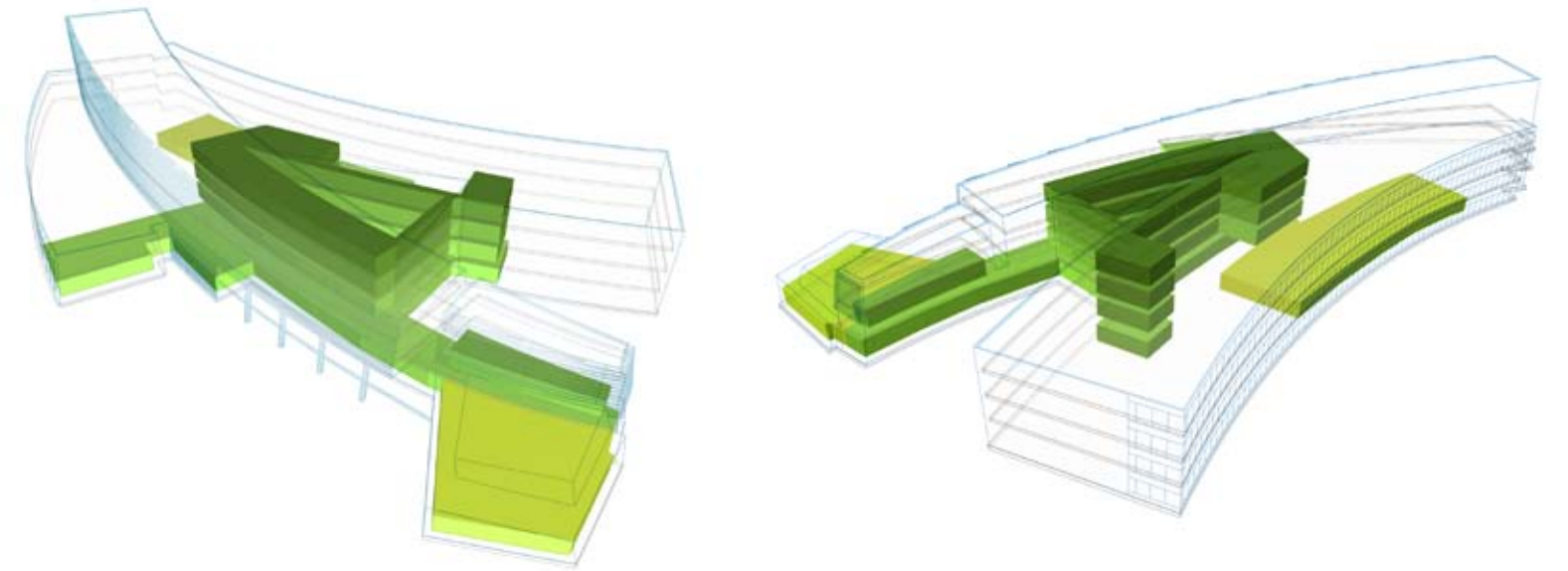
▲ south elevation



▲ north elevation



- The lower façade on the south and southwest has vertical and angled slit windows within pigmented, patterned precast concrete panels. This window pattern adds visual interest to the exterior and limits solar gain.
- The auditorium is a solid sculptural element that anchors the curve of the main façade. The auditorium is contained within pigmented, patterned precast concrete panel walls.
- At the other end of the building arc is the cupola, the highest occupied space. It is located at the top of the central curved wing of the building and oriented to provide the best views.



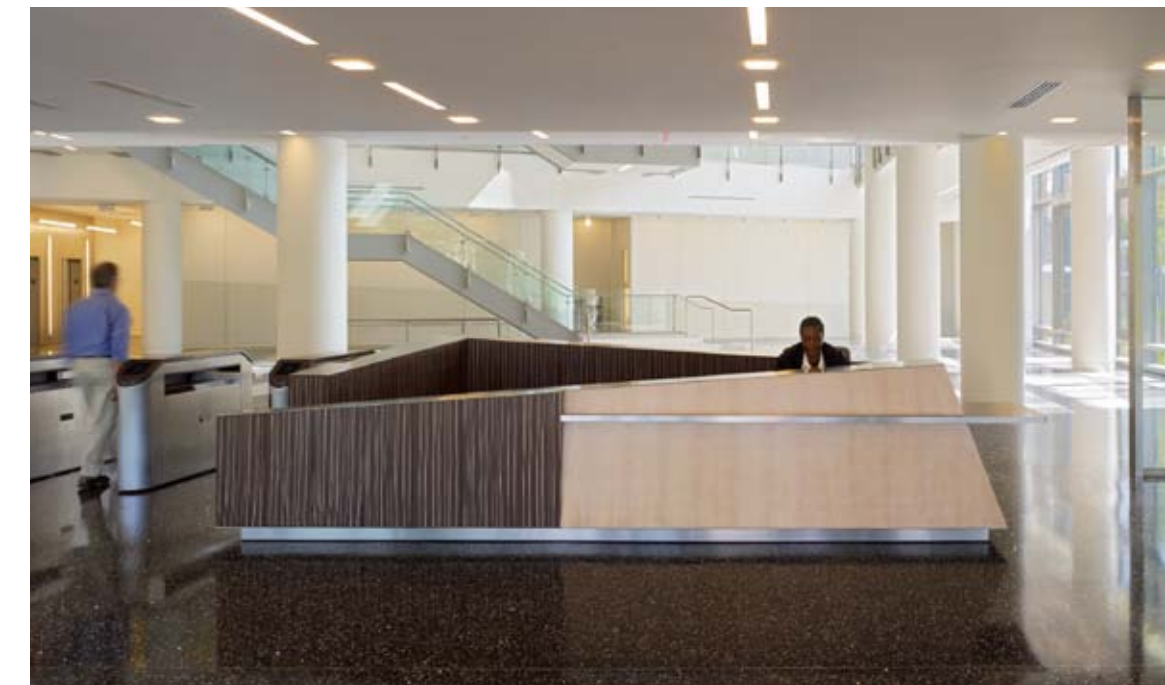
▲ diagrams: communal spaces



The Center's main entry canopy and lobby are clearly visible to people entering the site. These elements and the pavilion containing the auditorium are lower and designed to reflect a human scale. The entry is welcoming, with a large covered loggia at the building's front door. The full extent of the building form is not immediately apparent, but reveals itself gradually as visitors move through a series of unfolding vistas.

Although the gated site is designed to ISC Level IV security standards, the preservation of a large woodland area within the property lessens the sense of containment and provides pleasant outdoor spaces.

The role of technology in research and operations facilities gives a vital new dimension to today's government buildings. By incorporating intelligent building technologies, this new facility actively responds to its occupants and environment. All of the engineering and data systems are integrated and controlled by a sophisticated Building Automation System. Photoelectric dimming controls, occupancy sensors and sunshading devices significantly reduce energy costs while giving individual users more control over their work environments.



▲ lobby

◀ building entry



▲ auditorium pre-function



▲ atrium





SUSTAINABLE DESIGN INTEGRATION

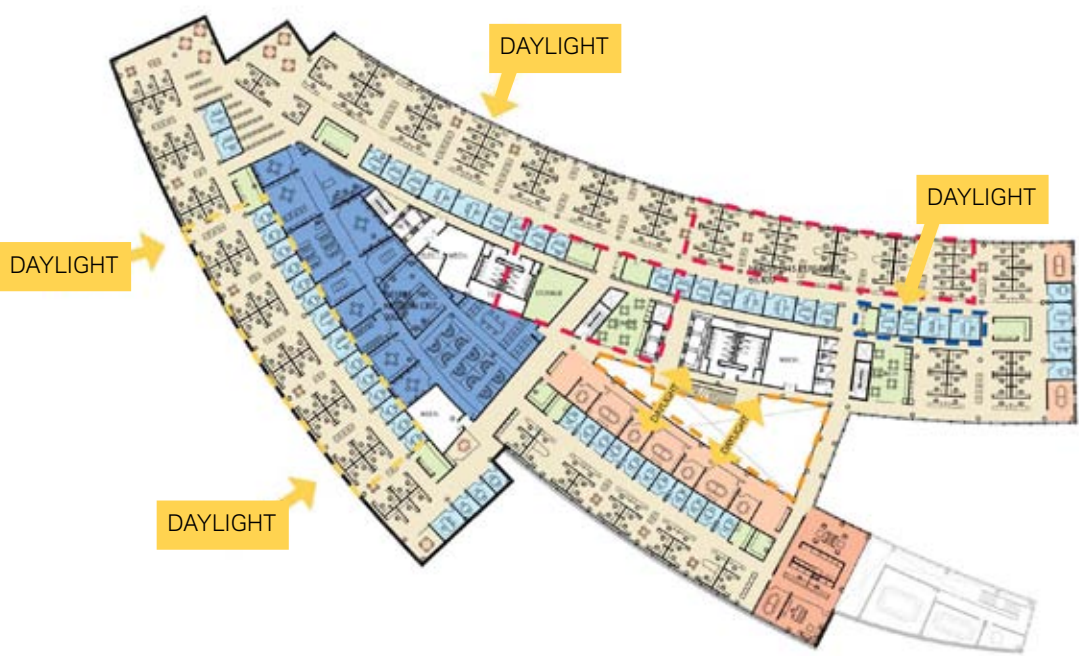
The design enhances NOAA's mission by minimizing the building's environmental impact. The building promotes innovation by connecting occupants with their natural surroundings.

Sustainable design strategies include water-sensitive site design, bioretention, energy performance optimization, natural daylighting, enhanced indoor air quality and increased thermal comfort and control.

The building actively demonstrates sustainable water use. Two-thirds of the roofs are gardens that act as its "fifth elevation." Researchers enjoy views of the elevated meadows, while the roofs mitigate urban heat island effects and reduce the amount of rainwater that enters the storm water system. The remaining rainwater cascades down a four-story waterfall element and feeds into bioretention gardens.

The building responds to the environmental conditions that its users are observing and predicting. The form and details link energy performance to the user experience.

Orientation is primarily north-south, with two-foot-deep sunshades covering the entire south-facing curtain wall. This prevents glare and heat gain in the summer and allowing natural light to penetrate deep into the spaces in the winter. Photoelectric dimming controls and occupancy sensors give users control of lighting. Adjustable floor diffusers in the raised access floor give users control of the mechanical air distribution in their work environments.



◀ sunscreen detail

◀ tenant fit out / typical floor plan



INTENT AND INNOVATION

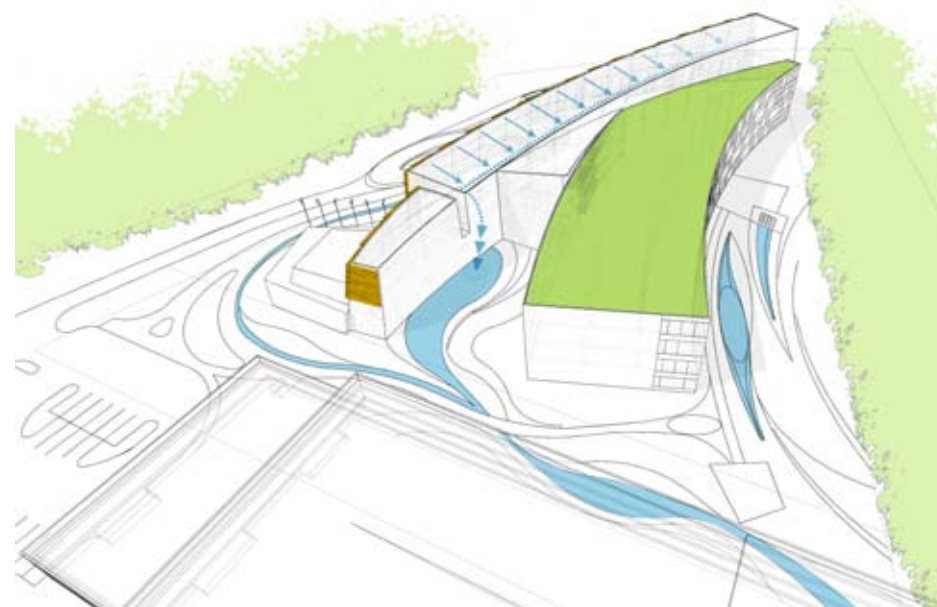
The design team had the unique opportunity to work with a government agency that emphasizes science and technology. This interaction generated several strategies that promote innovation.

WATER

The **green roofs** function as the building's "fifth elevation." Occupants of the upper levels look down on an aesthetically pleasant elevated meadow of ground covers and sedums that change color with the seasons and provide a habitat for insects, birds and butterflies. The green roofs also mitigate the urban heat island effect and reduce the amount of rainwater entering the storm water system.

The unique four-story **waterfall** element transfers rainwater from the high roof to **bioretention** gardens. The design creates 30 stainless steel cables, attached with turnbuckles at the top and bottom, that guide the water like a rain chain from the rooftop scupper down to a perforated precast concrete basin in the garden. Collecting rainwater from the only major non-green roof keeps it out of the storm water system. The natural waterfall's visibility from the atrium, office spaces and the gardens surrounding the cafeteria's outdoor seating "island" symbolically links the architecture to NOAA's mission.

An **underground cistern** collects rainwater used for irrigation. The native and low-water plant species reduce irrigation requirements.

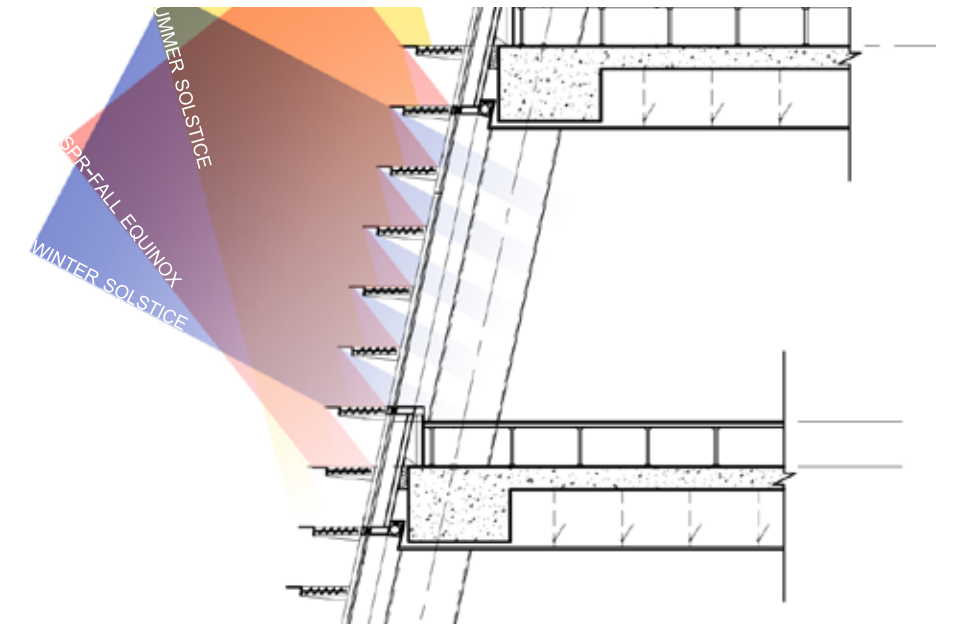


▲ rainwater diagram



▲ green roof

◀ view east: waterfall + bio-retention swales



▲ solar diagram

SUN

Two-foot-deep **sunshades** on all south-facing curtain walls prevent glare and heat gain in the summer and allow natural light to penetrate deeper into the interior during cooler months.

Photoelectric dimming controls and occupancy sensors give users control of their immediate work environments.

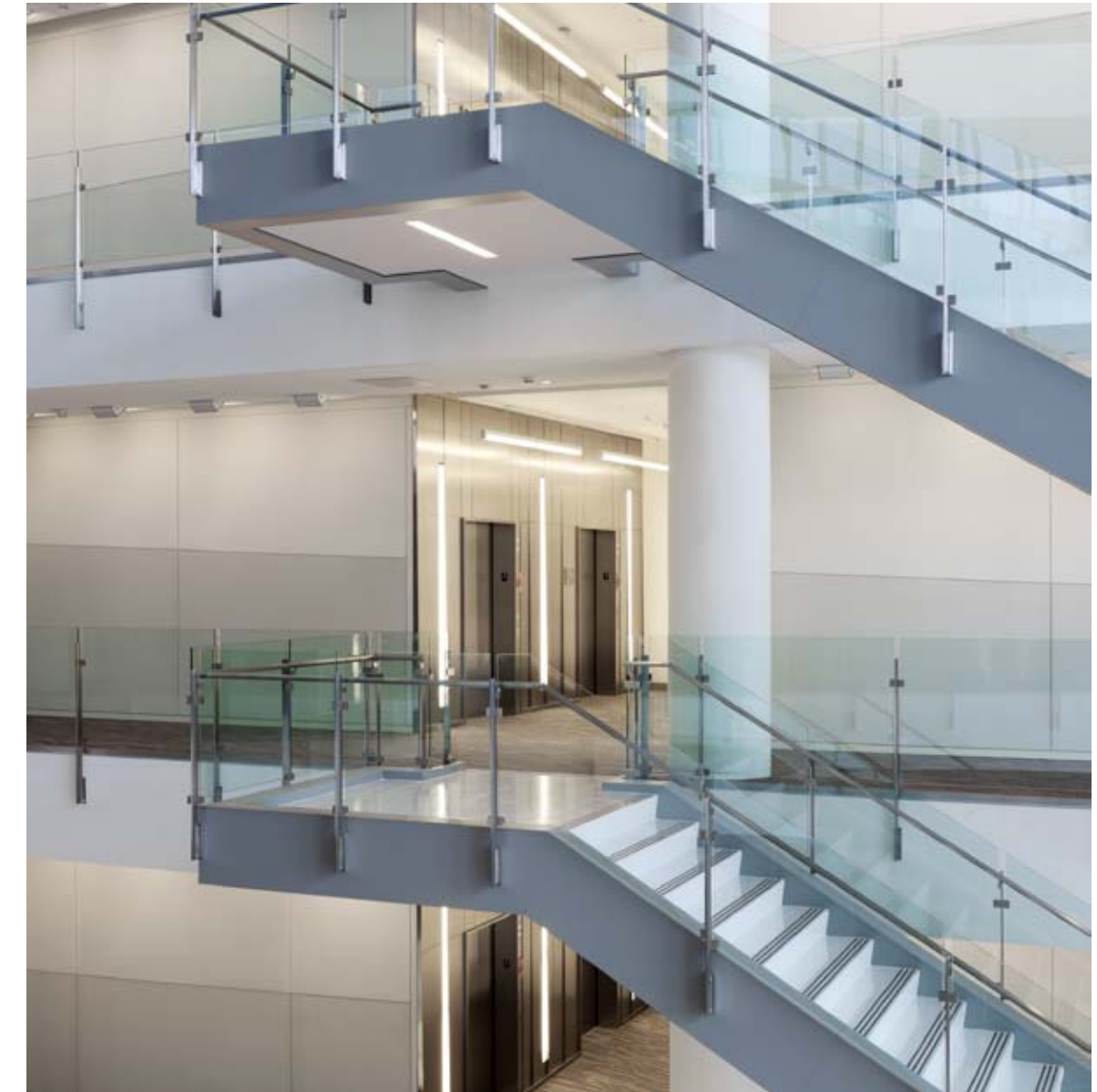


▲ cafeteria & wind sculpture

AIR

To create a more controllable and comfortable interior environment, the entire mechanical air distribution has under **raised access flooring** that is 24 inches high on the ground floor and 18 inches high on all upper floors. Building occupants can control the supply of air through adjustable floor diffusers that can be easily moved and reconfigured.

The design team researched and commissioned a **large wind sculpture** to be placed on the face of the garage, where it is highly visible from the atrium and office spaces.



▲ atrium staircase detail

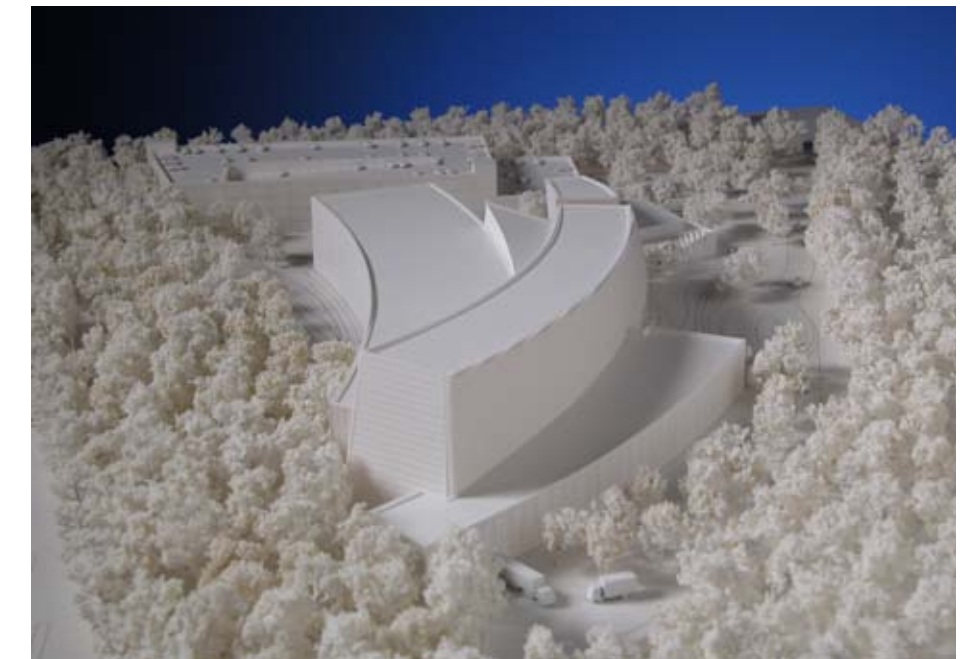


▲ aerial from south

MASS

The building mass is formed by three equally important goals:

- Create a spacious, flexible working environment with a design that promotes collaboration among all users.
- Orient the building in a primarily north-south direction and design the facades to minimize use of energy for cooling in summer and heating in winter.
- Take advantage of the available views from the building into the adjacent woods and landscaped areas. The shape of the floor plate is derived from an interweaving of interior and exterior space that gives the people inside a constant connection to the natural environment.



▲ study model

ENERGY

The building's orientation and form combine with the facades to minimize energy use. Elongating the building in the east-west axis maximizes north-south exposure. The facades and shading devices mitigate summer cooling and winter heating requirements. The atrium brings daylight into the center and reduces the size of the exterior envelope. The primary supply air distribution is underfloor air. Supply air rises through the space, removing heat and contaminants from people and equipment from the occupied zones and returning it to the air handling unit through the ceiling plenum.

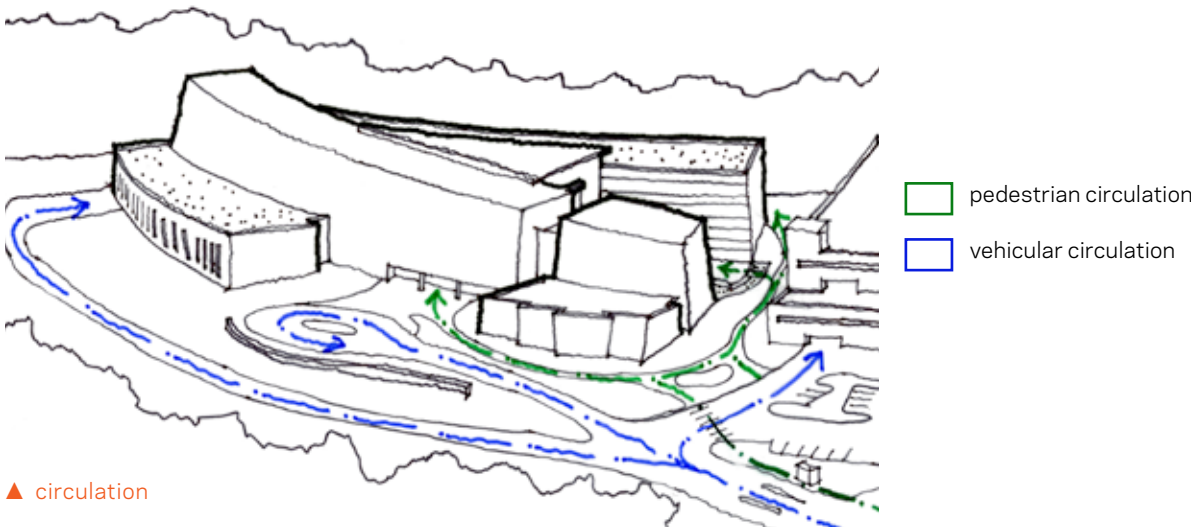
In addition to saving energy, this system is manually adjustable for occupant comfort. The north-facing elevation features continuous horizontal bands of windows that allow sweeping views into the woodland preserve while avoiding direct sun. The south-facing elevation at the building entry is a curtain wall with a system of sunscreens that reduce solar heat gain. These horizontal blades act as light shelves that bounce daylight deep into interior spaces. This allows for daylight harvesting and significantly reduces electrical lighting loads.

- a. Predicted EUI in kBtu/sf/yr excluding on-site renewable energy contribution
79.6 kBtu/sf/yr
- b. Predicted EUI in kBtu/sf/yr including on-site renewable energy contribution (carbon offsets will not be counted)
79.6 kBtu/sf/yr
- c. Predicted % regional energy reduction per Energy Star Target Finder.
81/100

COMMUNITY CONNECTIVITY

The new NOAA National Center for Climate and Weather Prediction is located on property adjacent to areas of existing woods and Prince George's County parkland. The site features a seasonal stream along the northern edge. A 100-foot-deep woodland preserve along this edge contains mature, mixed hardwood trees preserved in their natural forested state to minimize the impact of the secured perimeter and provide pleasant outdoor spaces. The cafeteria, which has access to the outdoor dining terrace and views of the wind sculpture, is open to the public. Building occupants along the north façade have wonderful views into this wooded area. The site is located in close proximity to the College Park metro station and two miles from the University of Maryland campus to help create synergy between students and NOAA researchers. The conference center at the ground level of the building was designed with easy access from the main building entrance.

- a. Parking spaces per occupant:
627 Employee Spaces, 35 Car Pool Space, 35 Low Emitting Vehicle Spaces (697 Total Parking)
800 FTE maximum planned capacity (0.87 parking spaces per occupant)
- b. WalkScore rating:
35



outdoor dining terrace ▲



WATER

The site design provides more than a 25 percent reduction to the one-year and two-year post-development storm water management rates and quantities as compared to existing conditions. The low-flow plumbing fixtures contribute to a total regulated, potable water savings of 41.3 percent compared to the baseline. Several design strategies help manage on-site storm water. More than half the roof surface is covered with an extensive green roof, which is visible to building occupants and provides rainwater detention, reducing stress on county infrastructure. The green roof improves the quality of the surface water that enters the local creeks and streams and the Paint Branch Creek watershed, which flows into the Anacostia River.

In this way, the site contributes to an ongoing effort by local park systems to revitalize the Anacostia River, which flows into the Chesapeake Bay. The rain garden captures surface water runoff and storm water discharge from the green roofs, which feature native plant species that are drought tolerant and need little maintenance, and the main sloped roof. This greywater is used to irrigate the landscape and cleansed by plant materials within bioretention areas before being released from the site. An on-site biofiltration facility provides water quality treatment of the run-off from the non-green roof and the parking garage's top deck. Drainage from the south side of the building, loading dock and entrance road is diverted to an underground cistern system, treated and used for irrigation.

- a. % precipitation managed on site:
100% managed on site
- b. % waste water reused on site:
0%
- c. Predicted annual regulated potable water use, gallons/sf/yr:
4.8 gal/sf/yr
- d. % regulated potable water reduction from baseline:
43.1%

MATERIALS

In addition to using sustainable building materials, 77.5 percent of the construction waste was diverted from disposal. All adhesives, sealants, paints and coatings were selected for low VOC content and selected carpets were certified Green Label Plus. Ninety-three percent of all new wood used in the project was sustainably harvested. None of the composite wood used, including ceiling tiles, doors, architectural woodwork, rough carpentry and demountable partitions, contained added urea-formaldehyde.





NOAA CENTER FOR WEATHER AND CLIMATE PREDICTION