NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SATELLITE OPERATIONS FACILITY
Suitland, Maryland

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ARCHITECTURE FOR MONITORING
EARTH AND SKY

From issuing tornado warnings that have saved hundreds of lives to measuring the depth of polar ice caps, the National Oceanic and Atmospheric Administration (NOAA) plays a crucial role in monitoring and preserving our environment. Its new satellite control facility advances this mission by providing offices and technical space for NOAA’s National Environmental Satellite, Data, and Information Service (NESDIS), which manages the collection, processing, and distribution of information related to weather and climate.

The 208,000-square-foot building is located on 15.6 wooded and grassy acres within the Federal Center in Suitland, Maryland, just outside Washington, DC. The architect took advantage of the site to preserve the environment while providing a highly sophisticated infrastructure for satellite operations and data processing.

Divided into two distinctive components, the facility symbolizes NOAA’s mission to monitor sky and earth by blurring the boundaries between architecture and landscape. Technical functions related to the satellites are housed within a slender, horizontal bar raised above the ground and crowned by antennae and satellite equipment. Below the control facility, administrative offices are placed in a disc-shaped, underground concrete structure, topped by a “green” roof resembling a grassy field.

In addition to identifying the dual functional roles of the building, this physical separation allows the satellite operations building, which has limited access, to function round-the-clock, every day of the year, independently of the support offices. In architectural terms, the separation explicitly expresses the two missions of the building—the gathering and the processing of information—through a striking juxtaposition of architectural forms.

The most visible structure is the three-story, 47,000-square-foot bar building dedicated to the control and operations of the satellites and associated data processing. Its long, horizontal façades are clad in panels of corrugated aluminum and cement
fiberboard to convey a machinelike feeling sympathetic to the building’s technical and scientific activities. The fiberboard panels, applied in a staggered pattern, cover the entire east façade and are punctuated by several horizontal strip windows. On the upper portion of the west façade, they are applied over an outwardly angled metal truss.

This truss is part of an exposed steel superstructure supported on large, splayed legs that extend to either side of the control tower’s main volume. The dynamic framework, with its built-in staircases, jutting angles, and exposed satellite equipment, appears reminiscent of the scaffolding around rocket launch pads. It boldly announces NOAA’s mission to monitor the Earth from space.

The steel superstructure also serves a vital purpose in supporting and providing access to the antennae that pitch and sweep to receive information from NOAA’s satellites in space. The building contains high-technology equipment, including 16 antennae that control more than $3 billion in environmental satellites. Emerging from the southern end of the control facility, large metal letters spelling out “NOAA” create an iconic identity for the stewards of this 21st century facility.

Extending underneath the sleek control building, the administrative office block acts as a foundation, both literally and figuratively, to support the satellite operations. Built of concrete, the sunken mat foundation and upper walls curve outward to extend into the landscape under a grassy berm punctured by circular skylights and rectangular garden courtyards. At the southwestern edge, the concrete structure rises above ground to reveal a band of windows tracing its curve.

Most of the structure remains beneath the earth to merge with the landscape, a gesture representative of NOAA’s environmental stewardship. Creating the berm over the subterranean office block required building up the roof from layers of waterproof membranes, insulation, drainage boards, and lightweight soil. Planted over this roof around circular skylights and garden courtyards are grasses and native plants.
to create an expanse of green. The only projecting structure in this field is a small concrete and glass pavilion at the northeast corner, which houses an emergency exit stair from the subterranean office area.

Along its front, west-facing side, the office block is cut away to reveal a vehicular ramp to the 284-space parking garage underneath the building and an adjacent service area. Next to the garage entrance, a plaza provides a place for cranes to hoist the satellite equipment onto the roof. On the southern edge of this space, a concrete pedestrian ramp extends from an on-grade, 56-space visitor parking lot to the main entrance on the upper floor of the office wing.
The siting of the building in the ground, under a landscaped green roof, is a performance-based move that not only improves energy efficiency in real terms but also educates the public and embodies the federal government's commitment to sustainability.

Thom Mayne
Architect, Morphosis
The entrance is tucked into the side of the building’s front porch, an outdoor vestibule sheltered by a canopy finished in metal mesh, which extends inside the building to form the ceilings in the public areas. Just beyond the front door is a 15,000-square-foot area of public spaces. The secure lobby with its concrete floors leads to several conference rooms with angular windows and a separate elevator lobby for access to the satellite control facilities in the above-ground structure.

Stretching eastward, the 146,000 square feet of open office areas are arranged around a square, two-level ring of shared support and meeting rooms at the center. Steel staircases, finished in stainless-steel and aluminum, provide access from the double-height office areas to the upper level of this support ring.

The 14-foot-high southwestern perimeter of the office floor is enclosed in a tall, curving window wall that filters natural light into the open space. Within this area, private offices and conference rooms are treated as freestanding structures to partition the larger, main space. These one-story volumes are framed in panels of translucent polycarbonate on walls and ceilings to transmit daylight while still maintaining privacy.

Sections of the office floor that are underground are also designed to provide access to light and views. Four outdoor, glass-enclosed courtyards are strategically inserted into the expanse of the office floor to filter daylight into the two-story space. Landscaped with raised concrete planters and gingko trees, they bring an element of nature inside the building and ensure that every employee is no further than 60 feet away from a window. At the front of the building on this level, a cafeteria and an exercise room are arranged around a fifth courtyard that extends along the entrance ramp.

Sunlight also permeates the subterranean level through 21 circular, domed skylights in the ceiling, which is supported by concrete columns. Augmenting this natural illumination are ceiling-mounted compact fluorescent light fixtures fitted into custom metal grids. This grid pattern is also echoed in the carpet tiles covering the access flooring throughout the office areas.
Above the open offices, the concrete ceiling subtly curves upward to 23 feet to form a broad, shallow dome. This curvature, formed by the underside of the green roof, is meant to simulate the earth’s curvature as seen by satellites orbiting in space. Large murals of satellite imagery mounted on the walls throughout the offices surround the employees with stunning images of the fruits of their own work.

Rising from the office wing, a five-level satellite operations block is arranged around a two-story Satellite Operations and Control Center on the north side of its uppermost levels. This command center with its wall of electronic display screens serves as the “brain” of the facility. Wrapping around its perimeter on the upper level is a glass-enclosed observation room, which also provides a view of another control room adjacent to the main operations center. NOAA primarily uses this smaller, two-story operations space, which also features a built-in display wall, when its satellites are launched into space.

On the third floor below the control rooms, racks of supercomputers and other equipment are arranged on an open floor to support the sophisticated networks required of NOAA’s satellite missions. The building is also fitted with electrical generators for emergency operations, crucial to this 24/7 mission critical facility.
The National Oceanic and Atmospheric Administration was formed in 1970 as an organization within the Department of Commerce. NOAA brought together some of the oldest agencies in the federal government. They include the U.S. Coast and Geodetic Survey, a descendent of the country’s first physical science agency; the Survey of the Coast, established in 1807 by President Thomas Jefferson; the U.S. Weather Bureau, established in 1870; and the U.S. Commission of Fish and Fisheries formed in 1871.

Over the past 35 years, NOAA has evolved into a scientific agency capable of reaching from the surface of the sun to the bottom of the sea. It has become an essential service, measuring and managing difficult environmental challenges all over the world. Today, NOAA is comprised of the National Environmental Satellite, Data, and Information Service; National Marine Fisheries Service; National Ocean Service; National Weather Service; Oceanic and Atmospheric Research; Marine and Aviation Operations; and the nation’s seventh uniformed service, the NOAA Corps.

The purpose of NOAA’s new satellite control facility is to provide timely access to global data related to weather and climate. The complex is home to NOAA’s National Environmental Satellite, Data, and Information Service (NESDIS), which manages the collection, processing and distribution of data and images produced by satellites. The prime client for this information is NOAA’s National Weather Service, which uses it to create forecasts for television, radio, and weather advisory services.

Information gathered by NESDIS is also used to detect forest fires and volcanic ash, monitor the ozone hole over the South Pole, and study oceans, coastal regions and farmland. The satellites also pick up distress signals during catastrophic natural disasters and assist in search and rescue missions.

Until the completion of the new satellite control facility, NOAA’s satellite operations were headquartered in a World War II-era building within the Federal Center in Suitland, Maryland, outside Washington, DC. This 226-acre suburban campus was established in 1941 by the federal
government to supplement federal office space within the District of Columbia. Today, the Suitland Federal Center consists of almost 3 million square feet of rentable space and accommodates a number of federal tenants, including the Census Bureau, the National Archives, and the National Maritime Intelligence Center.

The new satellite control facility and administrative offices for NESDIS are housed within a 208,000-square-foot building on 15.6 acres within the Suitland Federal Center. The control facility rises three stories above grade and the office wing extends one story above grade on its southern side. In an attempt to blur the distinction between building and landscape, most of the office space is submerged two stories underground below a shallow, concrete dome covered by waterproofing, insulation, and lightweight soil to support a grassy roof.

The cast-in-place concrete structure of the 161,000-square-foot office wing, including public conference rooms, a cafeteria and an exercise room, forms a base to the above-ground control building. Columns extend through the office wing to support the floors of the steel-framed control building.

Framing the ends of the control facility is a steel superstructure on splayed legs that supports the antennae used to receive data from NOAA’s satellites in space. The main truss connecting this structure at the top of the building is covered in fiber-cement panels. These panels are applied to the uppermost and central portion of the west façade. This side of the control building also incorporates sheathing of corrugated aluminum, which wraps around the southeast corner. The east façade is completely clad in fiber-cement panels and punctuated by horizontal strip windows.

The building is entered from the west side along a concrete ramp extending from a 56-car parking lot. Also accommodated on this side of the building are a utility area, a vehicular ramp leading to a 284-space underground parking garage, and an access area for satellite-hoisting cranes.

Inside the building, public functions, including a cafeteria, exercise area and conference rooms, are arranged off the
main lobby on the west side of the administrative offices. The two-story open office areas are sunken below the entrance level and reached by elevator and stairs. They are arranged around a square ring of support and meeting spaces, designed as a two-story structure that divides the open office areas.

Daylight within the largely underground work area is supplied by 21 circular skylights and four, glass-enclosed garden courtyards planted with gingko trees and other native vegetation. An additional courtyard flanks the entrance to supply natural light to a cafeteria and exercise room on the building’s west side. Along the southern perimeter of the office area, a window wall of insulated glass emits sunlight into the space.

The 47,000-square-foot operations division in the above-grade portion of the building centers on a pair of two-story spaces extending from the fourth through fifth levels. These mission control centers, which can be viewed from a glass-enclosed observation room on the fifth level, are used to monitor and launch satellites related to collection of weather and climate data. An entire floor of computer equipment, housed on the third level, supports their activities.

Public spaces throughout the building feature metal-mesh ceilings, concrete floors, and gypsum wall board. Installed throughout the offices and control spaces are access floors, modular carpet, and compact fluorescent lighting.
Location
A 15.6-acre site in the Federal Center, Suitland, MD

Size
208,271 Gross Square Feet
15,000 Square Feet of Public Entry Spaces and Conference Rooms
146,000 Square Feet of Above-Grade and Underground Office Space
47,000 Square Feet of Control Facility Space

Building Heights
80-Foot-High Control Facility
23-Foot-High Office Area Under Shallow Dome
14-Foot-High Office Area at Above-Ground Southwestern Perimeter

Time Frame
Design Awarded: January 2001
Final Design Approved: September 2002
Constructed Started: May 2003
Occupancy: March 2006

Parking
340 Parking Spaces
284 Spaces Underground
56 Spaces Above Ground

Foundation
Cast-in-Place Concrete

Structure
Cast-in-Place Concrete, Steel Truss System

Roof
120,000-Square-Foot “Green” Roof

Mechanical
Underfloor Air Distribution

Exterior Walls
Exposed cast-in-place concrete, aluminum and fiber-cement panels over steel

Interior Finishes
Exposed concrete, painted drywall, modular carpet
Thom Mayne founded the Los Angeles-based architectural practice Morphosis in 1972 to develop an architecture that would eschew the bounds of traditional forms and materials. Today, the firm consists of a group of more than 40 professionals who are committed to the practice of architecture as a collaborative enterprise. With projects worldwide, the firm’s work ranges in scale from residential, institutional, and civic buildings to large urban planning projects. Among its recent government projects are the new Federal Building in San Francisco, CA; Wayne L. Morse United States Courthouse in Eugene, OR; and Caltrans District 7 Headquarters in Los Angeles, CA. Representative educational projects include: the Dr. Theodore T. Alexander, Jr. Science Center School, a joint venture between the California Science Center and the Los Angeles Unified School District; the Diamond Ranch High School in Pomona, CA; and the soon to be constructed Cahill Center for Astronomy and Astrophysics at Caltech, in Pasadena, CA, and Albert Nerken School of Engineering of the Cooper Union for the Advancement of Science and Art in New York City.

International commissions include: the Hypo-Alpe-Adria Center, a mixed-use bank headquarters in Klagenfurt, Austria; Sun Tower, a retail office building in Seoul, Korea; the ASE Design Center in Taipei, Taiwan; and a social housing project in Madrid, Spain. Recent large-scale planning projects include the award-winning NYC2012 Olympic Village, and the Urbanizacion Rio Manzanares in Madrid, Spain. Over the past 30 years, Morphosis has received 25 Progressive Architecture awards, 58 American Institute of Architects (AIA) awards, and numerous other honors.

Mayne is also an educator as well as a practicing architect. He co-founded the influential Southern California Institute of Architecture and has held teaching positions at Columbia University, Harvard University, Yale University, the Berlage Institute in the Netherlands, and the Bartlett School of Architecture in London. Currently, he holds a tenured faculty position at the UCLA School of the Arts and Architecture.

In 2005, Mayne was awarded the Pritzker Architecture Prize, the profession’s highest
honor. His distinguished honors also include a Rome Prize Fellowship from the American Academy of Design in Rome (1987), the Alumni of the Year Award from the University of Southern California (1992), Member Elect from the American Academy of Arts and Letters (1992), the 2000 American Institute of Architects/Los Angeles Gold Medal in Architecture, and the Chrysler Design Award of Excellence (2001).

Mayne received his Bachelor of Architecture degree from the University of Southern California in 1968 and his Master of Architecture from Harvard University in 1978.
The NOAA Satellite Operations Facility is a singular building, with a program unique in this country.

NOAA scientists, in their role as caretakers of the earth—observing, analyzing, and quantifying geological and ecological information, look down at the world and at themselves from satellites hundreds of miles in the sky. We decided to leave the site as we found it, an open landscape with a single line of building above ground along the meridian. The NOAA project is literally engaged in the landscape, its employees inhabiting the space of the earth.

Thom Mayne
Architect, Morphosis
THE DESIGN AND CONSTRUCTION TEAM

Owner
U.S. General Services Administration
Regional Office: National Capital Region

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Morphosis
Los Angeles, California

Architect of Record
Einhorn Yaffee Prescott
Washington, DC

GSA Project Team
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W. James Hopkins (project manager)
Vince E. Matner (contracting officer)
Roger J. Perrault (reality specialist)

Design Excellence National Peers
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Garrison Architects
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Karen Van Lengen
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Construction Excellence National Peers
Frank Spears
SG Contracting, Inc.
(formerly with The Beck Group)
Atlanta, GA

Chuck DesMoineaux
Jacobs Facilities Inc.
Golden, CO

Dan Absher
Absher Construction
Puyallup, WA

Construction Manager
3D/International
Washington, DC

General Contractor
P. J. Dick, Inc.
Pittsburgh, PA

Construction Quality Manager
Jacobs Engineering Group, Inc.
Arlington, VA

Civil Engineer
A. Morton Thomas & Associates
Rockville, MD

Structural Engineer
Cagley & Associates
Rockville, MD

Electrical and Mechanical Engineer
Einhorn Yaffee Prescott
Washington, DC

Security Design
Jacor
McLean, VA

Landscape Architect
EDAW
Alexandria, VA
Public buildings are part of a nation’s legacy. They are symbolic of what Government is about, not just places where public business is conducted.

The U.S. General Services Administration (GSA) is responsible for providing work environments and all the products and services necessary to make these environments healthy and productive for federal employees and cost-effective for the American taxpayers. As builder for the federal civilian government and steward of many of our nation’s most valued architectural treasures that house federal employees, GSA is committed to preserving and adding to America’s architectural and artistic legacy.

GSA established the Design Excellence Program in 1994 to change the course of public architecture in the federal government. Under this program, administered by the Office of the Chief Architect, GSA has engaged many of the finest architects, designers, engineers, and artists working in America today to design the future landmarks of our nation. Through collaborative partnerships, GSA is implementing the goals of the 1962 Guiding Principles for Federal Architecture: (1) producing facilities that reflect the dignity, enterprise, vigor and stability of the federal government, emphasizing designs that embody the finest contemporary and architectural thought; (2) avoiding an official style; and (3) incorporating the work of living American artists in public buildings. In this effort, each building is to be both an individual expression of design excellence and part of a larger body of work representing the best that America’s designers and artists can leave to later generations.

To find the best, most creative talent, the Design Excellence Program has simplified the way GSA selects architects and engineers for construction and major renovation projects and opened up opportunities for emerging talent, small, small disadvantaged, and women-owned businesses. The program recognizes and celebrates the creativity and diversity of the American people.

The Design Excellence Program is the recipient of a 2003 National Design Award from the Cooper-Hewitt, National Design Museum, and the 2004 Keystone Award from the American Architectural Foundation.