CHICAGO BOTANIC GARDEN

Daniel F. and Ada L. Rice Plant Conservation Science Center
Fact Sheet ~ as of 6/10/09

Overall Details

- Groundbreaking on June 3, 2008; due for completion in Fall 2009
- Building area: 38,000 square feet
- Location: Southeast border of the Garden, across from the Evaluation Gardens
- Designer/Architect: Booth Hansen, Chicago
- Project cost: $50.9 million, including $10 million for endowment
- Daniel F. and Ada L. Rice Foundation made a challenge grant of $8 million for the building naming rights.
- Phase I of planned 15-acre science campus

Fun Facts about Rice Center Construction

- 6,135 tons of gravel
- 13,800 cubic yards of earth moved
- 26.5 tons of rebar (approximately)
- 1,520 cubic yards of concrete (approximately)
- 3,619 lineal feet of pipe
- 108,000 bricks
- 475 tons of structural steel, not counting decking and misc. steel stairs etc.
- 10,054 square feet of curtain wall (exterior building material)

Environmental Features

All life depends on plants. Plants provide us with everything we need to live our lives--the air we breathe, the water we drink, food, clothing, medicine and shelter. Careful attention was paid in designing the Rice Science Center to protect these precious resources.

Clean Air

Building materials were selected to have no or low Volatile Organic Compounds, such as paints and coatings, adhesives and sealants, carpet systems and composite wood and agrifiber products. Segregated areas are provided for hazardous chemicals or gases with containment drains and high level of filtration.

Encouraging Alternative Transportation

At least seven bicycle racks and two showers will be provided for staff to commute via bicycle. Signage will be added to two parking spaces for "Hybrid Vehicle Parking Only" and two parking spaces for "Carpool/Vanpool Parking Only."

Energy-Efficient Design

Careful attention was paid to selection of energy-efficient lighting, mechanical equipment, insulation of exterior walls and roof, windows with low-E and high-performance glass and air lock vestibules at all entrances.

Roof Garden and Solar Power
Light colored roofing and a roof garden (16,000 square feet) will cover over 50% of the roof area, reducing the heat island effect. Solar photovoltaic panels on the roof will provide power directly to the building.

Limit Land Impact
The design limits impact on the land by landscaping the surrounding area with native plants. The 16,000-square-foot roof gardens create additional open space.

Pollution and Waste Prevention
75 percent of the construction waste will be diverted from disposal. An erosion and sedimentation plan includes slit fencing, sediment traps and basins to prevent pollution of the surrounding area.

Recycled, Regional and Eco-Materials
20 percent recycled materials (post-consumer and half from pre-consumer) will be used in the building. 10 percent regionally extracted, processed and manufactured materials (within 500 mile radius) will be used in the building. FSC-certified wood will be used for 50 percent of the value of all wood used on the project.

Water Efficiency
A rain water glen will surround the building to collect rain water draining from nearby parking areas and filter it within the Garden's plant community. The roof garden system holds rain water to be used later by the plants. Native plants will be used in landscaping, reducing the need for irrigation by 50 percent, and no potable water is used for irrigation. The building will use 30 percent less water through selection of plumbing fixtures (low-flow plumbing fixtures and valves).

Laboratory and Facility Details

The Bridge to the Rice Science Center
The Bridge provides a connection from Evening Island to the Evaluation Garden, which is across the East Road from the Rice Science Center. Designed as a natural extension of the paths of Evening Island, the bridge will sweep up and over the water, with a bird's-eye view of the concentric beds of the Evaluation Garden, before gracefully curving down onto the eastern shoreline. Here the path will continue along the southern border of the garden, past the sun dial in the center of the garden. Constructed of wood and steel, the bridge will be twice as long as either The Arch or The Serpentine, which both lead from the Main Island to Evening Island. It is a more complex design using plant material to soften the structure which incorporates horizontal trellises upon which plant materials will fill out and spill over the beams. It will mirror the aesthetic sense of Evening Island so as to blend in and form a seamless transition to the Evaluation Garden. The walkway

will be composed of laminated wood to emphasize the curvilinear structure of the bridge. The handrail is proposed to be steel with a bronze cap, and will be both a natural support and a structure from which to view the plantings and the surrounding landscape.

Woman's Board Rain Water Glen and Footbridge
The entrance to the Rice Science Center is defined by a 40-foot long gently sloping bridge that rises from the east road. The wood bridge will have a metal railing with a sloped top rail to include interpretive messages about the Rain Water Glen that can be viewed from the bridge. Benches and planters are integrated in the bridge's design as well as indirect lighting concealed under the handrail to give the bridge a subtle glow at night.

The Visitor Gallery/Atrium
A central visitor gallery will run the length of the Rice Science Center and rise two stories to a height of 25 feet, with clerestory windows filling the space with natural light. Ribbon windows line the gallery along the first floor providing visitors the opportunity to view researchers working in the laboratories. Science comes to life in the Visitor Gallery. It is a vehicle to educate the visitor about the work being done at the Garden. In addition to observing conservation science research being conducted in the labs, hands-on exhibitry will engage visitors and provide information about the Garden's research programs and the importance of plants, and interpretive panels and interactive displays will provide information about all aspects of the buildings' green design, including energy-efficient technologies. Laboratories which can be viewed from the Visitor Gallery include (north side, from left to right) Herbarium, Plant Systematics Laboratory, Population Biology Laboratory, Ecology Laboratory and Soil Laboratory; (south side, from left to right) Microscopy Laboratory, National Tallgrass Prairie Seed Bank Preparation Laboratory, Reproductive Biology Laboratory, Economic Botany Laboratory and Plant Genetics Laboratory.

Herbarium
An herbarium is a reference collection of preserved plants complete with important data such as collecting location and date, ecological conditions and other plants found in close proximity. An herbarium is a historical record, documenting what plants grew where and when. It can be used to document when an invasive species arrived in an area, or the last documented record of a rare plant, or movements of plants due to climate change. It is useful for identifying unknown plants and describing a new plant species collected in the field, comparing unidentified plants against known species, or determining the variability between closely and distantly related plants. The herbarium collection is also a source of DNA which can be extracted from leaves or other plant material. It also allows researchers to document the specific plants that have been studied as part of a research project by creating a "voucher" specimen that can be used by future scientists to verify the identification of the plants that they studied. Additionally, an herbarium is invaluable for educational purposes such as training staff and volunteers in the identification of native plants, and for courses in plant taxonomy and morphology. It is also a shared resource that supports research projects at institutions from around the world. The new herbarium will be capable of housing hundreds of thousands of specimens, greatly expanding the Garden's current herbarium which is near capacity. The Herbarium

includes specimens from The Flora of Cook County Collection, regional flora of the Upper Midwest, plant exploration trips to Russia, Korea and China, horticultural and native plants in the Garden's living collections, research projects and a teaching collection of representative families and genera.

Plant Systematics Laboratory
Knowing the name of a plant not only allows one to list it, but also to find information on its ecology (habitat, flowering time, pollinators, etc.) Thus, it is fundamentally important when describing a plant community for ecological research or restoration activities or when preserving rare and endangered species to have correct identifications. It is also important to know how they are related to other plants from an evolutionary standpoint; i.e., where do they fit into the tree of life. Plant systematics is the study and classification of plants and leads to the understanding of how they are related to one another. All of the research activities in the plant genetics, ecology and population biology laboratories will depend upon the work that is conducted in the Plant Systematics Laboratory, connected as it is to the Herbarium. Plant systematics is used as a basis for fields as diverse as restoration, medicinal research or historic climate changes. In addition to systematic research, activities in this lab will include the preparation, mounting and accessioning of new herbarium specimens. The lab will also be a place for staff, volunteers and scientific colleagues to study the herbarium collection. The Herbarium and Plant Systematics Laboratory combined are 1,000 square feet.

Population Biology Laboratory
Rare and endangered plant species survive in part because their population size is large and genetically diverse enough to support continued reproduction and healthy populations (e.g., attract pollinators and not suffer from problems due to inbreeding). Many factors can affect their reproduction including habitat fragmentation, climate change, plant diversity, changes in pollinators and wild fires. Scientists, interns and graduate students in the Population Biology Laboratory conduct research on how these and other factors impact the genetic diversity and thus, long-term survivability of affected plant populations. The lab will contain two environmental chambers with temperature and humidity controls, as well as a dissecting scope with a camera and computer.

Growth Chambers (Not Visible from the Visitor Gallery)
There will be two growth chambers in the Population Biology and Ecology Laboratory. Each room will have controlled temperature, light and humidity to grow plants for experiments that require very specific environmental conditions and careful monitoring. Approximately 10 feet by 10 feet, the chambers are equipped with bottom lit shelving for plants on lower levels and a watering system. The rooms will be used by conservation scientists from different disciplines to grow plants being studied from seed. Plants may be in the growth chamber for their entire life cycle, which may last from a few months to a couple of years, or they may be evaluated for six months before they are set out in the field for further study. The ability to grow these plants in a controlled setting allows the scientists to study differences in plant characteristics that might predict, for example, how the plant may fare in different environmental settings with site-specific pollinators.

Ecology Laboratory
The Chicago Botanic Garden is actively maintaining, restoring and/or recreating five native habitats: McDonald Woods, the Dixon Prairie, the Skokie River corridor, the Barbara Brown Nature Reserve, and our 60-acre system of lakes. These activities teach restoration ecologists a great deal about habitat management that can be applied in other regions. The Ecology Laboratory enables scientists to study community ecology, water quality and other ecological factors important to our ability to effectively restore and manage these environments. What is learned will be shared with other organizations involved in similar pursuits. Activities will range from plant measurements to growing plants under different environmental conditions. The equipment in this lab will include several types of microscopes such as dissecting microscopes and stereomicroscopes and an automated analyzer for water and soil nutrient analyses. The combined space for the Population Biology Laboratory and Ecology Laboratory is 2,400 square feet.

Soil Laboratory and Soil Preparation Laboratory
Soil contains intricate ecological networks linking plants, soil and soil microbes. Research has documented that plants grow and survive better in soils that contain the appropriate fungi and other microbes. Proper land management and recovery of disturbed habitats depends upon our understanding of these ecological networks of soil. These laboratories will house research on the connection between soil, microorganisms and plants, how human activities are impacting these networks, and how these networks are involved with issues like carbon sequestration. Because the soil being studied contains unknown microbes, fungi and other possible contaminants, the lab must be a closed environment. The Soil Preparation Lab is the area of entry where the soil can be processed before it comes into the Soil Lab. Combined, these two labs cover 1,200 square feet in the Rice Center. The Soil Lab contains a fume hood, which is designed to capture contaminants that are then captured and filtered out so as not to get into the ventilation systems of other laboratories.

Seed Quarantine Chamber (Not Visible from the Visitor Gallery)
After seeds are collected, they are placed in the Seed Quarantine Chamber to ensure that no pests or diseases will infect the established collection. At this stage the seeds begin the initial drying and cooling process. The seeds are separated from the fruit and examined to ensure that insects and debris are removed. The room's temperature is kept at about 50 degrees Fahrenheit with low humidity to discourage mold and other fungi. This promotes the longevity of the seed and provides safe, short-term storage until the seeds can be used immediately for restoration or research activities or proceed to the National Tallgrass Prairie Seed Preparation Laboratory to be cleaned, packaged and frozen.

National Tallgrass Prairie Seed Bank Preparation Laboratory
After seeds are collected and quarantined in the Seed Quarantine Room, they are brought into the National Tallgrass Prairie Seed Preparation Laboratory. Here, healthy seeds are separated from other plant material. The seeds are cleaned and analyzed for moisture content, weighed and counted. The room is isolated from the other rooms in the seed banking process and has an area with a fume hood to ensure that any contaminants are sequestered and filtered out. At this point, about 25 seeds are sent to the Reproductive

Biology Laboratory where they are germinated to ensure that they are viable. The remaining seeds are slowly dried to 15 percent humidity and 58 degrees Fahrenheit. They are then carefully labeled and packaged in large, heat-sealed foil containers before being stored in the Dixon National Tallgrass Prairie Seed Bank at -20 degrees Celsius. From the field to the freezer, the process takes approximately 6 months.

Dixon National Tallgrass Prairie Seed Bank (Freezer Door Is Visible from the Visitor Gallery)

The Dixon National Tallgrass Prairie Seed Bank safely houses the seeds collected as part of a conservation project of the Chicago Botanic Garden aiming to collect and store the seeds of the tallgrass prairie region flora. Between 2003 and 2009, the Chicago Botanic Garden has committed to collect 20,000 seeds from 1,500 native species across the Midwest, with an emphasis on tallgrass prairies species, with the goal of conserving prairie plants before they become further imperiled. The goal of the seed banking project is global in scope. The National Tallgrass Prairie Seed Bank, in association with the national Seeds of Success (SOS) program, is part of an international seed conservation initiative collectively known as the Millennium Seed Bank Project (MSBP), originally developed by the Royal Botanic Gardens, Kew, in the United Kingdom. This global program aims to bank 10 percent of the world's flora by 2010 for long-term storage and conservation. Seed banking — conserving and storing species away from their original habitats — enables plants to escape threats imposed by destructive habitat changes including urbanization, climate change, invasive species, overharvest, and pollution. The National Tallgrass Prairie Seed Preparation Laboratory and Dixon National Tallgrass Prairie Seed Bank are 1,000 square feet.

Reproductive Biology Laboratory

For a seed bank to be successful we must know how long seeds remain viable after they have been placed in the seed bank and we must understand conditions under which seeds germinate. This 700-square-foot lab is where scientists and graduate students will study such factors as seed germination, reproductive biology (pollination), and the quantity of seeds produced by different species. Here, scientists will better understand reproductive success and population stability in a number of rare and endangered plant species. Seeds can be germinated, grown and analyzed for genetic differences and viability. Samples of seeds stored in the Dixon National Tallgrass Prairie Seed Bank will be regularly tested to see that they will still germinate, and to determine the rate of decline of viability over time. If it is determined that viability has started to decline, the seeds can be replaced with new collections. Alternatively, we may take existing seeds out of the Seed Bank, grow them, harvest new seeds and replenish the seed bank collection.

Economic Botany Lab

Economic Botany examines the complex relationship between plants and people. The field explores the cultural uses of plants to determine which could be exploited for medicines, industrial use, or new food crops. In addition, some researchers in this area document the geographic origin and wild relatives of crop plants to aid in plant breeding programs and to develop strategies for the sustainable use of plant resources. Economic botanists often investigate the chemistry of particular plants to assess the potential

medicinal properties or economic benefits of selected species. Initial chemical screening can occur in this lab as part of collaborative research with major centers at universities and/or private and federal laboratories. New uses may be discovered from the plants we are conserving.

Plant Genetics Laboratory
As increased understanding of the molecular genetics of rare and endangered plants is gained, populations of these plants, and the community that they grow in, can be better managed and preserved. One of the many scientists and graduate students who will use this laboratory is Dr. Jeremie Fant, a conservation scientist in molecular ecology population genetics. Dr. Fant uses a combination of molecular and quantitative techniques to better understand the level and distribution of genetic diversity within rare and endangered species. One of his projects has been the reintroduction of the Pitcher's thistle to the Illinois Beach State Park, a species once extinct in Illinois. He studies the manner in which evolutionary forces like adaptation and migration shape the patterns of biodiversity and how these natural processes continue despite disturbances to habitats. The Plant Genetics Laboratory will house specialized equipment such as a DNA sequencer and centrifuge that will be used by graduate students, interns and scientists who utilize molecular biology techniques in their research. The Economic Botany Laboratory and the Plant Genetics Laboratory are 2,000 square feet.

Additional Areas in the Rice Science Center

Academic Seminar Suite
One large room with a retractable wall which can be used to form two smaller rooms comprises the Academic Seminar Suite. Classes held through the Garden and Northwestern University joint MS and PhD programs in Plant Biology and Conservation as well as some classes through the Regenstein School of the Chicago Botanic Garden will be taught here. Additionally the suite will be a place where scientists will gather to discuss their research and other topical subjects with their peers. Seminars, meetings and programs will be conducted and visiting scientists will have space to meet with their colleagues. When fully open, the 800-square-foot suite will have space for 70-80 people in a lecture style seating arrangement. The room will have a conference table and state of the art audio-visual equipment for presentations.

Lenhardt Library - Rice Science Center
The Lenhardt Plant Science Library will house scientific journals and books. It will include an information desk, a large compact shelving unit, shelving on the outside walls under the windows, one work table for six, two computer stations, two lounge seats and a table. The space is 1,200 square feet. The main Lenhardt Library is located in the Regenstein Center.

Roof Garden Staircase

At the east end of the Visitor's Gallery, a "monumental" staircase will rise to the second level of the Rice Center. In keeping with the feel of the building, the glass, stone and metal stairs will have an open and contemporary design with one landing. The stairs will lead to an interior space at the roof level containing a conference room and inner corridor that will overlook the Visitor's Gallery and out to the Roof Gardens. At either end of the East hallway, doors will allow access to the Roof Gardens.

Roof Garden Overlook and Conference Room
With a view over the East Entrance Terrace and Garden, the Roof Garden Conference Room will be an elegant venue for meetings and small gatherings and events. The 450-square-foot space will have state-of-the-art audio-visual equipment for presentations. The glass walls will allow slotted views out to the Roof Gardens on the west side. The Roof Garden Staircase ends on the second level at the Roof Garden Overlook. This area is adjacent to the Roof Garden Conference Room and also expands north and south to glass doors that lead to the decks of the Roof Gardens. It will contain interpretive panels educating visitors about all aspects of the building's green design. From the Overlook, there will be a dramatic view back down to the Visitor Gallery, out to the Roof Gardens and west toward the Evaluation Garden, the Dixon Prairie and Evening Island.

Roof Gardens North and South
Crowning the new Rice Center will be two rooftop gardens, on either side of the atrium clerestory. Each side of the roof is designed as a demonstration garden representing the currently accepted best plants for roof top gardening. The gardens will be a beautiful display reflecting the talents of the horticultural staff at the Chicago Botanic Garden. Additionally, each side is an evaluation garden for roof top garden plants - a site for rigorously studying the adaptability of plants on a roof to ultimately increase the diversity of plants currently used in this extreme type of setting. Plants native to this region and elsewhere in North America will be studied. The roof will be a living classroom for visitors offering them the opportunity to learn the best materials and practices used in roof top gardening and the extent to which a roof top garden can ameliorate air pollution, the urban heat island effect and non-point source pollution caused by storm water runoff.

East Entry Terrace and Garden
For staff, visiting colleagues and volunteers arriving by car, the primary entrance to the Rice Science Center will be on the east side of the building. The stairway leading to the glass curtain entrance will be flanked by walkways along the building edged with a landscaped berm and understory plantings. These gently upward sloping walks provide an ADA accessible entrance. Trees will adorn the east wall next to the walkway.