



From left: Rough Brothers president Albert Reilly, USBG executive director Holly Shimizu, USBG facility manager Robert Pennington, and Rough Brothers vice-president Richard Reilly.

GG's exclusive story behind the historic reopening of the United States Botanic Garden.

A National Treasure Reborn

SPECIAL FROM THE GG EDITORS

EIGHT and a half stories of mint-new, yet historic, greenhouse conservatory once again tower above the National Mall in Washington, D.C., serving as the national horticultural beacon. In December, the renovated United States Botanic Garden (USBG)

opened its doors to the public for the first time in four years. The beloved landmark's rebirth marks the most meaningful greenhouse renovation project in the past 75 years.

Run down by the normal toll that time and heavy usage invariably take on a greenhouse, the iconic conservatory had been completely closed to the public since September 1997.

"When it was finally shut down, the botanic garden looked more like a surreal movie set than a conservatory," said one on-site observer. "The buildings were deserted, plants and weeds were growing through the glass, squirrels ran about. It looked like an end-of-the-Earth type of thing."

Truly, the story behind the actual rebuilding and renovation of the conser-

vatory is as exciting as the 4,000-plus varieties that are once again environmentally protected in the glass and aluminum structure.

In its newest state, the 68-year-old landmark had to be capable of safely and efficiently hosting more than one million visitors a year while nurturing horticulturally diverse plant themes such as World Deserts, Oasis, Plant Adaptations, and the Garden Primeval. The latter is a recreation of a primeval forest as it might have appeared in the mid-Jurassic period of the Mesozoic era. Plants include mosses, ferns, and cycads, all of which are shown in their natural environments.

In addition, themes connecting plants to humans such as medicinal plants, rare and endangered species, plant exploration, and exotic orchids each required a technical sensitivity above and beyond standard greenhouse structure criteria.

"The plants in the United States Botanic Garden are both wide-ranging in their origin and in their respective types," says USBG executive director Holly Shimizu. "The plants on exhibit adhere to our formalized collections policy and are meant to be educational and of a particular horticultural value."

For example, at any one time the USBG shows about 2,000 orchids, which are rotated from an inventory of 16,000 orchids maintained in off-site greenhouses. These selections are the best of the hybrids, as well as the species, and are chosen to tell a story about why orchids are important to society.

Taking The Challenge

Rough Brothers, Inc., the Cincinnati-based greenhouse structure manufacturer, was selected as one of the primary guardians of the national USBG trust, being the successful bidder for the frame restoration and glazing segments of the



Left: More than 20,000 panes of glass were installed in the conservatory. Shown here is the Palm House.

Below: The U.S. Capitol, which appears to grow through the roof of the conservatory, is a short walk from the USBG.

project. Specifically, Rough Brothers' involvement entailed reglazing the entire conservatory, adding structural materials such as purlins, designing a new shade system, installing ventilation equipment, and installing insect and bird screens. The total building and renovation project is, by far, the largest contract undertaken by any greenhouse manufacturer in 50 years.

"The initial bid preparation for a job this monumental – and complex – was quite extensive," says Richard Reilly, Rough Brothers' vice president. "It took three of our people – myself, institutional senior project

manager Mike Ward, and former Rough project manager Jim Smith – working for a solid month to develop a bid with which we were both comfortable and competitive."

The overall USBG renovation was estimated at approximately \$33.5 million, of which Rough Brothers bid on an \$8 million portion.

Any critical mistakes or oversights in the estimations could have been financially devastating, Reilly says. Based on initial conversations with USBG sources, including the Architect of the Capitol (AOC) and general contractor Clark Construction Group of Bethesda, MD, Reilly says he thought the project would present unprecedented challenges.

"Once we got the assignment, we realized that the most difficult part still laid ahead: successfully restoring one of the most historically significant structures in the nation's capitol," he says.

"Our 'customer' was not a single entity but the entire populace of the United States. Our job was to do something that in many respects had never been technically accomplished before."

Renovation talks went back more than 10 years, initially consisting of feasibility discussions involving Rough Brothers officials and AOC architects. These included temporary enclosure issues to ensure the environmental protection of the thousands of invaluable live plants, and also the safety of the large number of visitors to the facility.

Ultimately, the commitment to proceed with a major overhaul of the 52,000-square-foot botanic garden was finalized in 1997, a



Congressional decision spurred by the closing of the attraction for safety reasons. The authority from Congress was decisive and inclusive: restore the USBG's conservatory to its initial condition when it was first built as a post-Depression Works Progress Administration project in 1933.

The unique Deco design, a combination of Victorian curvilinear frame and modernist neo-classic government-style building forms, would once again grace the Washington Mall as the spectacular focal point among such attractions as the Smithsonian Air & Space Museum, the White House, the Lincoln and Washington monuments, and the National Gallery. The Capitol itself practically sits within the figuratively long shadow cast by the USBG.

Focusing On Excellence

Through its conservatory restoration division, Rough Brothers put together a dedicated team of four key design and structural experts to work exclusively on the USBG project. The project's conceptual plans had taken the AOC nearly 12 years to complete, working in cooperation with the Los Angeles-based architectural firm Daniel, Mann, Johnson & Mendenhall. From those plans, Rough Brothers developed its specific design strategy.

A look at the project details helps put the magnitude of the renovation in perspective. For example, the initial set of drawings produced by a three-man Rough Brothers team working full-time for an entire year was budgeted at nearly \$300,000 – more than the actual total cost of many large commercial greenhouses. On-site construction labor was budgeted by Rough at 47,880 man hours in part to put up 20,957 panes of glass. These panes are held in place in part by 82,000 feet of bedding sealant – an amount that would stretch nearly to outer space if placed end-to-end. Helping hold things together are more than 20,000 barcaps and 60,000 barcap screws. The skeleton of the Palm

Rebuilding History: The USBG Dream Team

The renovation work involved in the recently re-opened United States Botanic Garden (USBG) in Washington, D.C. is widely considered by horticulturists, architects, and contractors to be the most significant undertaking of its kind in the past 75 years. Here's how the project came to fruition, and the companies and people who put the USBG pieces back together again.

Based on a recommendation in 1997 from the Architect of the Capitol's (AOC) Alan Hartman, Congress approved a \$33.5 million rebuilding and renovation overhaul of the landmark USBG. Incidentally, the Architect of the Capitol governmental department was mandated in 1793 and has architectural accountability for virtually all government buildings at Capitol Hill, statues, and other attractions.

Working on the USBG project for the AOC were Joseph Metzler, project manager, and Roy Coffey of the project management division. The architectural firm of Daniel, Mann, Johnson & Mendenhall (DMJM) was hired as structural engineer, with DMJM's Andrew Sauvage functioning as associate principle of structural engineering, along with Michael Brainerd, structural engineer. The Clark Construction Group, Bethesda, MD, was employed as general contractor, with Joe Ockershausen as project manager and Kevin Sullivan as superintendent.

In late 1998, Rough Brothers won the subcontractor bid to rebuild the main Palm House portion of the USBG and to reglaze the entire conservatory. The project also included the design and installation of new shade and ventilation systems, and additional work relevant to the bid. New environmental control systems, also included in the contract, were subcontracted to Argus Controls.

Rough Brothers named Iain Gray site construction manager; Ben Urbanek and Dale Scholer initial project designers; and Eric Ford, project manager. Rough's Richard Reilly prepared the initial technical proposal, based on estimates supplied by Rough project managers Mike Ward and Jim Smith. Pat Long, Rough Brothers' institutional/conservatory project manager, functioned as general project overseer.

By the official opening to the public on December 11, 2001, approximately 80% of the plants were in place, carefully nurtured by a full-time staff of 10 headed by USBG executive director Holly Shimizu, horticulture manager Robert Pennington, and operations manager John Gallegher.

The United States Botanic Garden is located on the National Mall at the foot of the U.S. Capitol. The address is 100 Maryland Ave. SW, Washington, D.C. 20515. Admission is free. For more information, call 202-226-4082.

House's rounded dome was completely replaced by an aluminum alloy infrastructure specifically reproduced to match the original aesthetics. The greenhouse structures surrounding the central Palm House – the USBG's 87-foot-high central greenhouse – were sandblasted, treated with rust inhibitors, and totally reglazed.

Visit The USBG

The USBG reopening is sure to



Rough Brothers completely restored the USBG's Palm House.

spark consumer demand in plants, says Rough Brothers' president Al Reilly. "The renewed interest in public conservatories generated by the USBG's high profile can only benefit the horticulture industry," he says. "That fact alone should help drive plant sales."

For more information on the USBG, contact Christine Flanagan at 202-225-1269, e-mail cflanaga@aoc.gov, or visit www.nationalgarden.org. **GG**