



## ROOFTOP GREENHOUSE (BSL-2)

**BUILDING:** Biological Sciences Learning Center & Knapp Research Complex

**OWNER:** University of Chicago  
Chicago, IL, USA

**CLIENT:** Loeb Schlosman & Hackl  
Chicago, IL, USA  
Mr. Kenneth Yliniemi

**AREA:** 11,860 sf

**COMPLETION:** 1994

This project is located on the roof (6th floor) of the Biological Sciences Learning Center of the University of Chicago. The \$51.5 million, 240,000 sf structure houses genetics and molecular labs, a medical research building and the rooftop drug research greenhouses.

A third of the budget went to mechanicals, which had to be slipped into tight space and handle air flow without contamination between facilities. The project received top billing from the American Consulting Engineers Council and received one of six (6) Honor Awards for projects in the State of Illinois.

Agritechnove was responsible for the complete design of the 11,860 sf rooftop greenhouse, five (5) large size highly specialized custom growth chambers and participated in the design of the mechanical support space and headerhouse, both located under the greenhouse, on the fifth floor. The design called for BSL-2 requirements and had specific architectural constraints modifying standard ways of designing greenhouse systems. The greenhouse has 9 compartments of 1,800 sf and 500 sf as well as 5 custom growth chambers, each 240 sf. This space is completed by 10 ft wide corridors allowing easy circulation.

**SPECIAL FEATURES** - One zone includes very high lighting levels and wide temperature range. Two zones are air-conditioned and provide very accurate temperatures from the bench top up to 4 ft above in the range of 15°C to 25°C. One zone is fitted with specially designed black-out benches and ebb & flow benches, all under computer control. One plant propagation zone is fitted with automatic soil temperature control. Natural ventilation is used in conjunction with automatic shading and fogging to minimize the use of forced air system. Fresh air is introduced through corridors and from there to the greenhouses. Other features are: vertically moving sash panels allowing fresh air in the greenhouse without obstructing corridors (now a standard for the manufacturer who built the greenhouse), directed AC air flow (air released underside benching, moves up vertically at very low velocities), unique probe hook-ups, highly controlled high light-high heat growth chambers (15-25°C) including one for virus research that generates high humidities and special lighting. High airtightness was called for, measured during commissioning and achieved.



**TECHNICAL SYSTEMS** - Over 400 points distributed DDC control system with greenhouse designed software. All greenhouse and growth chambers functions are tied to this system. Special double-line insect screening and natural ventilation. HID lighting, automatic CO2 injection, automatic irrigation and fertigation, fogging system, rolling benches, 2-step modulating hot-water heating system, modulating ventilation systems, shade/energy curtains, dry-pipe fire sprinkler system, all piped services and electrical/control conduits precisely located and hidden (embedded in concrete) whenever possible. Not a single glass perforation for mechanical/electrical systems. Shade studies conducted to verify shaded parts of the greenhouse during the year.

**CONSTRUCTION PHASE** - The design was on a fast track, construction started before the top floor design was complete. This added to the complexity of the project.