



Juliet Rice Wichman Botanical Research Center

Kalaheo, Hawaii

DEAN SAKAMOTO ARCHITECTS

Despite sitting squarely in hurricane territory, the island of Kauai has very few buildings made almost entirely from concrete. But in 2003, when architect Dean Sakamoto was asked to complete Vladimir Ossipoff's original master plan for the National Tropical Botanical Garden (NTBG) by designing the Juliet Rice Wichman Botanical Research Center, concrete was the best option. "The building had to be lean [financially], but had to be a 100-year building, and also needed to withstand hurricanes," says Sakamoto, describing just a few of the structure's requirements. The final design is a two-level structure cut into a hill above the garden—the building's second level is all that is visible from the street.

It was during the construction process, however, that Sakamoto's team learned at least one of the reasons concrete is used so sparingly in the environment: The island has only one ready-mix plant, and only 10 cement trucks that carry 10 cubic yards apiece, meaning that the 320-cubic-yard pour that had to be completed for the building's second-story floor plate required a carefully choreographed train of trucks going back and forth from the site to the plant, hoping that the traffic gods were with them.

Despite the unconventional pour, the concrete helped meet another requirement for the design: earning LEED Gold certification. Committed as a LEED building from the start, the research center is the first green building on the island and was a learning process for the client, the craftspeople, and the architect himself. "I introduced them to LEED," says Sakamoto. "I hadn't done a LEED building before, but I was a member of the U.S. Green Building Council."

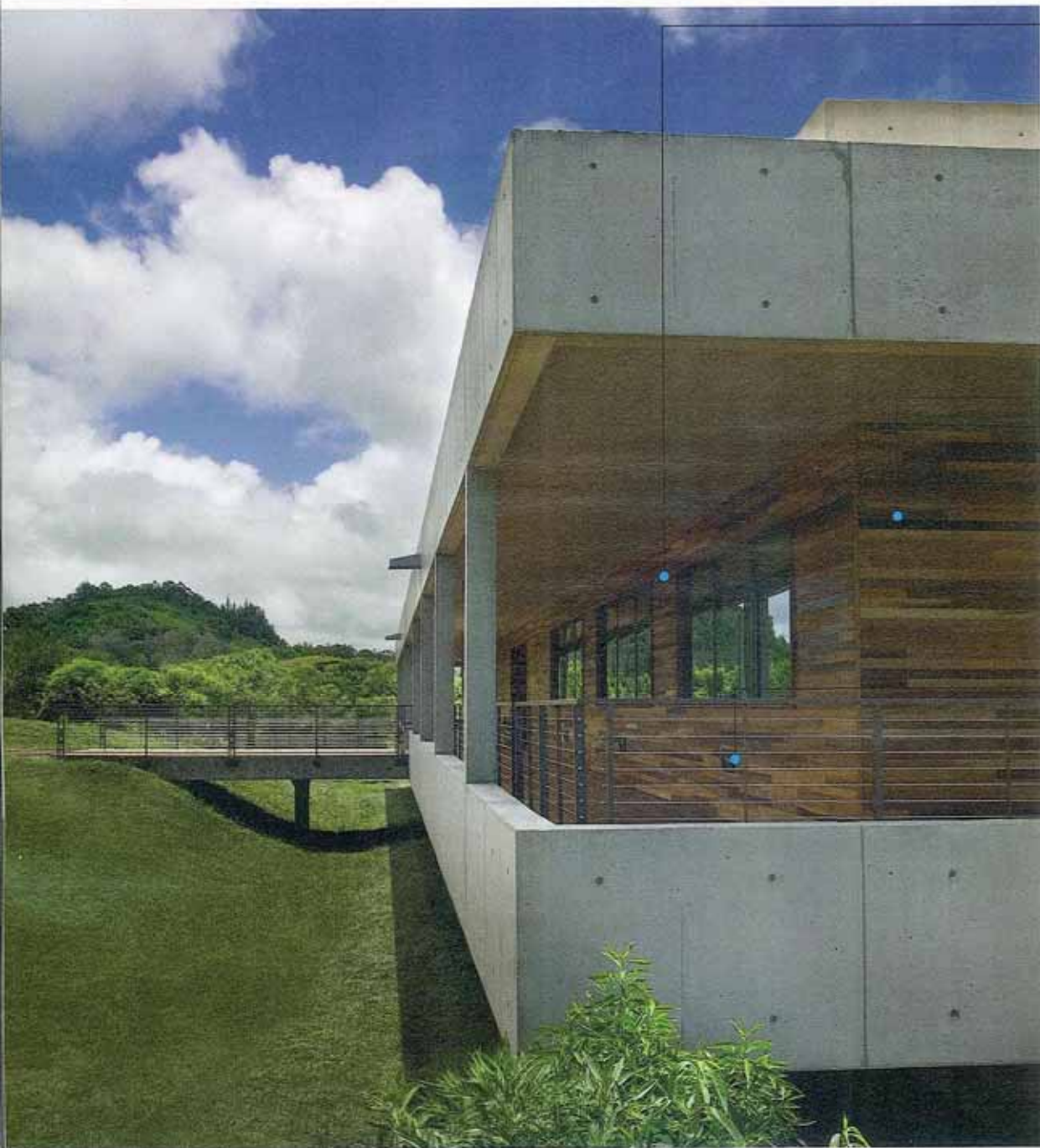
To maximize the building's sustainable potential, a photovoltaic (PV) array on the roof contributes to the

building's energy load. "PV panels are fused to the roof," says Sakamoto. "The perimeter of the panels has a fringe that is the same material [as the roofing membrane], so the panels were heat-welded to the roof. This avoids points of penetration, and the panels don't act as sails in high winds."

The PV panels are part of a larger active roof system that allows light penetration into the building through skylights and collects rainwater. The rainwater collects and moves quickly across the TPO roofing membrane and collects in a 25,000 gallon cistern. "The garden has a real issue," says Sakamoto. "The existing irrigation system doesn't have enough power to push water up the hill. Now, the spigot can be opened, and gravity takes the water to the garden below."

On the building interior, the architect kept materials to a minimum, including staining the concrete floor with Lithochrome Chemstain from Scofield Systems instead of installing carpet or hardwood. Wherever possible, glass separates the enclosed spaces so that views are maintained and light can enter. The spaces are open, allowing the NTBG to install shelves to hold the 56,000 plant species that constitute the institution's herbarium. A rare-book room on the lower level holds one of the nation's largest collections of antique botany books, the bequest of which sped up the building's timeline. An HVAC system maintains humidity levels throughout, combatting the moist tropical air. "The building is basically hermetically sealed," Sakamoto jokes.

Sakamoto credits careful planning for keeping the project on track. And on track it was—the idiosyncrasies of using concrete on an island aside, the building was completed two months ahead of schedule and \$500,000 under the \$11 million total budget.



World Mix reclaimed hardwood siding
 TerraMai
terramai.com
 Wood is sourced from discarded tropical hardwood shipping crates • Milled with a shiplap profile with a 1/4-inch reveal • Mix includes wood species such as balau, pyinkado, mempering, bintagor, agofo, rengas, mertas, simpoh, and thitka • All wood is FSC-certified recycled • Standard dimensions are 2 1/2 inches wide and 3/4 inch thick • Comes unfinished • Circle 535

Sun-Proof clear exterior wood stain
 Pittsburgh Paints
pittsburghpaints.com
 Provides UV protection for wood • One-coat coverage • Available in acrylic/oil and alkyd/oil formulations • Can be used on new, weathered, and pressure-treated wood • Acrylic can be cleaned up with soap and water • Circle 536

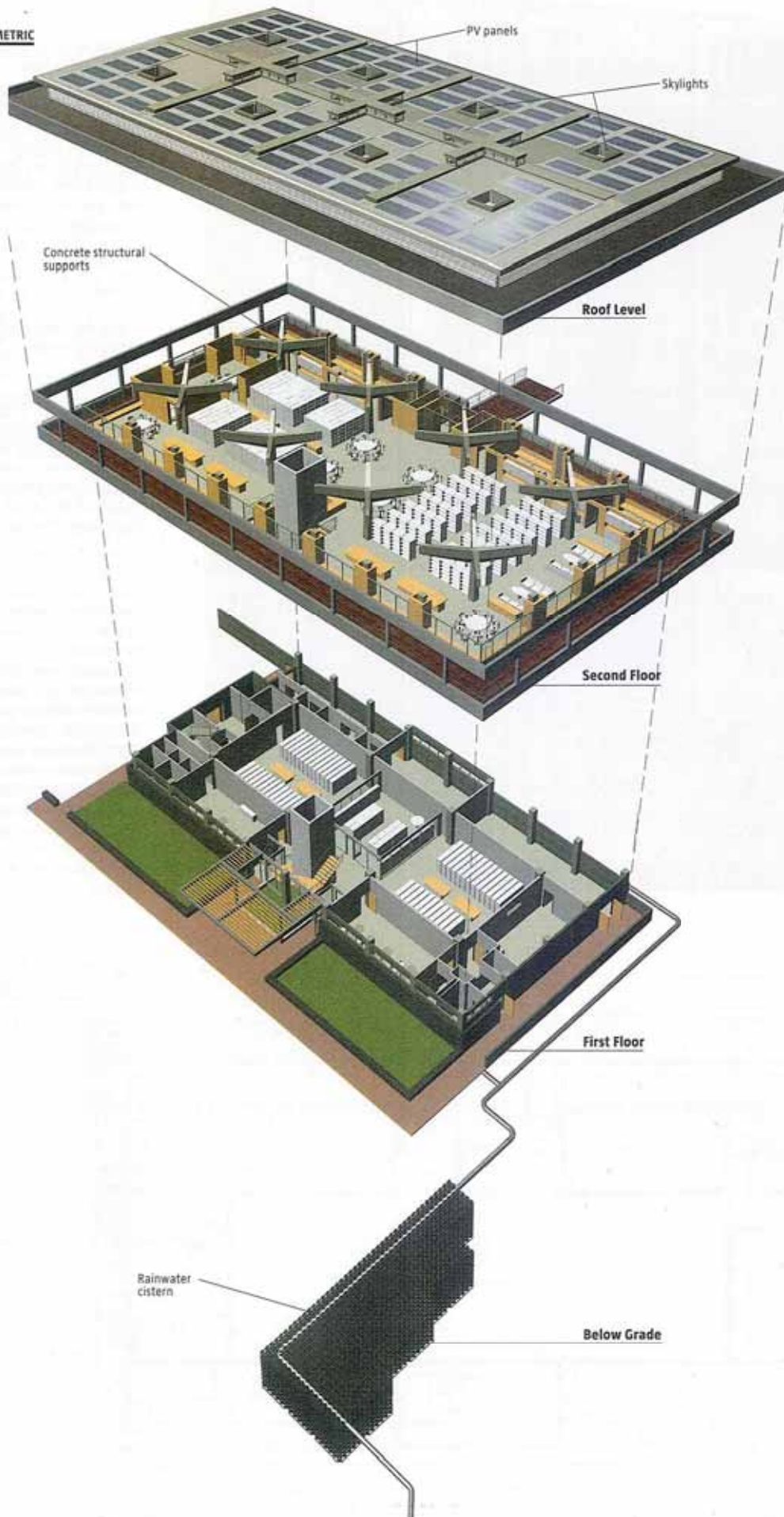
Sightlines recessed lighting fixture
 Rebelle Architectural Lighting
rebellectlighting.com
 Three lines available: Maxi, Midi, and Mini • Cast-aluminum housings • Fixtures are fully gasketed and are available with tamper-resistant hardware • Available with metal halide, high-pressure sodium, and compact fluorescent sources • Round and rectangular profiles • Addresses needs for low-level area lighting and recessed and compact step and path lighting • Circle 537



PowerGate Plus photovoltaic system inverter
 Satcon Technology Corp.
satcon.com
 11 models available, ranging from 30 KW to 1 MV • All models feature a maximum power-point tracking system that can improve performance by up to 20 percent • Can be specified in conjunction with PV View Plus, an integrated monitoring system to track power levels and variables systemwide • Maximum array input voltage is 600 volts, DC power • Circle 538

Because the structure is built into a hill, there are entries on the first and second floors, with the latter accessed by a pedestrian bridge (above). To maximize the use of the surrounding tropical environment, the architects included a lanai where workers can relax or hold meetings. Likewise, the flat roof surface became a platform for a vast solar array that contributes to the building's energy load (right).

AXONOMETRIC



Dean Sakamoto
Principal
Dean Sakamoto Architects

PROJECT Juliet Rice Wichman Botanical Research Center
LOCATION Kalaheo, Hawaii
CLIENT National Tropical Botanical Garden—Charles R. Wichman Jr. (chief executive officer and director)
ARCHITECT Dean Sakamoto Architects, New Haven, Conn.—Dean Sakamoto (principal); Kenneth Kajiwara (associate); Jim Reilly (job captain); Amado Aquinaldo, Ann Cassidy, Christopher Dial, David Ainsworth, Elizabeth Bishop, Jeff LeMay, Jing Huang, Jing Lin, Jordan Barr, Karl Mascarenhas, Lindsay Suter, Margo Angelopoulos, Mo Lee, Nathan Herrero, Nicholas Stout, Reuben Herzl, Steve Ybarra, Wael El Dasher, William Douglas Matthew (project team)
LEED COMMISSIONER Air Balance Hawaii
GEOTECHNICAL CONSULTANT Masa Fujioka & Associates
M/E/P CONSULTANT Steve Winter Associates
MECHANICAL CONSULTANT Southport Engineering Associates
ELECTRICAL CONSULTANT PC Aero-Electric
LEED CONSULTANT Viridian Energy & Environmental
CIVIL ENGINEERING CONSULTANT Wagner Engineering
STRUCTURAL ENGINEERING CONSULTANT Schlach Bergermann und Partner
STRUCTURAL ENGINEERING CONSULTANT William Blakeney Inc.
ACOUSTICAL CONSULTANT Cavanaugh Tocci Associates
LIGHTING CONSULTANT Atelier Ten
LIGHTING CONSULTANT Eron Ashley
COST ESTIMATOR CONSULTANT Rider Hunt Levett & Bailey
GENERAL CONTRACTOR Unlimited Construction Services
SIZE 20,000 square feet
COST \$10.5 million



Mini Forecast series linear fluorescent fixture
 Forum
forumlighting.com
 Available in 2-, 3-, 6-, or 8-inch widths • The 3x3 series permits T8 lamping options in addition to T5 and T5HO • Blade baffles or flat and linear lenses can be incorporated • Can be used as a direct, indirect, or indirect/direct fixture • Circle 539

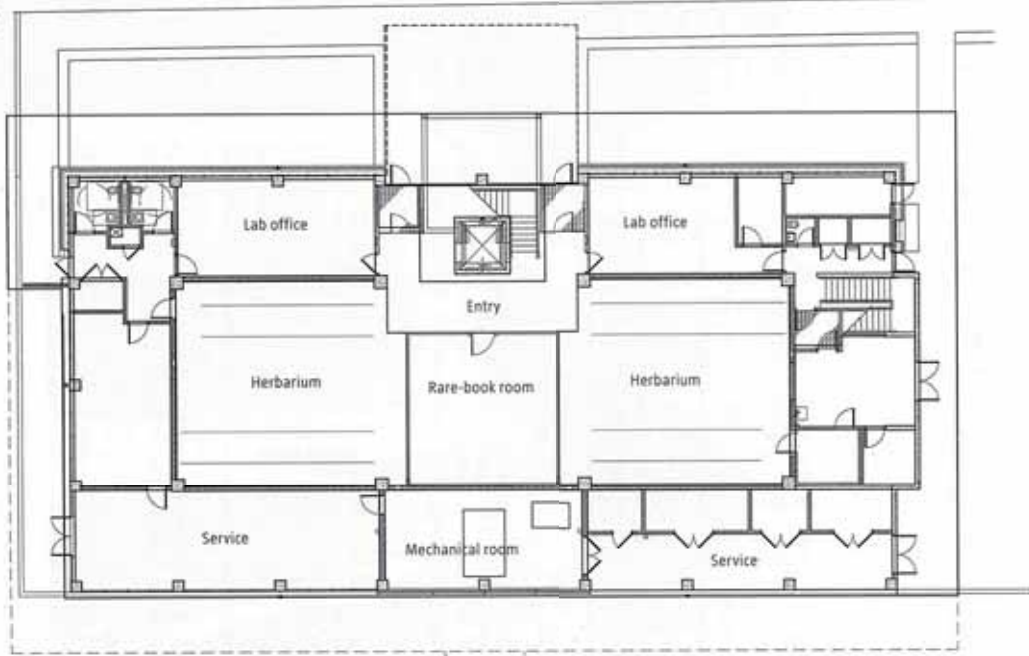
SentryGlas Plus exterior glazing interlayer
 DuPont
dupont.com
 Stiffer than PVB • Comes in four thicknesses • Remains free of clouding over time • Can be specified with reflective coated or low-E glass • Patterns available in SentryGlas Expressions • Circle 540



Acoustical ceiling panels
 Tectum
tectum.com
 High-impact wood fiber panels
 • Abuse resistant • Can be installed in a grid system or direct-attached • Available in unpainted natural, white, or custom colors • R-value is 1.75 per inch • Light reflectance is up to 0.75 • Available product lines include lay-in, Tónico, Multiplane, V-line, and Designer Series panels • Circle 541

Concrete is visible in every room of the building, from the floors in the herbarium that will hold shelves of plant samples (above) to the support columns throughout (right). But despite the fortresslike construction, ample glazing and skylights let natural light filter through the second story (opposite).

FIRST FLOOR

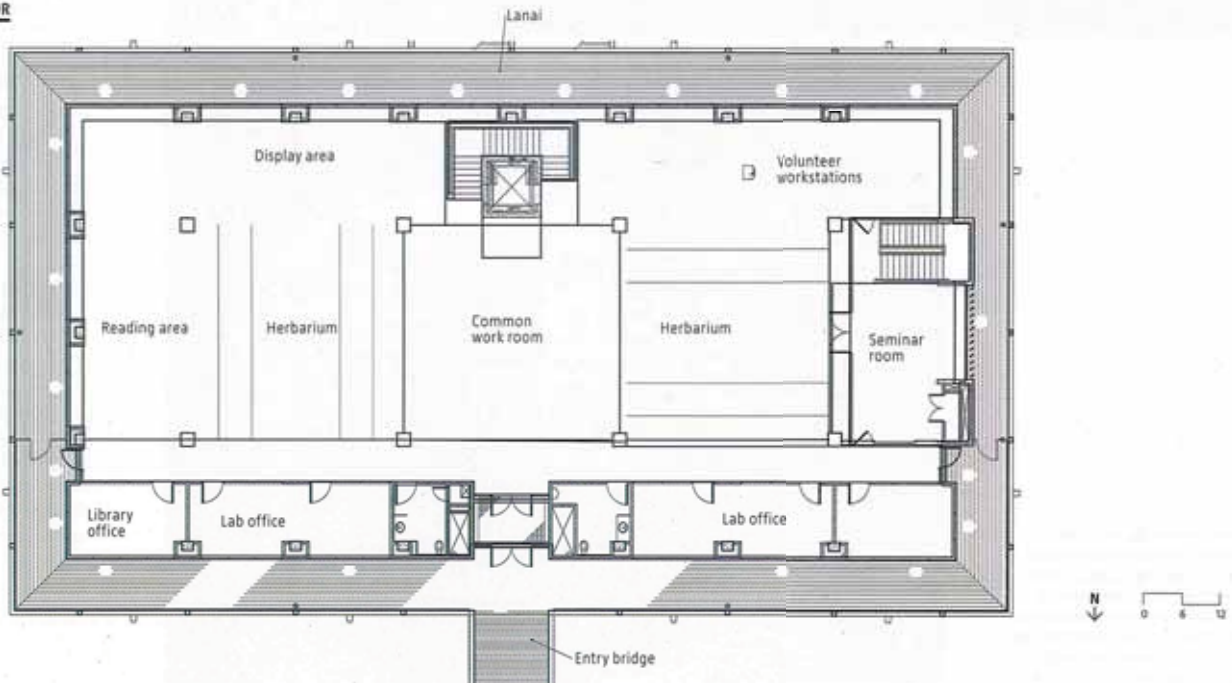


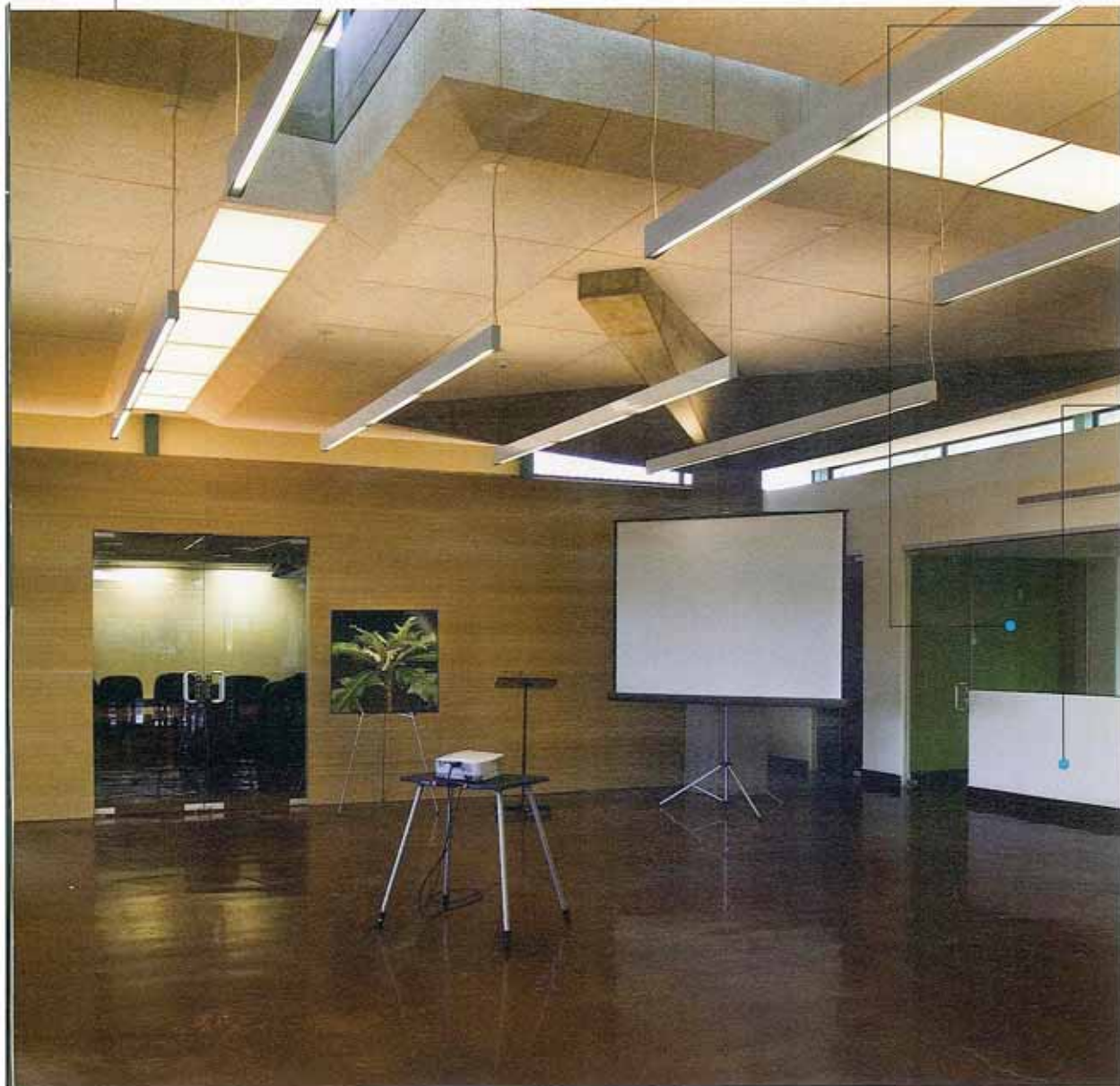
SmartOne intelligent smoke detector
 Fenwal Protection Systems
www.fenwalfire.com
 Three types of detection available: ionization, photoelectric, and thermal • Built-in microprocessor allows detectors to communicate with one another across the system, sounding a general alarm if smoke is detected at one point • FailSafe system redundancy • Automatically returns to prior programming after system gives all-clear • SmartOne system includes detectors, contact input and relay output devices, signal module, air duct smoke detectors, and heat detectors • Circle 542

Nova T lighting controls
 Lutron
lutron.com
 Line of matching lighting controls, fan-speed controls, and accessories • No visible metal heat sink • Power failure memory • Heavy-duty components offer security against power surges • Incandescent and fluorescent dimmers and general switches available • Seven plastic wallplate colors, three metal and five specialty metal wallplate finishes, and three anodized aluminum wallplate options available • Circle 543



SECOND FLOOR





F-Style interior glass door
PRI Glass Systems
priglass.com
 Heavy-glass door series • Corner patch rails available in polished or satin-finished stainless steel or brass, and anodized painted finishes • Metal push/pull hardware available in several standard finishes, and custom finishes • Glass options include 1/4- to 3/4-inch laminated or tempered glass and 1-inch insulated glass units • Aluminum header and pivot system • Circle 544

ProRoc moisture- and mold-resistant gypsum board
CertainTeed Corp.
certainteed.com
 Water resistant • Sheets measure 1/2 inch thick and 4 feet wide • Standard lengths are 8 and 12 feet • Tapered edge detail • Special widths and lengths are available by special order • Face paper is water resistant and can be directly painted or prepared for laminate or wallpaper • Framing locators provided for quicker application • Meets ASTM C 1396 and C 840 standards • Type X board has a fire-resistant core • Circle 545



Lithochrome Chemstain
Classic concrete floor stain
Scofield Systems
scofield.com
 Penetrating concrete stain provides permanent translucent color • No chipping or peeling • Multiple applications can intensify color • Can be applied with acid-resistant hand-pump sprayers • Should be used in conjunction with a concrete sealer to protect surface • Available in eight standard colors, with color variation if applied with Lithochrome Color Hardener • Average coverage is 200 to 300 square feet per gallon per coat • Circle 546

A seminar room is located outside what is now the herbarium (above) to accommodate education sessions and meetings. And at the heart of the building is the rare-books library (right), which contains one of the largest collections of antiquarian botany books in the country.

Structure

Titan HV formwork • Titan Formwork Systems • titanformwork.com • Circle 547

Concrete • Glover-Honsador • gloverltd.com • Circle 548

Eucon 37 water-reducing admixture • The Euclid Chemical Co. • euclidchemical.com • Circle 549

Building insulation • CertainTeed Corp. • certainteed.com • Circle 550

Vapor barrier • DuPont • tyvek.com • Circle 551

Astro-Foil radiant barrier • Innovative Specialties • innovative-specialties.com • Circle 552

Cold-formed metal framing • Dietrich Metal Framing • dietrichindustries.com • Circle 553

Power actuated fasteners • Simpson Strong-Tie Co. • strongtie.com • Circle 554

Drywall stud • Dietrich Metal Framing • dietrichindustries.com • Circle 555

ProFin Joint Compound All Purpose Compound • CertainTeed Corp. • certainteed.com • Circle 556

Drywall Joint Tape • BPP Marco/CertainTeed Corp. • bpp-na.com • Circle 557

World Mix siding • TerraMai • terramai.com • Circle 558

Roofing

Thoroseal waterproofing membrane • BASF • basf.com • Circle 559

Roofing insulation and adhesive AC Foam II • Atlas Roofing Corp. • atlasroofing.com • Circle 560

TPO thermoplastic roofing membrane • Burke Industries • burkeind.com • Circle 561

Solar cell power conditioning system • Satcon Technology Corp. • satcon.com • Circle 562

PowerGate Plus photovoltaic system inverter • Satcon Technology Corp. • satcon.com • Circle 563

Coatings

Edoco Aqua Resin Cure • Dayton Superior • edoco.com • Circle 564

Vulkem 45 55L sealant • Tremco • tremco.com • Circle 565

Lithochrome Chemstain Classic concrete floor stain • Scofield Systems • scofield.com • Circle 566

Pitt-Tech paints • Pittsburgh Paints • pittsburghpaints.com • Circle 567

SealGrip primers/sealers • Pittsburgh Paints • pittsburghpaints.com • Circle 568

Sun-Proof exterior wood stain • Pittsburgh Paints • pittsburghpaints.com • Circle 569

Finishes

Cabinet liner sheets • Wilsonart International • wilsonart.com • Circle 570

Horizontal Forming Grade HGP (HF-4) plastic laminate • Nevamar Decorative Surfaces • nevamar.com • Circle 571

Exotic hardwood lumber in teak • TerraMai • terramai.com • Circle 572

Ceramic tile Debris Series • Fireclay Tile • fireclaytile.com • Circle 573

Keracolor S grout • MAPEI Corp. • www.mapei.us • Circle 574

Louvers and vents, Model 653XP • JL Industries • jlindustries.com • Circle 575

Flooring

World Mix flooring • TerraMai • terramai.com • Circle 576

Floor mats • Mats Inc. • matsinc.com • Circle 577

In a Snap carpet • Shaw Contract Group • shawcontractgroup.com • Circle 578

Doors and Windows

Hollow metal steel doors and frames, 707 Series • Curries Co. • curries.com • Circle 579

FireGuard Plus flush wood doors • Eggers Industries • eggersindustries.com • Circle 580

F-Style Door, Euro Top & Bottom Patches • PRL Glass Systems • prlglass.com • Circle 581

SentryGlas Plus exterior glazing • DuPont • dupont.com • Circle 582

Ceilings

Acoustical ceiling panels • Tectum • tectum.com • Circle 583

Acoustical ceiling drywall grid system • Armstrong • armstrong.com • Circle 584

Walls and Surfaces

ProRoc Type X gypsum board • CertainTeed Corp. • certainteed.com • Circle 585

ProRoc interior ceiling gypsum board • CertainTeed Corp. • certainteed.com • Circle 586

ProRoc moisture-resistant gypsum board • CertainTeed Corp. • certainteed.com • Circle 587

Sheetrock Acoustical Sealant • USG Corp. • usg.com • Circle 588

Two-hour-rated gypsum board shaft-wall assemblies • Dietrich Metal Framing • dietrichindustries.com • Circle 589

Cork bulletin board • Claridge Products and Equipment • claridgeproducts.com • Circle 590

Fire Protection

Fire Protection Academy fire extinguisher cabinet • JL Industries • jlindustries.com • Circle 591

Life Safety fire alarm system control panel • GE Security • est.net • Circle 592

Fire alarm system intelligent initiating device • GE Security • est.net • Circle 593

Clean agent extinguishing system • Fenwal Protection Systems • www.fenwalfire.com • Circle 594

SmartOne intelligent detectors • Fenwal Protection Systems • www.fenwalfire.com • Circle 595

Vertical Transport

Electric Traction Elevators • Kone Corp. • kone.com • Circle 596

Plumbing and Fixtures

Recessed paper towel dispenser and waste receptacle • Bobrick • bobrick.com • Circle 597

Surface-mounted multiroll toilet tissue dispenser • Bobrick • bobrick.com • Circle 598

Surface-mounted soap dispenser • Bobrick • bobrick.com • Circle 599

Surface-mounted napkin disposal • Bobrick • bobrick.com • Circle 600

Heavy-duty clothes hook with concealed mounting • Bobrick • bobrick.com • Circle 601

Mirror with stainless steel channel frame • Bobrick • bobrick.com • Circle 602

Stainless steel grab bars with snap flange • Bobrick • bobrick.com • Circle 603

Swing-up grab bar • Bobrick • bobrick.com • Circle 604

Walk-in freezer • National Cooler/Hill Phoenix • nationalcooler.com • Circle 605

Dropln Sink • Durcon Laboratory Tops • durcon.com • Circle 606

Systems

Diesel generator set • Cummins Power Generation • cumminspower.com • Circle 186

Close coupled pump • Aurora Pump • aurorapump.com • Circle 187

PVC rigid electrical conduit • PW Eagle • pweagleinc.com • Circle 188

HVAC

Air-cooled scroll chiller • York by Johnson Controls • york.com • Circle 167

Chilled water system • Liebert Corp. • liebert.com • Circle 168

Indoor central station air-handling units with variable speed drive • Trane • trane.com • Circle 169

Blower coil air handler • Trane • trane.com • Circle 170

Uni-flange valve • Griswold Controls • griswoldcontrols.com • Circle 171

Isolator R • Griswold Controls • griswoldcontrols.com • Circle 172

Expansion tank • Elba-Ustek Group • elba-ustek.com • Circle 173

Air-elimination equipment • Amtrol • amtrol.com • Circle 174

Foamglas insulation • Pittsburgh Corning Corp. • pittsburghcorning.com • Circle 175

Lighting and Shading

Dual-technology ceiling mount sensor • Lutron • lutron.com • Circle 176

Calculte compact fluorescent surface cylinder • Lightolier • lightolier.com • Circle 177

Sightlines lighting • Rebel Architectural Lighting • rebelighting.com • Circle 178

Site Lightforms • Kim Lighting • kimlighting.com • Circle 179

Mini Forecast series • Forum • forumlighting.com • Circle 180

Energos lighting systems • Lightolier • lightolier.com • Circle 181

Recessed wall washer • H.E. Williams Inc. • hew.com • Circle 182

Nova T lighting controls • Lutron • lutron.com • Circle 183

Horizontal louver blinds • Levolor • levolor.com • Circle 184

Insolroll Sheerweave roller shades • Window Trends • windowtrends.hdwfg.com • Circle 185