inform

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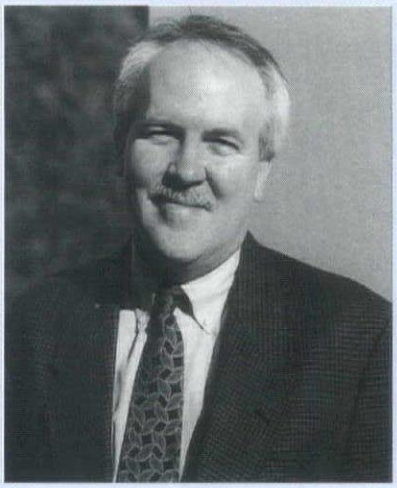
From the Editor



All About Process

Not all architects can be Frank Gehry. Nor should they try to be. But on a trip to New York this summer to visit the blockbuster exhibition "Frank Gehry, Architect" at the Solomon R. Guggenheim Museum, I must admit I was struck by the many possible links between the rarefied practice of America's darling sculptor/architect and the more routine professional circumstances in which so many of the nation's architects find themselves today.

What impressed me so strongly while maneuvering along the Guggenheim's trademark spiral ramp was the clarity and accessibility of Gehry's design process. It is easy for architects to think that, because Gehry's work is so unique, so seemingly unattainable by any but the man who invented these complex forms, his way of working must be beyond what any typical office can achieve. Not so. The beauty of Gehry's process, in fact, is that he occupies two worlds at once – one foot placed squarely in the technologies of the 21st century and the other placed somewhere in the Renaissance, when the details of large buildings were rendered in model form before construction would begin.

The New York retrospective of Gehry's work revealed his affinity for a process that takes little for granted. Gehry starts by manipulating crude blocks that represent pieces of a building's functional program, then he makes sketches that reflect the massing suggested by the stacked blocks and how they fit comfortably on the site. In one example, the Walt Disney Concert Hall now under construction in Los Angeles, the exhibition included forty intricate cardboard models, each one representing a different configuration for the interior space. In another case study, the Weatherhead School of Management at Case Western Reserve University, the exhibition showcased twenty-nine iterations of wooden design process models for the building's façade. Some of the models explored varieties of openings. Some examined the use of sinuous solid walls. Still others studied sawtooth surfaces and vertical slit windows. But all were intended to refine the design – and improve the result – of a given architectural problem. Asked in a published interview if his designs gel quickly, Gehry responded: "It takes a long time. It is like watching paint dry."

Having the parts and pieces of Gehry's design process spread out for all to see was, in my mind, a powerful way to demystify the work that architects do. Clearly the flowing form of Gehry's museum in Bilbao, Spain, his most famous commission to date, did not leap from a crude sketch to built form without painstaking study, analysis, and redesign. The exhibition made this amply clear. At the same moment, I saw the exhibition as a kind of call to architects to step up to the plate. For, although the computer has become ubiquitous in architecture firms, many of the best architects still know that the best way to develop a three-dimensional idea is through a three-dimensional medium – the model. Simple reliance on the strength of computers is a shortcut that often robs the final result of a large degree of power, sophistication, and design excellence.

Interestingly, in his article on page 26 that discusses trends in architectural education, U.Va. professor Earl Mark emphasizes the value in having students move back and forth between the two- and three-dimensional worlds, implying that traditional methods still have value in a profession that is increasingly dependent on the computer. Gehry, for one, creates awesome results by charting a process that combines sketches, models, and digital technology in a series of steps that involve exploration, risk, study ... and time. While his buildings are singular, his way of arriving at them don't need to be peculiar to him. So, in a certain sense, maybe all architects *can* be Frank Gehry. They should try to be.

– Vernon Mays

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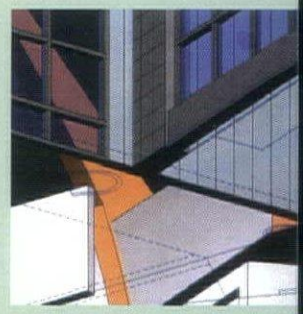

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On the cover: Still frame from "Visualizing the Un-Visible," by Group Goetz Architects.

In our next issue: Cultural Buildings

Pentagon

Braced for Attack By Virginia Firm

The damage to the Pentagon's Wedge One, a section recently renovated by Hayes Seay Mattern & Mattern could have been much worse due to the terrorist attack.

Amid the chunks of reinforced concrete and steel that was once part of the Pentagon, engineer Cecil Doyle realizes there's cause for relief: the disaster could have been worse. When hijackers slammed American Airlines Flight 77 into the Pentagon on September 11, they hit Wedge One – the only section that was newly renovated with blast-proof windows and walls, fireproof rugs and an updated sprinkler system.

"The sprinkler system kept the fire down. The windows worked as they were designed to," said Doyle, president and CEO of Roanoke-based Hayes Seay Mattern & Mattern, which designed the renovated section.

Wedge One was the only section reinforced internally with steel beams and a mesh of support structures that held together like a spider web, said Brett Eaton, spokesman for the Pentagon Renovation Program. "That was the most fortuitous place to get hit," Eaton said. "Had it not been there, the amount of damage the plane could have done is untold."

Built between 1941 to 1943, the Pentagon was at one time the world's largest office building, with 6.5 million square feet of floor space for as many as 25,000 people. Its five concentric rings still makes it one of the most efficient buildings anywhere; it takes just seven minutes to walk between any two points in the building.

But the Pentagon was never designed for the computer age, Eaton said. Electric and telephone wires are bunched together in corners, connected to inefficient systems that experience frequent power outages. Some of the walls contain asbestos and the paint is contaminated with lead. The five-story building has no passenger elevators and does a poor job accommodating people with disabilities. The pipes are rotting, and the basement is known to house big rats.

Renovation efforts began in 1993, with the construction of a nearby heating and cooling plant. Each of the wedges were to take about three years to finish, with Wedge One set to be completed this October. It cost $252 million to design and build Wedge One. The asbestos and lead paint was removed. The interior was equipped with escalators, automatic toilets and sinks, new lighting, plumbing and work stations. "It was 'Class A' office space," Doyle said.

On September 11, Doyle was in a meeting about state and national engineering competitions when a co-worker pulled him out to see the news. "I realized it was Wedge One that was hit," he said. "You see those things happen in other parts of the world, but here – especially at the Pentagon – it's just hard to describe how to feel about this."

Fortunately, none of the company's architects or engineers were present when the plane crashed. "It's just been a real tragedy," Doyle said. "Our deepest feelings go to the families of the people who were lost. I don't know what else I can say."

Now, construction crews will likely have to start all over, said Doyle, who has not yet been notified by the federal government about when work will continue. Eaton said the renovation program will continue soon, although he's not sure when.

– Chris Kahn

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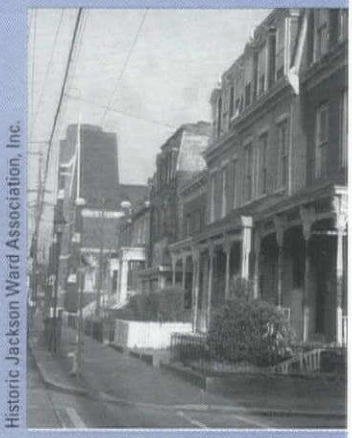
Historic Neighborhood Placed on National Trust's Endangered List



Historic Jackson Ward Association, Inc.

Jackson Ward is home to over 600 historic buildings, many in disrepair.

Given Virginia's wealth of high-profile historic sites, it is sobering to find one of the state's most intriguing historic areas on the National Trust for Historic Preservation's list of "America's Eleven Most Endangered Historic Places of 2001." The Jackson Ward neighborhood, once a prosperous African-American district in Richmond, contains hundreds of distinctive historic buildings, many of which have fallen into disrepair. But because it lacks a master plan, strong legislative protections, and hearty investments in rehabilitation, the so-called "Harlem of the South" could disappear, falling to the ravages of unmonitored demolition and inappropriate developments.

Founded by free blacks and immigrants, Jackson Ward sprouted to the north of downtown Richmond. Black entrepreneurs shaped the area into an economic and cultural mecca. Both Maggie L. Walker's St. Luke's Penny Savings Bank and William Washington Browne's Savings Bank of the Grand Fountain, United Order of True Reformers – milestones of African-American leadership – set up shop around the turn of the century. A thriving culture of nightspots, jazz clubs, restaurants, and theaters developed within the bustling neighborhood. When the Jim Crow laws institutionalized segregation in the early 1900s, residents of Jackson Ward responded by establishing their own economy driven by financial institutions located along Second Street, giving the area the nickname "Black Wall Street."

Segregation seems only to have strengthened Jackson Ward, which thrived in the face of adversity. The flip side of that coin: when desegregation came to Richmond in the 1950s, the strong black culture that had driven Jackson Ward for years seemed to dissipate, as residents moved away and businesses faltered. Striking the worst blow, white business interests pushed, and received city support for, construction of an interstate highway that cut a swath through the neighborhood, destroying more than 200 homes, stores, and offices, and displacing more than 900 families. Carved in two and no longer united by the thriving economy and cultural scene of the past, Jackson Ward slipped into disrepair, beginning decades of urban decline that have yet to turn around.

Important not only for the unique slice of Virginia's history it represents, but also for the edifices it still shelters, the neighborhood contains more than 600 significant historic structures listed on the National Register of Historic Places, including Richmond's oldest public school building, the first African-American bank in the country, and one of the finest collections of wrought ironwork nationwide. Though in the 1970s the home of pioneer banker Maggie Walker and the Jackson Ward neighborhood itself won designations as historic sites, some 100 buildings in the area remain vacant today. Many more sit in disrepair. For this reason, the National Trust felt it necessary to place the district "at the top of the list," noting that while support of residents, preservationists, and the city exists, the area needs even more advocates. It abuts Richmond's expanding convention center, and still suffers from a lack of protection measures. So, argues the National Trust, serious investments in the properties and the community itself are necessary to preserve Jackson Ward for future generations of Virginians.

– Rebecca E. Ivey

National AIA Honors Inform Editor

Inform magazine Editor Vernon Mays was honored by the American Institute of Architects this year as one of two people to receive the 2001 Institute Honors for Collaborative Achievement, a national award to recognize exceptional contributions to the design and architecture community. The honors were conferred at the 2001 AIA National Convention and Expo in Denver.

Mays (center) receives award from AIA President John Anderson and CEO Norman Koontz.

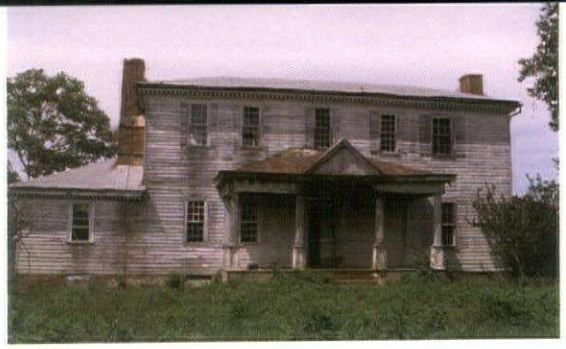
After launching his journalism career as a news reporter in 1977, Mays has devoted the past 18 years to studying architecture and writing about it for a variety of regional and national publications. During that time he has distinguished himself as the first full-time architecture critic for *The Hartford Courant* newspaper and as a senior editor for *Progressive Architecture* magazine.

For the past 12 years, Mays has been the editor of *Inform*, the award-winning regional design magazine published by the Virginia Society AIA, circulated throughout the mid-Atlantic and regarded as one of the area's most successful professional publications. With degrees in architecture from Virginia Tech and journalism from the University of North Carolina-Chapel Hill, Mays brings considerable skills to the magazine.

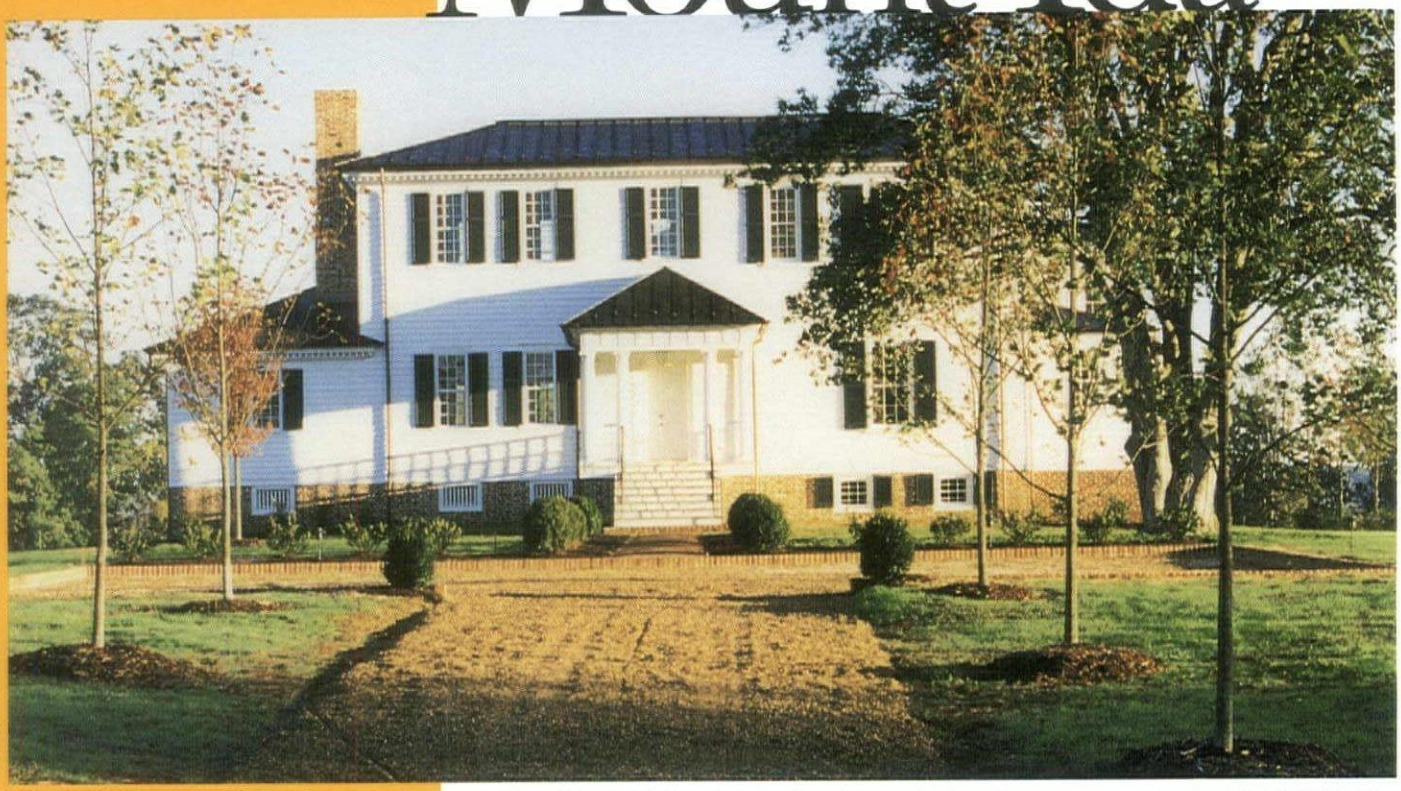
Holly Gerberding, AIA, the Chicago architect who chaired the awards jury, credited Mays with "a tremendous achievement in creating a serious regional publication on architecture and urban issues, and making it appealing to a community wider than just architects."

While the production of *Inform* magazine has been his primary concern, Mays also serves as contributing editor on several national publications, including *Architecture* and *Landscape Architecture* magazines. In 1999, he published his first book, a survey of commercial office interiors called *Office + Work Spaces*. He recently served as professional advisor to the Council for America's First Freedom in its selection of a design for the First Freedom Monument.

– Margaret J. Tinsley



Moving Mount Ida



Courtesy Smith Garrett Architects (left); Frazier Associates (top)

Mount Ida, with its façade restored, rests comfortably on its new grounds (above). The front porch was recreated using photos of the house from the turn of the century, before the porch was expanded. A more recent photograph (top) shows the house just prior to its disassembly and relocation.

By Rebecca E. Ivey

One thinks of landmarks and historic buildings as absolutes – erected centuries ago, one assumes they will be preserved for centuries to come. Often overlooked are the properties, buildings, and structures with historic significance that languish in fields, unrestored and frequently unnoticed. Less than a decade ago, the estate known as Mount Ida fell into this category despite its listing on both the National Register of Historic Places and the Virginia Landmarks Register. Fortunately, the historic plantation's plight piqued the interest of investor James Murray, who decided to undertake the complex project of moving Mount Ida to a new location, carefully renovating it for use as a residence, adding an appropriate addition, and – on top of all that – getting it re-listed on the national and state registers, often a near-impossible task to accomplish.

Built in 1795 by David Ross, Mount Ida originally faced the James River in Buckingham County. About 1850, the second owner, William Leitch, added a major addition to the east side of the house, marked by differences in window size, siding, and interior trim. Mount Ida's most significant feature, however, was *and* is the interior detailing, including elegant and unusual museum-quality woodwork following patterns found in two 18th-century pattern books, William Pain's *Science of Architecture* and Asher Benjamin's *Practical House Carpenter*. The elaborate decoration in the parlor is, as architectural historian Calder Loth puts it, an outstanding example of the late Georgian style of the late 18th century. The unusual evolution of the building adds to its appeal – the new addition features Greek Revival trim and intricate Asher Benjamin-inspired woodwork. Though this interior decoration is quite noteworthy, Mount Ida was abandoned in the 1970s and stood deserted and in disrepair in the early 1990s. Offered for sale with the stipulation that the buyer remove the building from the land where it stood, Mount Ida was in danger of being sold piecemeal or being left to simply decay.

To the rescue came Murray. He had just purchased 423 acres of land in southern Albemarle County on which he intended to build a residence and horse farm with Hardware River frontage. Formerly owned by a timber company, the land was densely covered in trees that were periodically clear cut and sold, but the topog-

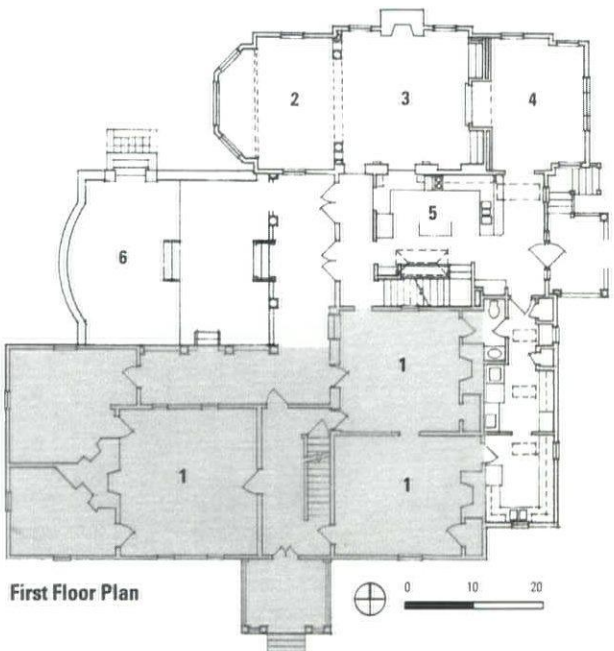
raphy appealed to Murray, who thought the land had excellent potential. After the purchase, Murray discovered the runs of an 18th century plantation, Bell Mount, or the Dawson/Brockenborough plantation, bulldozed by the timber company in the 1950s. After retaining the Department of Archaeology at The College of William and Mary to perform an archaeological survey of the ruins – during which they discovered a wrought iron chimney arch that was later incorporated into the Mount Ida addition – Murray decided the most appropriate use for the land was to situate and restore another historic plantation home on the site. Personal contacts led him to Mount Ida, sorely in need of just the situation he envisioned.

Murray hired Frazier Associates of Staunton to plan the move, carry out the rehabilitation, oversee the reapplication to the national and state registers, and craft plans for an addition. The Virginia Department of Historic Resources initially warned that moving the house would likely result in the loss of its landmark status. Shortly thereafter, though, a unique arrangement was fashioned in which the location would be assessed and approved, the house would be carefully disassembled, each part numbered, documentary photographs taken, and precise drawings prepared. If satisfactorily completed, the department agreed that it would re-list Mount Ida on the Virginia Landmarks Register, and re-nominate it to the National Register. Lewis Ramsey, a man who does disassembly and reassembly of historic buildings, coordinated those aspects of the project. Drew Murray came on as general contractor, and the Frazier team began documenting Mount Ida and creating

Charles Shoffner

Decorative elements in the addition (above) were designed to emulate the weighty, but elegant, appearance of the woodwork in the original house. The addition consists of two separate masses, with a low, porch-lined section connecting the original to a taller, somewhat contemporary section (below left).

Charles Shoffner



First Floor Plan

0 10 20

1 Existing House
2 Sun Room
3 Great Room
4 Breakfast Room
5 Kitchen
6 Terrace

Charles Shoffner

Exterior elements were designed with features that mimic the front porch and original roofline.

specifications for the move and restoration.

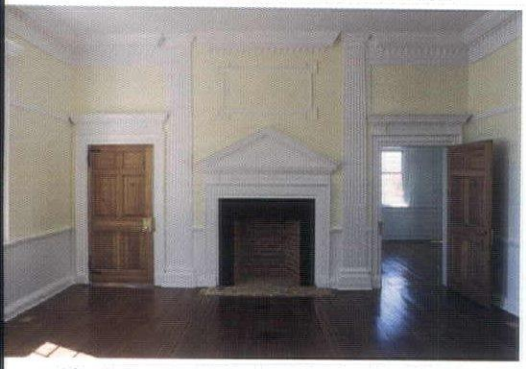
Challenges arose not only from the restrictions associated with maintaining register status, but also from the code requirements for new residential buildings. Mount Ida now sits on land with similar topography to its original site, with its orientation and proximity to a river almost exactly replicated. The collaborators rebuilt the house with meticulous attention to detail, and the house is now virtually identical to the original building. One notable exception is the front porch, which Frazier Associates recreated to appear as it was prior to a late Victorian addition.

Murray knew that Mount Ida would need an addition with modern amenities and spaces, but constructed in a manner consistent with and physically deferential to the original. Candace Smith, AIA, of Smith Garrett Architects in Charlottesville, and the late Floyd E. Johnson, FAIA, collaborated with Frazier Associates on the addition. Johnson and Smith designed the detailed interior woodwork and exterior decorations embellishing the addition, while Smith designed interior and exterior spaces, including the modern kitchen, the kitchen stair, the master bath, and the addition's porches.

The idea of transition, rather than mere replication, shows throughout the addition, although attention to consistency shows in Johnson and Smith's design of substantial, yet elegant columns, cornices, wainscoting, and cabinetry. The stair represents the transition best, creating an interior surface that replicates the outside

Before dismantling the interior, each room was documented to aid in its reconstruction.

Frazier Associates



After being rebuilt, the intricate details of the woodwork have been restored with accuracy.

Hay L. Hardy/ Frank Hardy, Inc.

of the historic house. Illumination from a broad central skylight reveals original windowpanes, new weatherboards, and a brick foundation as one travels up and down the stair, simulating the experience of viewing the exterior of the original building.

While many elements remain the same, others are streamlined to provide a continuum from historic to modern. Smith chose materials that possessed a traditional antique feel, such as heavy reclaimed heart pine ceiling timbers and bricks salvaged from the ruins of Bell Mount. The porches integrate interior and exterior space, while setting the addition apart from the original by using changes in roof height and detailing. These extensions into the countryside provide views of the nearby pond, pastures, river, and winding drive. Gentle landscaping by Peggy Van Yahres of Van Yahres Associates landscape architects in Charlottesville creates a suitably serene environment where historic Mount Ida and its modern addition seem to belong.

Mount Ida stands tall again, having been restored and proudly boasting an elegant addition with the modern amenities expected at such a grand estate. A success story on all fronts, this project is not only a testimony to the talents of a diverse group of collaborators, who succeeded in safeguarding the house's place on the national and state registers, it also provides an encouraging example of what can be done to preserve and develop Virginia's great old buildings.

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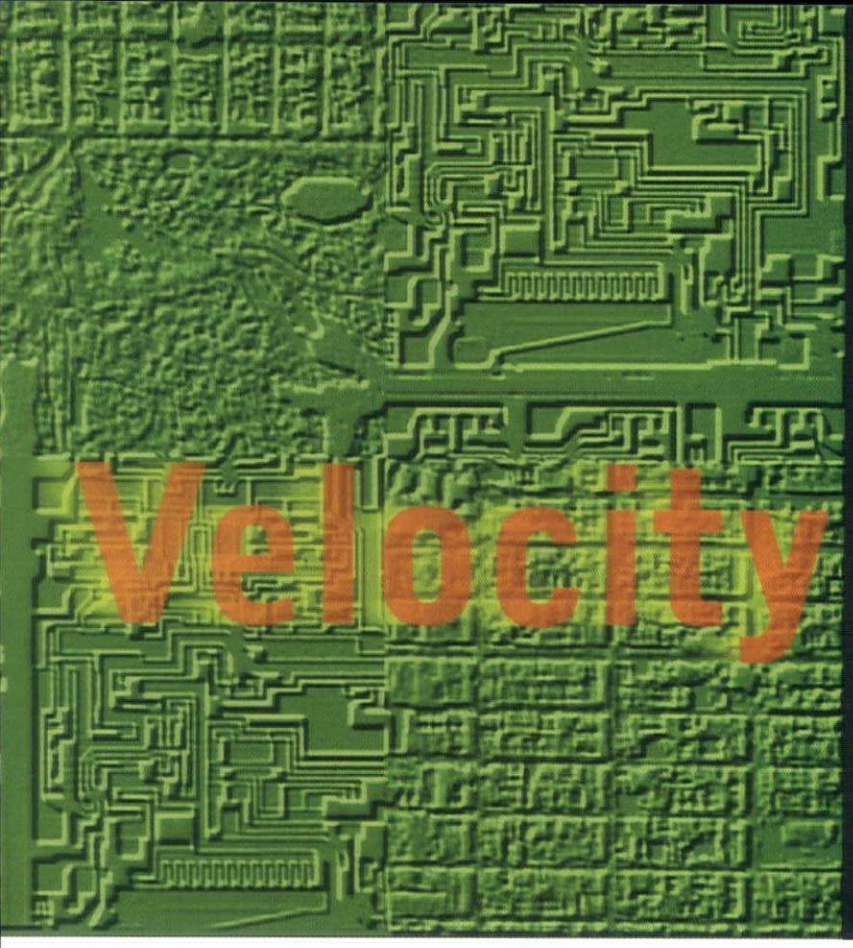

Velocity

"Technology influences our efficient use of time,

Virginia Design Forum V

or, stated differently, the extent to which we use our time efficiently."

March 22-23, 2002

Masonic Temple, Alexandria, Virginia

The theme for the event is "Velocity," a focus for discussions which seek to explore the impact that technology, construction techniques, and cultural influences have on the speed with which design ideas are developed, refined and implemented. Registrations are being accepted now for a two-day program that will feature Neil Denari, AIA, director of SCI-ARC in Los Angeles. Joining him will be design talent from around the world, including Tod Williams, of Tod Williams Billie Tsien & Associates in New York; Ben Van Berkal of UN Studio in Amsterdam; William Morrish, theorist and urban designer from the University of Virginia; and Adam Yarinsky, principal of the Architecture Research Office in New York.

Virginia design forum V

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GOING DIGITAL

The latest advances in computer technology provide more avenues to good design than ever before.

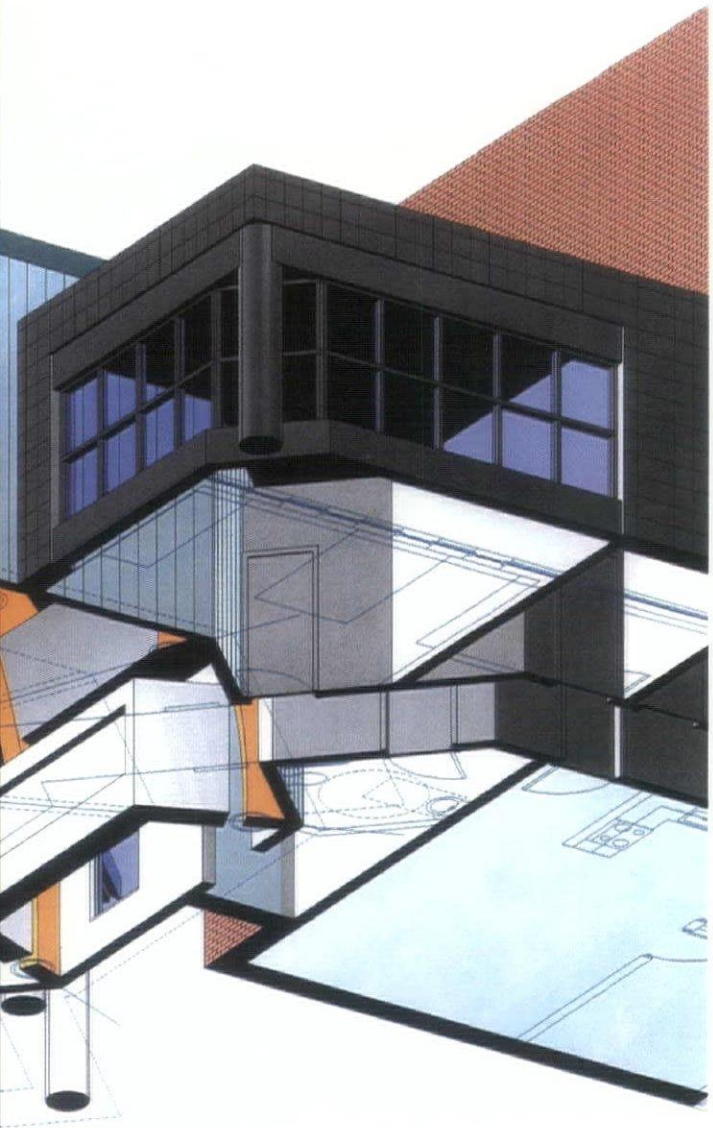
By Kim A. O'Connell

When faced with the whiz-bang possibilities presented by computer technology, architecture traditionalists often lament the loss of the human touch that characterized hand renderings – the eraser marks and expressive lines that are evidence of a design process that springs purely from imagination. Computer software, the old-school types note, seems fit to produce only letter-perfect boxes snapping to a grid.

Today, that has all changed. Architects are no longer as limited by computer software as they have been in the past ten or 15 years. More and more computer programs are vastly advanced in their design capabilities, allowing architects to think as fluidly at the computer screen as they do at the drafting table – perhaps more fluidly. Already, evidence of this phenomenon exists in the built environment. A recent exhibition at the Heinz Architectural Center of the Carnegie Museum of Art in Pittsburgh, called "Folds, Blobs + Boxes: Architecture in the Digital Era," argued that computers have forever expanded our architectural tastes. Frank Gehry's "blobs" – such as the Guggenheim Museum in Bilbao, Spain, and the Experience Music Project in Seattle – already are classic examples.

According to Michael Tardif, Associate AIA, director of the AIA Center for Technology and Practice Management in Washington, D.C., the main hindrance to computer-aided design has been that the available software was not so much about design as it was about computerizing construction documents. These days, however, software technology has placed the emphasis instead on parametric modeling, Tardif says. This means that the computer understands objects based on their parameters – such as height, thickness, and purpose (for example, whether an object is a wall or a window). In such relatively new programs as ArchiCAD and Revit, the technology allows a design to be realized in three dimensions from the outset. Traditional plans, elevations, and sections are just 2-D views of the model.

"Most design applications over the past 15 years mimic the process of creating conventional drawings," Tardif says. "What's different about Revit and ArchiCAD is that you're creating the model. When you're working on it in plan or elevation, you're



DMJM Architects

Using Revit software, architects at DMJM produced this worm's eye view of a residence hall at Christopher Newport University (left).

changing the model. It's a conceptual shift. The data within the applications begin to behave as we would expect their real-world applications to behave. It frees the architect to design instead of having to crunch numbers."

DMJM, located in Arlington, recently used Revit to design a 24,000-square-foot municipal building in James City County and new residence halls at Christopher Newport University in Newport News. The firm quickly realized several benefits, according to architect Robert Smedley, AIA, a project design manager there. Chief among these were the firm's ability to explore more design options rather than spend time on presentation documents, save money by not having to employ a computer modeler, and present the design as an interactive experience with the client.

Carter + Burton Architecture in Berryville has used ArchiCAD to help with complex angles and curves, as well as to conduct light and sun studies. The program allows the firm to electronically scan artwork of a specific material, such as stone, and then apply it with accurate perspective to the relevant portions of a rendering, says principal Jim Burton, AIA. The firm makes a point, however, to ensure that not all the computer models and presentations look alike. "We've also hand-rendered on top of the computer images to soften the image," Burton says. That process moves swiftly, taking minutes to produce what might once have taken hours.

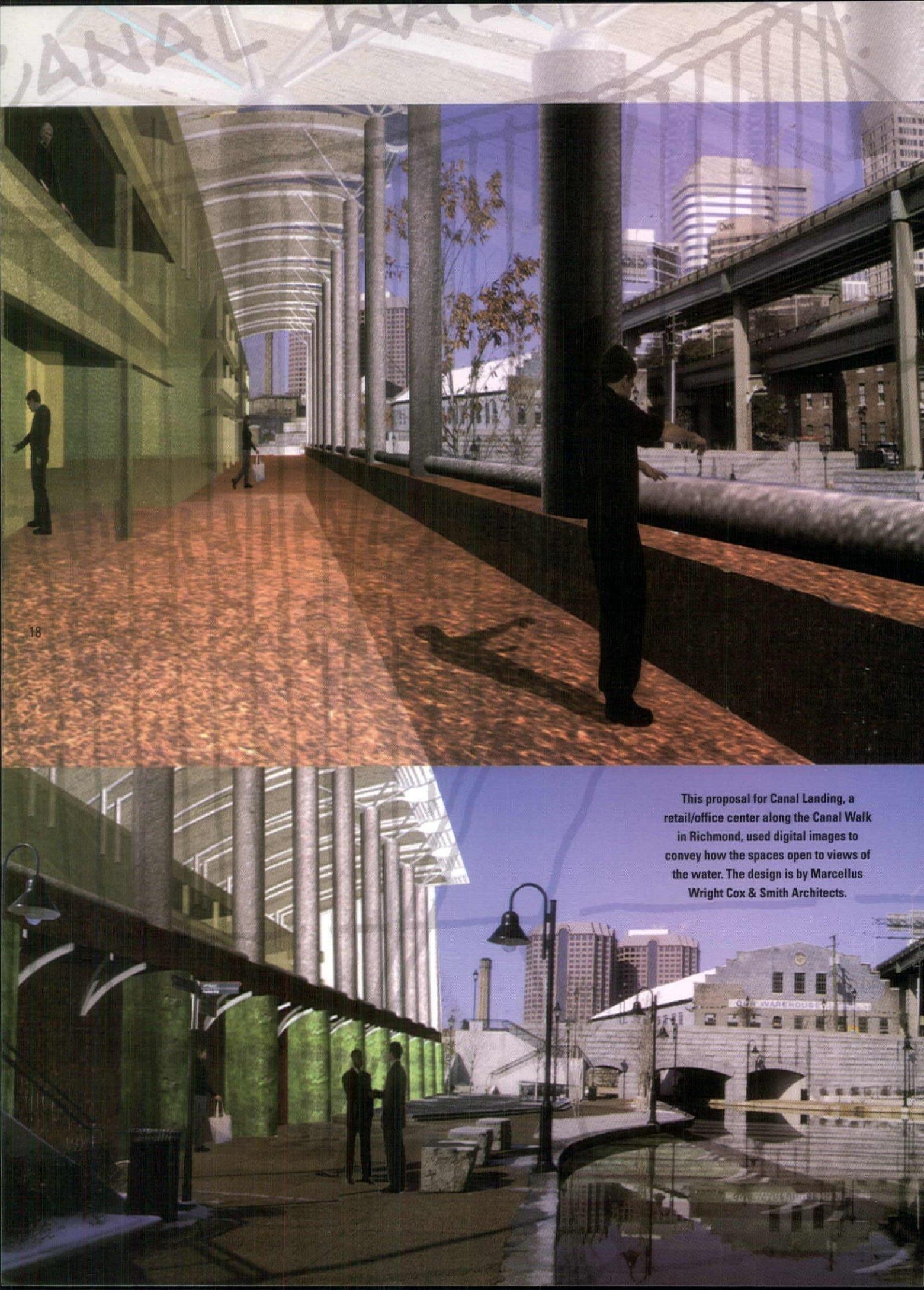
SMBW Architects in Richmond has been using 3D Studio VIZ to render and animate designs and apply materials and lighting to projects, says principal Christopher Fultz. In one example, the program allowed the firm to present several different possibilities, using a fly-by and a computer animation for the rehabilitation of Richmond's towering City Hall (see story, p. 20). "It allows us to access our work on a perspective level so quickly," Fultz says. "You can't do it as well with the sketch. It's a nice balance between the hand and the computer."

Architect Chris Hendrix, founder of Digital Sky Studios, a computer design studio based in Virginia Beach, sums up these capabilities on his website: "There's no doubt that traditional renderings can be beautiful. The real benefit of computer-based solutions is flexibility and technical accuracy. The computer also provides us the ability to generate multiple renderings from the same computer model at a fraction of the cost of commissioning several 'hand' renderings."

At a cursory glance, the technology can be intimidating, however. "Right now I feel like there is a conflict between the older generation and the newer generation," says Frank Neagle, an intern architect at Marcellus Wright Cox & Smith Architects in Richmond, which uses 3D Studio VIZ to create animations and fly-arounds. "The newer generation wants to use this stuff and get out there and design in that three-dimensional world. The older generation that for years and years drew on a drafting board doesn't have a grasp of how it's done."

But these programs are also generally easy to use, which may help to close the gap between the seasoned architects who found earlier computer software frustrating and the recent graduates who had the luxury of learning the latest techniques in school. Smedley, who has been in practice since the mid-1980s, found this to be true in Revit. "I'm not an AutoCAD-literate architect, and it's kind of frustrating when you're managing a design process and you can't jump on and be part of the team," he says. "But when I was first watching the [Revit] presentation, it seemed user-friendly enough that I felt I could use it."

Advances in design technology are complemented by the other project-management benefits of computer programs. Marlene Shade, AIA, an associate with Phillips Swager Associates in McLean, says that her firm has developed a corporate intranet site and a company website, in addition to videoconferencing capabilities that facilitate communication and teamwork among the firm's four offices and with clients and partnering firms.



This proposal for Canal Landing, a retail/office center along the Canal Walk in Richmond, used digital images to convey how the spaces open to views of the water. The design is by Marcellus Wright Cox & Smith Architects.

Courtesy Phillips Swager Associates

Computers now produce renderings with ever-increasing sophistication, such as this view of the Peoria Police Station by Phillips Swager Associates created in Microstation (left).

Clients are also becoming ever more conscious of the technology – but this can be a double-edged sword for architecture firms. On one hand, techno-savvy clients will be more easily sold on designs created with these programs. But if a designer makes detailed material and color choices for the computer rendering, that has the potential to backfire. "If you make the building a particular color brick," says Neagle, "the client may feel like you've made decisions before you've consulted them." Other clients may see spectacular effects on TV and in the movies, Tardif says, and think that architects can push a button and instantly create them on their desktop. "It creates an expectation that isn't possible to meet," Tardif says.

But the technology will only improve as time goes on. Christopher Fultz notes that construction technology is keeping up with the design technology, such that designs and forms built in virtual space can be exported into milling machines that cut abstract shapes. MIT and Virginia Tech are already experimenting with a 3-D "printer" that can build a 3-D model of what is developed on the screen. "In 10 years, it will be like a laser printer," Fultz says.

Tardif adds that, ideally, the data created by these programs should be independent of the applications that create them, which would foster an even more open and fluid design process. For example, Smedley notes that DMJM is experimenting with Sketch-Up, a program that does some things that Revit does, and others that it does not. If the two programs could work together in some way, the firm might benefit exponentially.

Even if the prevalance of hand rendering has already gone the way of the dodo bird, it remains true that computers will still be nothing without a fine mind at the keyboard and mouse. "The drafting has been taken over by computers, but this only allows the editing process to be easier," says Neagle. Even though the technology of design is evolving, architects still have to create the image – that isn't going to change. Armed with an ever-expanding arsenal of digital resources, and an always visionary eye on design, no doubt architects are up to the task.

Kim A. O'Connell is a freelance writer based in Arlington.

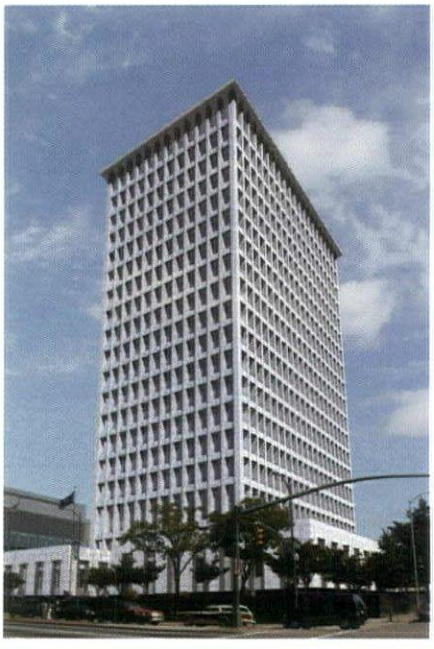
In this design for a proposed peace chapel, Carter + Burton imported a scanned image of stone into Archicad, which rendered the material as the ground plane with realistic perspective.

NEW

SMBW Architects of Richmond has embraced cutting-edge computer technologies, and recently expanded its repertoire through a study of options to reclad Richmond's City Hall. The four-year project – headed by architects Fred Ortiz, AIA, of SMBW, and Daniel Lemieux, AIA, of Wiss, Janney, Elstner Associates in Fairfax – focuses on replacing the 18-story building's exterior marble panels. While the supporting structure remains in good condition, the panels are quickly becoming a safety hazard because of a natural process called hysteresis, which causes marble to crack under temperature extremes. The bowing, pillowing, and sugaring of the stone panels covering City Hall had weakened them to the point where some 4,900 fiberglass straps had been installed to hold them in place.

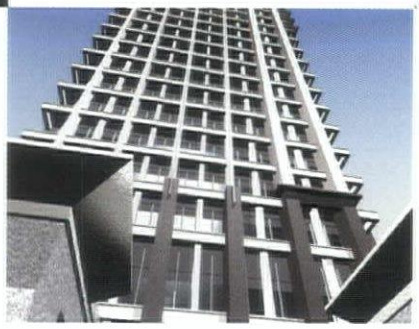
The current team's study analyzed several replacement materials, ranging from granite and limestone to aluminum and synthetic stucco. Using Autodesk's 3D Studio VIZ, the architects mapped the materials onto existing elevations. The ability to quickly and thoroughly visualize their options helped them create a

The recommended solution for City Hall incorporates elements that dramatize the vertical proportions, with a cap that sweeps into the sky, recalling features of historic Richmond architecture.

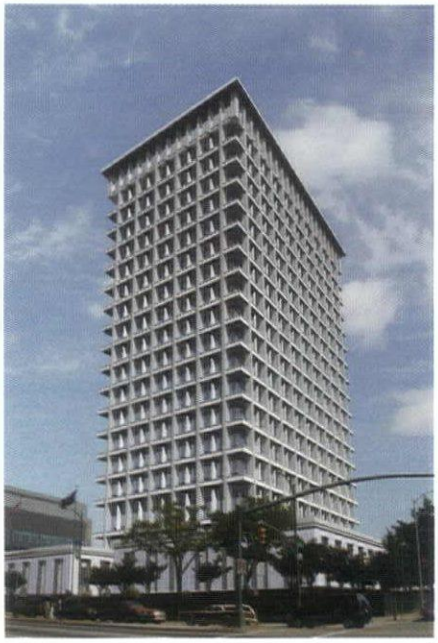


SMBW explored two other options, including replacement with granite panels (right) and the sole use of composite aluminum panels (facing page).

CLOTHES FOR CITY HALL



This four-frame sequence from SMBW's animation presents a dramatic upward view of the proposed City Hall, then shifts downward to depict the approach from Broad Street.



strategy for not only recladding the building, but redefining City Hall as a landmark. The team first investigated an in-kind replacement, substituting granite for marble at a cost of $26 million. The second option examined the use of composite aluminum panels, which whittled the price tag to $20 million. In the end, the team combined the two in a redesign that emphasizes the building's vertical proportions and visually ties the materials together for $21 million.

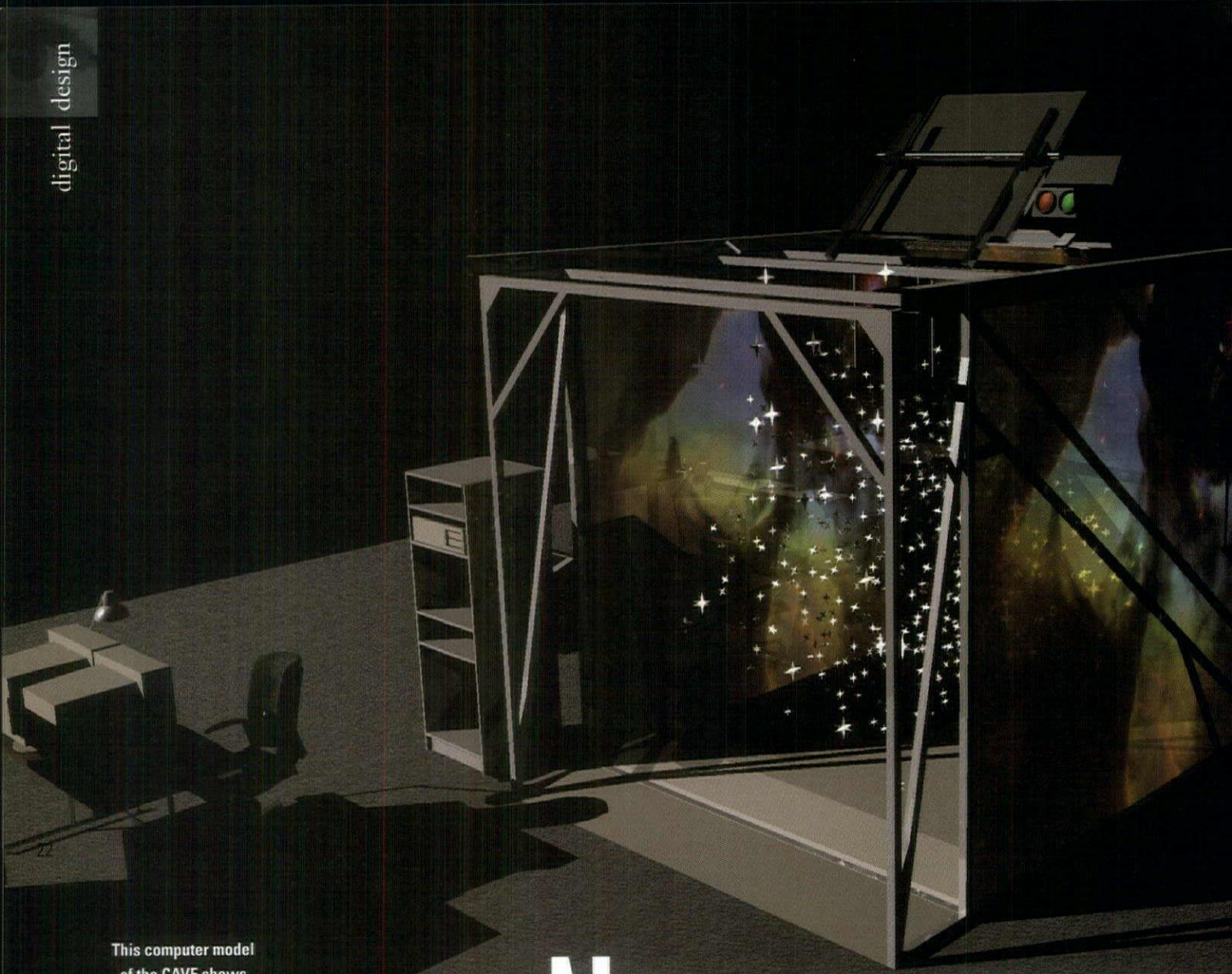
In this scheme, council chambers are sheathed in light charcoal granite veneer, while the lower floors of the high-rise are paneled in dark charcoal granite. A new rhythm is established by replacing the nonstructural columns around the tower with more slender shapes and eliminating the corner columns. Composite aluminum paneling covers the tower, contrasted by a series of mid-tone granite columns.

To refine the design, the team experimented with animations. "We wanted to go beyond conventional elevations and the one-point perspective," says Ortiz. By creating realistic three-dimensional perspectives, the team could more easily visualize and develop its ideas.

The animated sequences and renderings were excellent vehicles for presenting the project to city officials. Rather than simply handing out a written report, SMBW arrived with a PowerPoint presentation that showed the three options before cutting to the dramatic fly-around that swoops around City Hall. City staff responded enthusiastically with oohs and aahs. "In a formal presentation, there's a fear of doing something totally different," says Ortiz. "But, even though it is different, this conveyed a very strong message."

The presentation allowed SMBW to convey its vision clearly and communicate the logic of the ultimate solution. As a result of their success with the City Hall proposals, SMBW began applying the same techniques to competitive situations involving other projects. In this case, technology offered more than just efficiency, it also nurtured the creative process.

– Rebecca E. Ivey



This computer model of the CAVE shows the cube form of the screens and their scale in relation to the operator's desk.

NEW FINDINGS

It can make you feel weightless, giving the sensation that you're flying like Peter Pan, but the full-immersion 3-D environment known as the CAVE at Virginia Tech is more – far more – than child's play. Although the technology supporting the CAVE (or Cave Automatic Virtual Environment) was created by researchers at the University of Illinois, an early spinoff came to Blacksburg in 1997 with the aid of an $850,000 grant from the National Science Foundation. Housed in a cavernous Torgerson Hall laboratory, the CAVE at Virginia Tech is a boxlike assemblage of three walls, a floor, and a ceiling. The walls and floor are screens that receive images from four video projectors. Rendered by high-powered computers, the images are projected in stereo, but because users wear special mechanized glasses that blend the images, they perceive themselves to be occupying three-dimensional space.

At Tech, the CAVE can be used by faculty and students from all disciplines. Engineering classes can assemble and take apart complex structures. Veterinary surgeons can prepare for operations by viewing large-scale simulations of animal organs. And architecture students? "We are hoping to be able to design in an environment like this, rather than develop something on the outside and bring it in here," says Bob Schubert, associate dean for research in the College of Architecture and Urban Studies. "One of our master's students is working on a drawing system that allows you to work in real time." Schubert imagines one of the outcomes of the work will be striking three-dimensional renderings that the user will inhabit as the drawings are being created.

To demonstrate the CAVE, Schubert calls up a virtual image of the interior of Santa Maria Maggiore, one of the lost monuments of Rome. Manipulating a joy stick while standing in the center of the cube, Schubert takes his glasses-wearing guest on a virtual tour of the building, stopping to examine mosaic tile details and passing through the floor to view the subterranean struc-

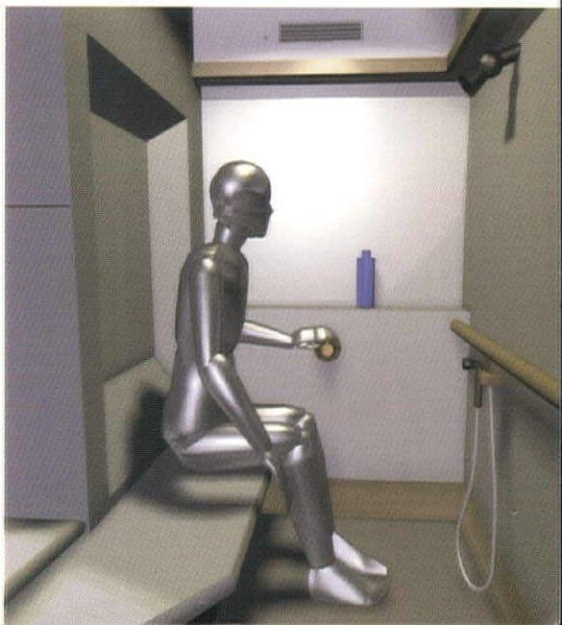
Cave rendering: Dennis Jones

Student Dennis Cafiero is shown in the CAVE wearing the special glasses that blend stereo images into three-dimensional ones.

IN THE CAVE

tural system. Switching to another program, he displays a project in which a student converted a dormitory's working drawings into three dimensions, with each of the mechanical systems rendered a different color. "We see all kinds of potential for something like this, because you can look at potential conflicts of the systems," Schubert says. "Do you see where the blue and the red intersect? Well, they should really be in different planes." As the technology becomes more interactive, the user will be able to grab the object with his hand and move it so the conflict no longer exists. The working drawings would automatically be modified.

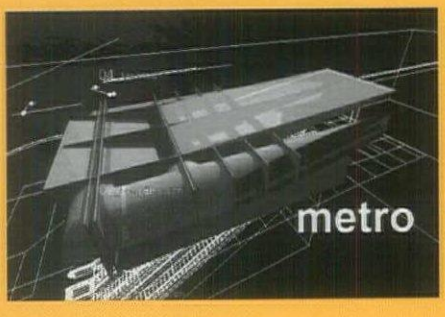
Already there exists the capability to link CAVEs at different locations, so that teams in different parts of the country – or the world – can work simultaneously on the same problem in a collaborative manner. Says Schubert: "We really see it as an incredible environment to bring multidimensional information into one location." *– Vernon Mays*

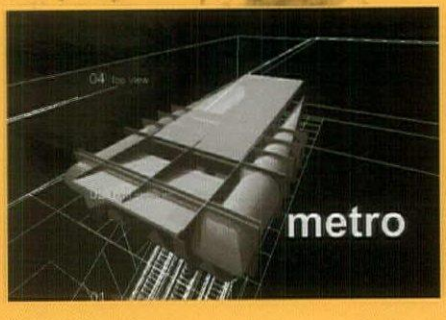


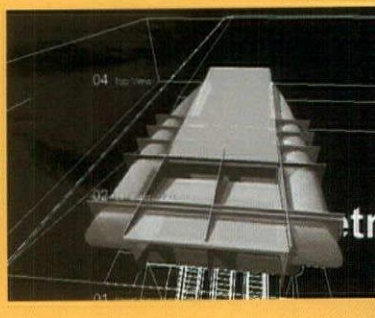
In an earlier phase of technology at Virginia Tech, virtual representation was used to refine a prototype of this bathroom unit (right).

TRAINING THE EYE

VISUALIZING THE UNVISIBLE







First the call went out – the competition to create a comprehensive escalator canopy design for the Metrorail system in Washington, D.C. The city's transit authority sought a scheme that would not only protect riders and equipment from inclement weather at forty-six escalator entrances, but would also engage the public as works of architecture. Requesting submissions on a 30-by-40-inch board, the competition required conventional two-dimensional plans and elevations. One-hundred sixty-seven firms responded.

One of the entrants, Group Goetz Architects of Washington, submitted a design by Mansour Maboudian, Associate AIA, the firm's director of design. Maboudian envisioned a canopy that would extend the feel of the underground tunnels, creating an immediately recognizable icon that expressed "the structure, materials, and nature" of the Metro system. As he envisioned it, the transparent canopy would allow people to see the shape of the supporting structure from the outside; conversely, riders would be greeted by the open sky when ascending the escalators from below. From afar, the design would appear both industrial and organic. While it would consist entirely of modern materials, on a visceral level it would look like both a gigantic underground beast thrusting its head above the sidewalk and a spaceship transported from a science fiction novel.

After the competition – which was won by another firm, Lourie, Chenoweth & Houghton of Silver Spring, Maryland – Group Goetz wanted to showcase its design in a more elaborate fashion. Maboudian collaborated with graphic designer Evan Roth to develop a Quicktime movie to post on the firm's website. The thematic element, the eye, stemmed from the idea of "the growth of a concept from imagination to reality, from the intangible to the concrete," says Maboudian. For the mini-movie, Roth played with the idea of imagination by showing the eye opening and closing as information streams by. The viewer is drawn suddenly into the eye, plunging towards what first appears to be a reflection, but soon comes into focus: an escalator. Moving up the escalator, the viewer's perspective takes in the surrounding canopy and rises, moving into the street. Once outside, the point of view sweeps around the canopy, with views from both sides and above, giving a three-dimensional perspective that brings the design to life.

Group Goetz created the movie primarily as a marketing tool for use as one of many multimedia samples found on its firm website: www.gga.com. The movies show different projects in three dimensions, helping clients understand the design of a space and comprehend the feel of walking around inside a building that's not yet built. These digital tools are an integral part of Group Goetz's overarching marketing strategy and perspective on the contemporary world, conveying the message that the firm operates on the leading edge of technology.

– Rebecca E. Ivey

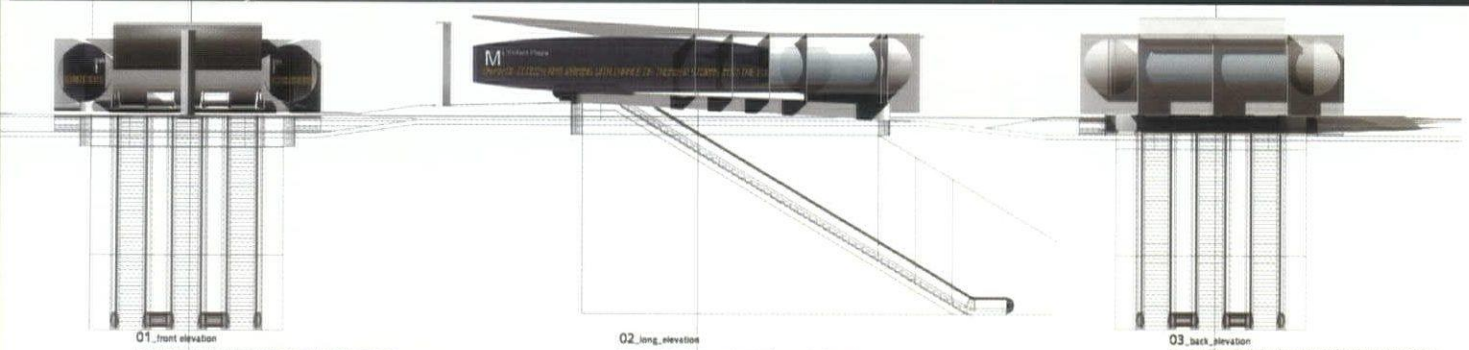
04_topView

02_longElevation

01_

metro

Static images are made dynamic as the Quicktime movie draws the viewer up the Metro escalators sheltered by the transparent canopy.



01_front elevation

The five-line system serves a population of 3.4 million people in a 1,500 square mile area. Metrorail is the second largest rapid rail system in the country and has earned a worldwide reputation for reliability, cleanliness, safety, security and architectural beauty.

02_long_elevation

The system has received numerous architectural and design awards and is revered as an outstanding example of Modern architecture. Thoughtful considerations give rise to design principles that reflect the closely integrated and spacious ness of the nation's capital.

03_back_elevation

In a region with more than its share of monuments, the Metrorail system is a monument to individualism, dignity and design excellence.

ALIZING
UN-VISIBLE

blematic expression above ground of the structure,
s and nature of the underground transport system.

AERIAL

PERIPHERAL_ENCLOSURE

EXPANDABLE_STRUCTURAL_GRID

APERTURE

04_top view

The movie closes with a view of the firm's official entry to the competition, a 30-by-40-inch board containing conventional plans, sections, elevations, and perspectives.

05_perspective

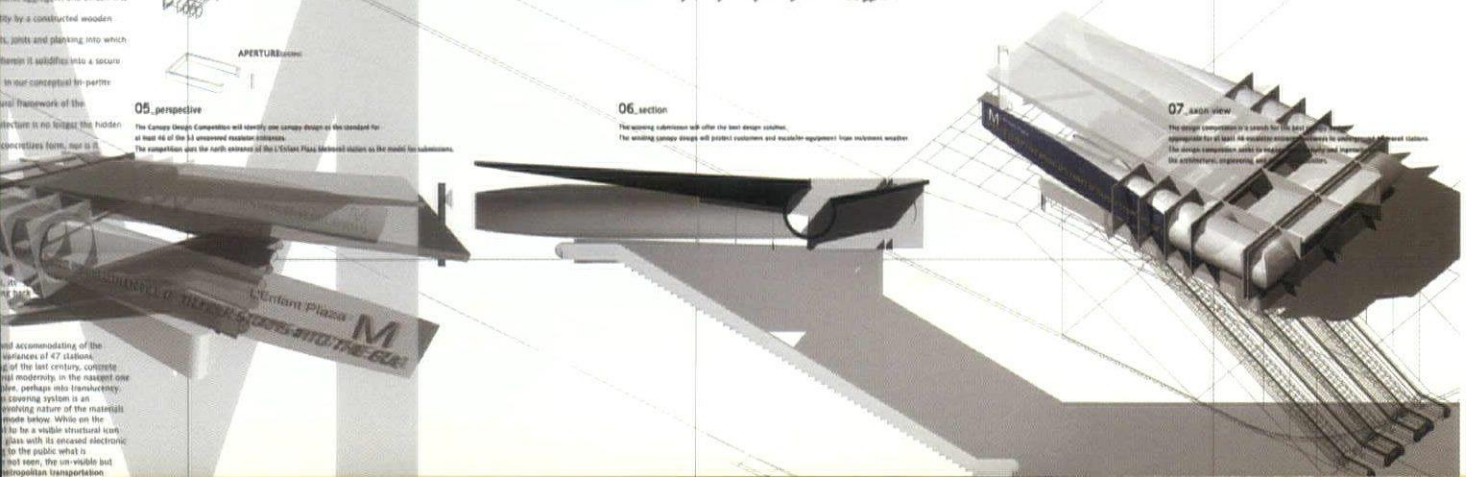
The Canopy Design Competition will identify one canopy design as the standard for at least 46 of the 53 uncovered escalator entrances.
The competition uses the north entrance of the L'Enfant Plaza Metrorail station as the model for submissions.

06_section

The winning submission will offer the best design solution.
The winning canopy design will protect customers and escalator equipment from inclement weather.

07_axon view

The design competition is a search for the best [illegible] design appropriate for at least 46 escalator entrances to underground Metrorail stations.
The design competition seeks to improve [illegible] and improve the architectural, engineering and [illegible] characteristics.



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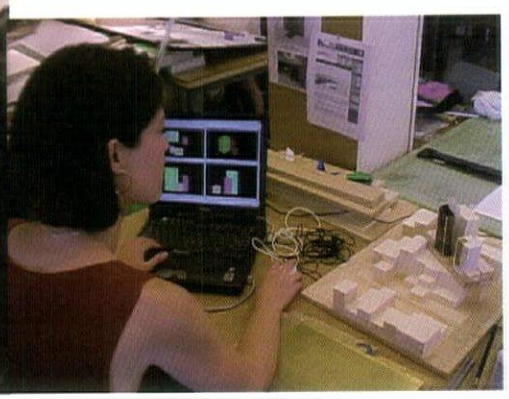


Methods of representation have changed radically between 1937, when students rendered by hand on linen paper (left), and today, when computers are the norm (below).

THE ACADEMY, THEN AND NOW

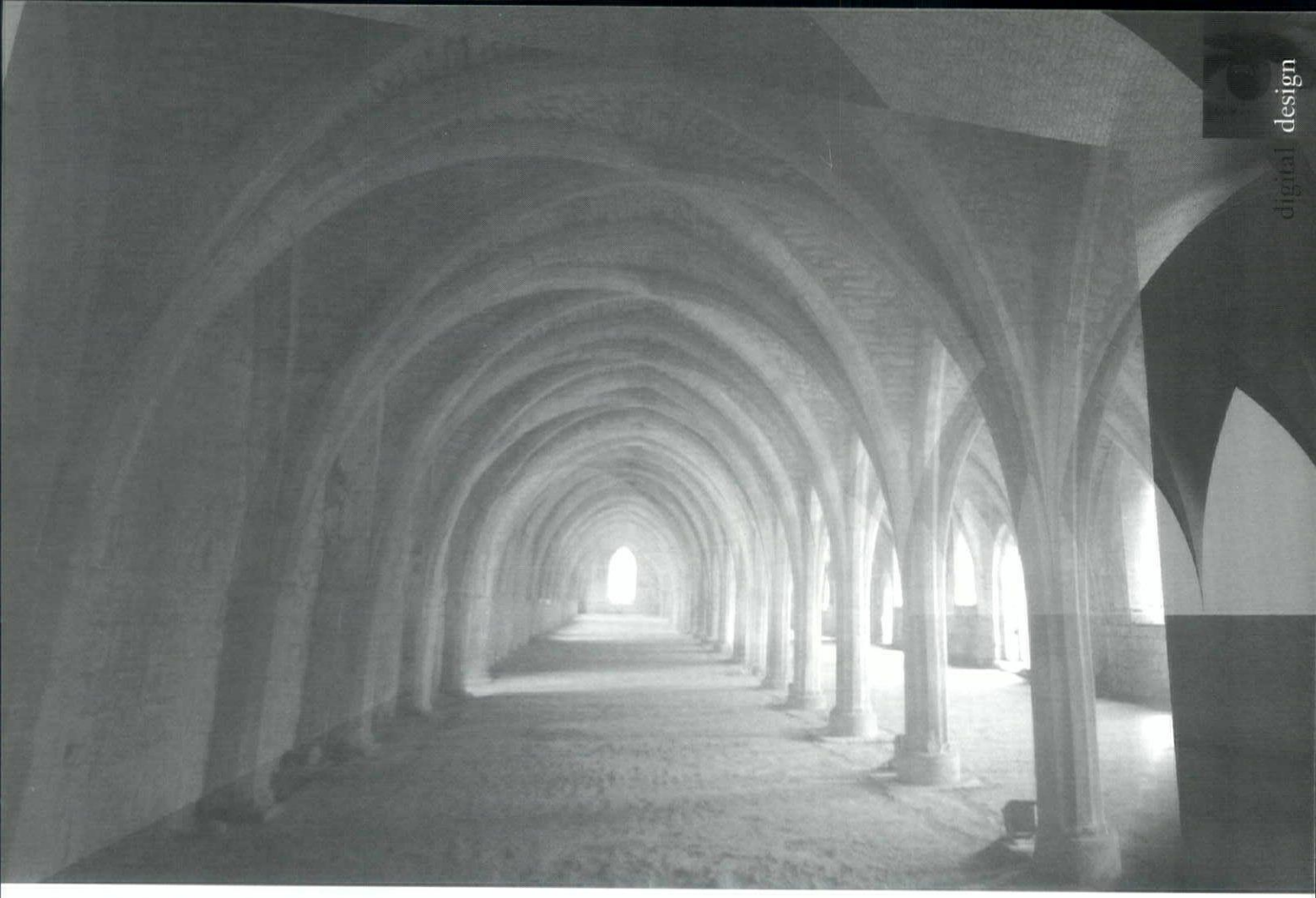
By Earl Mark

If we look at the working design methods of an architectural student today and those of one at the University of Virginia more than fifty years ago during the height of its affiliation with the "Ecole des Beaux Arts," appearances differ greatly. A photograph of a student from the Class of 1937 depicts a young man dressed in a cleanly pressed shirt, looking out over a drawing table at an overgrown field and drawing on linen paper. The lines he draws are his lines. They reflect his own signature style. Details that he adds to the drawing fuse together the concept evolving in his mind's eye with a hand-eye skill acquired through long disciplined effort and natural ability. Architects developed their skill in school to make traditional drawing media yield a compelling vision of a world that reflected their sense of good design, building technology, and proportion.

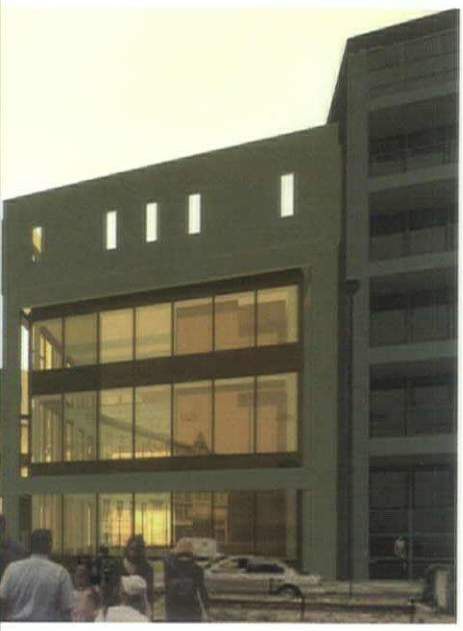
On the other hand, a photograph of a young designer at U.Va. today is more likely to show an eclectic mix of computer-based and traditional paper-based media. The lines he or she draws are not always the direct byproduct of his or her own hand, but sometimes the indirect result of instructions to a computer drawing package. The link between hand and eye is now a more limited part of design. Some critics argue that much has been lost in the process, while others believe that this eclectic approach is far behind the times.

The widespread application of computers in design education is now entering its third decade. The initial display technology and some early design methods in computer-aided design were pioneered in 1963 by Ivan Sutherland, a Ph.D. student in engineering at MIT. This technology was adapted to architectural practice in the late 1960s, and by the end of the 1970s was beginning to enjoy commercial success. The emergence of a fast-growing computer-aided design market in architecture, engineering, and construction became the target of a highly competitive industry in the early

Computer-generated renderings, such as this scheme for an artist's colony by graduate student David Neff, are common in the schools today.



As part of a historic reconstruction project exploring surfacing technology, Earl Mark developed this perspective photo match of computer-generated vaults based on the architecture of Fountains Abbey in Yorkshire, England.

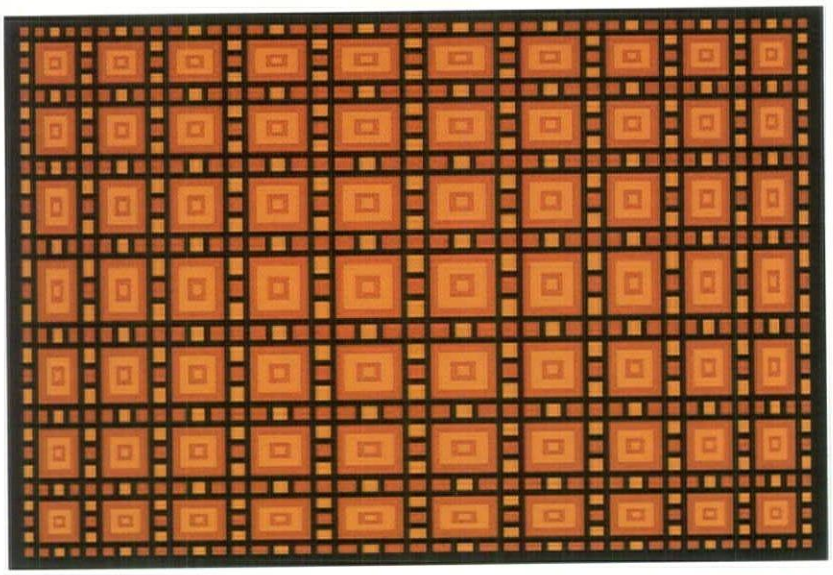


1980s. It has now reached maturity and new advances continue, both in terms of the subtlety of representation and the extension of computers into the physical realm. That is, computer-generated output within a growing number of architecture schools now includes physical three-dimensional models, building components, and other physical objects. Resistance within a number of schools of architecture began to fade by the early 1990s under accreditation reviews and pressures from professional practice. Today it's an inescapable fact that schools of architecture need the technology to be competitive in the present educational marketplace.

But computer-aided design methods and other computer applications related to the studio do not necessarily supplant all uses of traditional paper-based media. It is difficult to find a substitute for capturing the fluid and fleeting ideas that may be revealed in a rapid sketch, although research on this problem with electronic media – notably by Prof. Donald Greenberg at Cornell – is moving forward. Physical models allow students to work with materials and explore their tangible and tectonic qualities. Computer-generated 3-D models are modifiable in dynamic ways. For example, they can be constructed as a "kits of parts," in which each part can be adjusted in scale – such as a window that has muntins of a constant cross-section but glazing that is expandable in area.

At U.Va., the approach is increasingly to mix both traditional and computer-based modeling techniques. It is an approach that allows a three-dimensional computer model to be transferred to a physical model through numerical control processing and laser-cutting equipment. A cyclical design process occurs as a physical model is re-digitized back into a computer-based geometrical model, and further modifications are made to it.

In one example, a computer program is harnessed to a computer-aided design



Designs based on logarithmic patterns, such as this reproduction of Persian tile after an original by Owen Jones, can only be generated with precision by harnessing software to a computer-aided design system.

system to generate a rusticated stone pattern on wood. The computer procedure was developed according to a pattern of rusticated stone initially drawn by Sebastiano Serlio in his classic *Five Books of Architecture*. First, the stone pattern is replicated. Next, a logarithmic progression is applied to the computer procedure in order to produce a further development of the original stone pattern. Finally, the pattern is transferred to a laser cutter for etching into wood. The ratios of this logarithmic pattern are such that it would be very difficult to reproduce by hand. Similar processes can be applied to milling and routing machines to make physical models, but the geometry can be more complex and precise than what would typically be achieved by hand.

In a broader application, a computer-generated three-dimensional CAD figure can be translated into a three-dimensional physical model through a number of output devices. The physical model can be reworked and then digitized as the basis for a second-generation computer-generated model. The physical media offer the advantages of tectonic expression and tactility. The computer-based media offer the advantages of malleability and complex geometry. So the process, in effect, is coming full circle. The latest advances in computer technology are leading designers back to the benefits of working with three-dimensional media.

A further advantage is that we can now look to nontraditional means of generating form. The formal composition is not necessarily first crafted by hand. Rather, as in the case of a logarithmic progression, the architect may first conceive the formal composition by preparing the logic for a computer procedure.

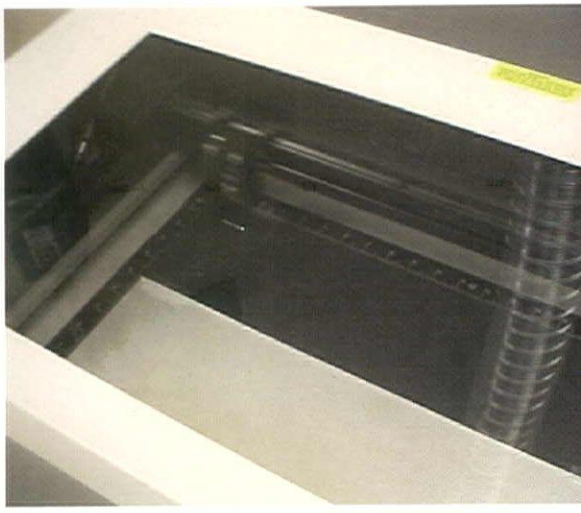
The computer also has given us a common interdisciplinary three-dimensional model of the built and natural world. We can overlay different analytical perspectives by combining, for example, a geometric model of a building with a digital terrain model of its site. We can also overlay geographic information systems (GIS) models of the surrounding environmental or urban context. We can derive computer graphic animation from the model and simulate movement in real time. Site and building survey information can be added to the mix of representations through the use of three-dimensional laser scanning and surveying equipment. The computer also permits digital video site location footage to be captured alongside traditional sketches in the field, and all this again juxtaposed with a three-dimensional computer model. In addition, the computer serves as a telecommunications device linking remote participants in a design process through videoconference technology, while simultaneously allowing for multiple access to the same 3-D computer model.

Improved computer applications are continually exciting the imagination of the design disciplines. Advances in simulation of materials, energy, and lighting, advanced structure analysis, and more complete ways of manipulating a digital terrain model all constitute important strategies emerging in the design studio.

At the same time, the basis for an architectural education has not been so radically altered as to become unrecognizable to former graduates. The critical reasoning and conceptual understanding of architecture still reflects a strong emphasis on developing careful representations of the three-dimensional world, a discriminating attitude towards materials, time, and place, and ultimately, a good eye and design judgment. The jury-based studio system is still the ultimate arbiter of students' creative design abilities. The resulting curriculum is not one of a radically new field, but one that has been carefully integrated and debated relative to the position of the new digital technology. While the new spatial and data analysis tools have the capacity to expand the repertoire of design methods, the basic orientation may not be so markedly changed.

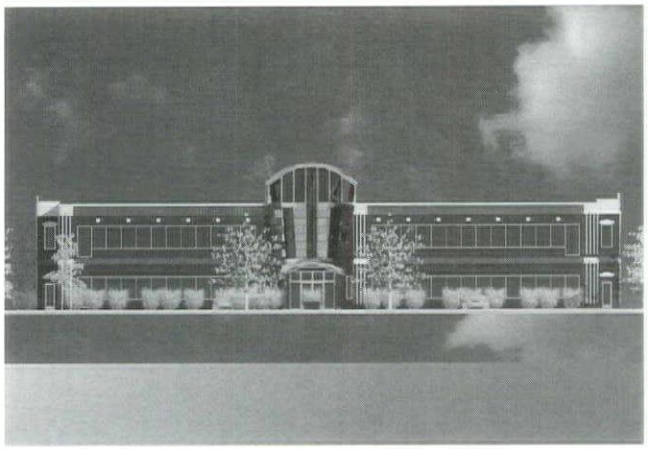
Were he to be transported forward in time, that young man in the Class of 1937 would find a more diverse and greatly expanded student body, but would identify with the values and analytical methods still being employed today. Nonetheless, he might have a few advantages in conceptual skills acquired through a more complete education in traditional means of drawing. The loss of those skills is a legitimate concern, but can be minimized by merging the best of old and new representation methods. Achieving a better and meaningful balance is perhaps the greatest challenge for the current generation.

Associate professor Earl Mark, Ph.D., is director of computer technologies at the University of Virginia School of Architecture. He also practices at Johnson, Craven & Gibson Architects in Charlottesville.



Data from the 3-D computer model can be linked directly to a laser cutter (above) to make a tangible model.

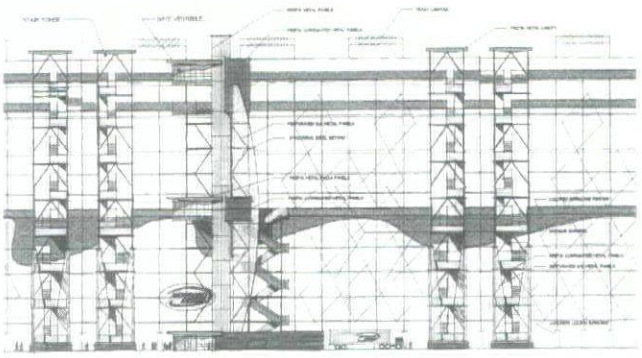
On the Boards



Architect: Achitecturra Design Group, Inc., Newport News

Project: Cedar One

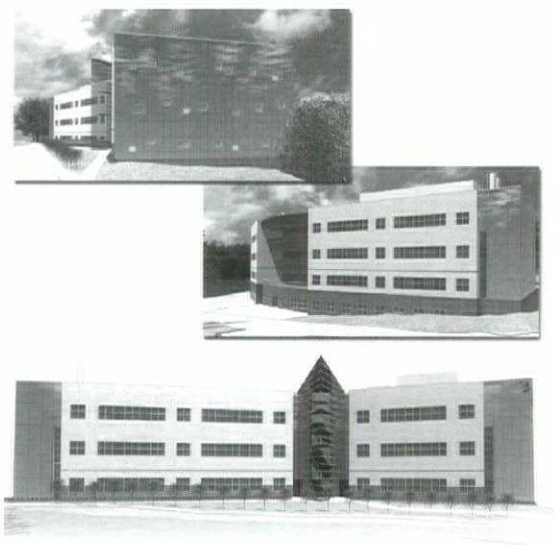
Cedar Enterprises Number One, a 20,000 s.f., 2-story building, is the first of several class-A office buildings in Oyster Point office park. ADG has ringed all offices, conference rooms, and support functions around a 2-story central atrium that will allow natural light into the core of the building. Tel: 757-873-9644



Architect: Baskervill & Son, Richmond/Timmons, Richmond

Project: Richmond International Raceway

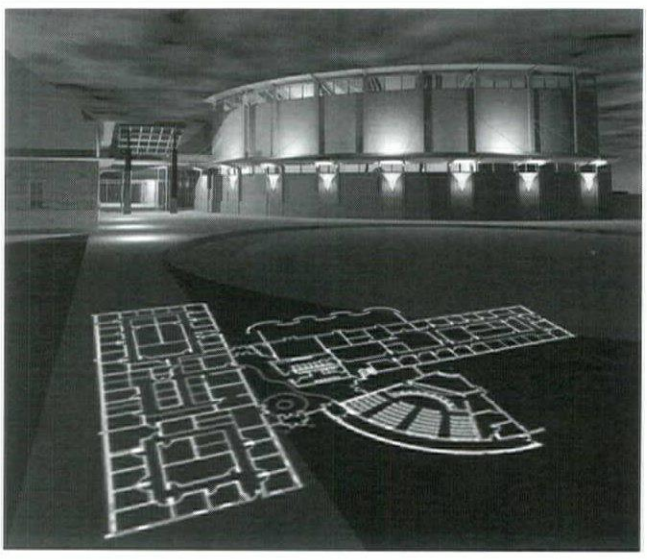
Hosting Virginia's largest spectator event, Richmond International Raceway plans to increase its seating capacity from 105,000 to 150,000 seats. The master plan and design include bold new graphics, new site amenities, elevated corporate suites, and an elevated pedestrian plaza. Tel: 804-343-1010



Architect: Clark Nexsen Architecture & Engineering, Norfolk

Project: Sciences Research and Teaching Building

This 68,168 s.f., 4-story research laboratory facility at the Va. Instutute of Marine Science will house several departments including physical science, biological science, fisheries science, and the aqua cultural genetics and breeding technology center, as well as a distance learning center. Tel: 757-455-5800

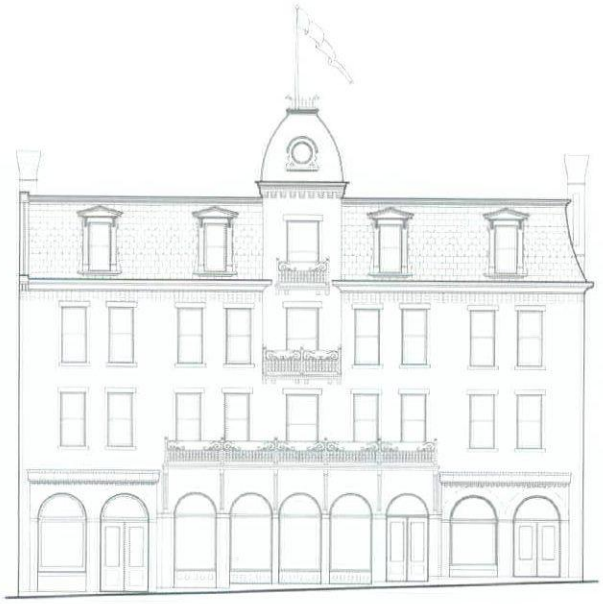


Architect: DMJM, Arlington

Project: Government Office Building

James City County is expanding the Government Center with a new 24,000 s.f. administrative building. The design provides flexible office space in two wings framing the curved wall of the board room. Photovoltaic panels are incorporated on the south wing and public entry canopy. Tel: 703-807-2518

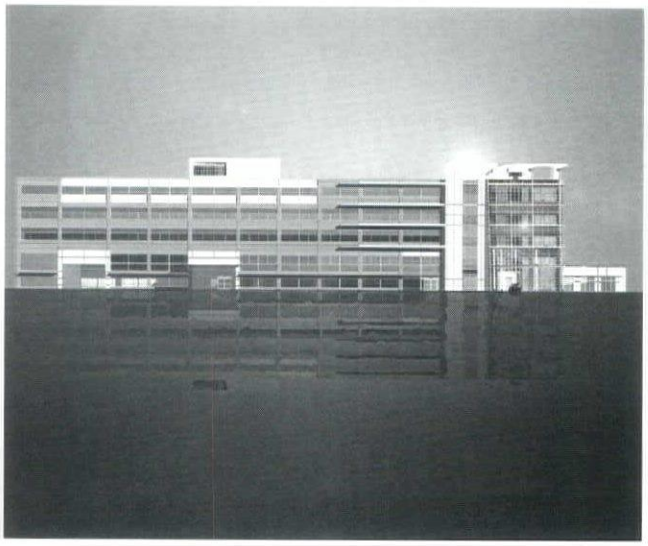
On the Boards listings are placed by the firms. For rate information, call Inform at 804-644-3041.



Architect: **Frazier Associates, Staunton**

Project: **R.R. Smith Center of History & Arts**

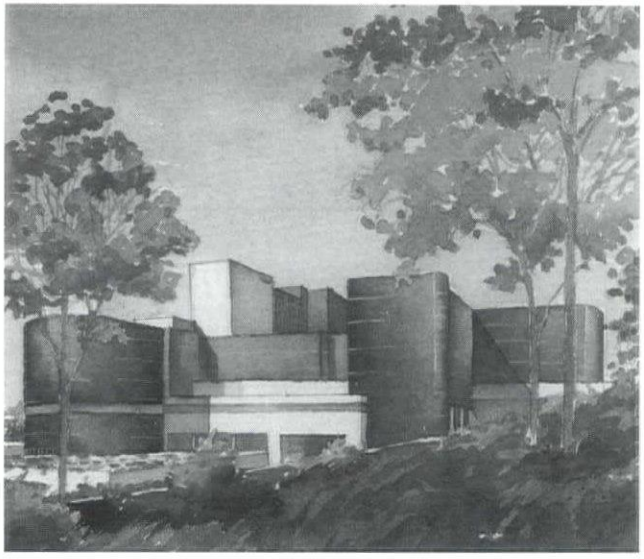
This 25,000 s.f. historic hotel in downtown Staunton will contain galleries, a lecture hall, conservation lab, archival storage, gift shop, studios, and offices for three nonprofit groups: Historic Staunton Foundation, Staunton Augusta Art Center, and Augusta County Historical Society. Tel: 540-886-6230



Architect: **Gresham Smith & Partners, Richmond**

Project: **Chippenham Johnston Willis Medical Center**

The centerpiece of this project is the new 130,000 s.f. heart pavilion, which also includes an expanded ER and medical office space, and will serve as the main entry to the hospital. The existing hospital will undergo a major façade renovation that will visually connect it to the new building. Tel: 804-270-0710



Architect: **HSMM, Inc., Roanoke**

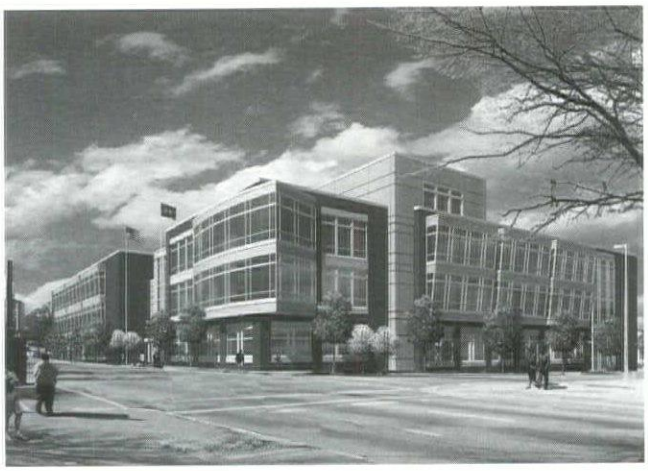
Project: **Addition to Carilion Roanoke Memorial Hospital**

HSMM and consultant HOK are teamed with Beers Construction Company to build a 142,000 s.f. addition to Carilion Roanoke Memorial Hospital. The addition includes general and vascular surgery, angiography, and intensive and progressive care units. Tel: 540-857-3257

Architect: **HVC-Chenault, Richmond**

Project: **Prince George County Administration Building**

The new 72,500 s.f., 3-story administration building will fulfill Prince George County's 2010 master plan. The plans include a board meeting room, offices for the county administrator, and 12 departments. The design is "customer focused." Tel: 804-225-9900



Architect: McKinney & Co., Ashland, with CUH2A laboratory consultants

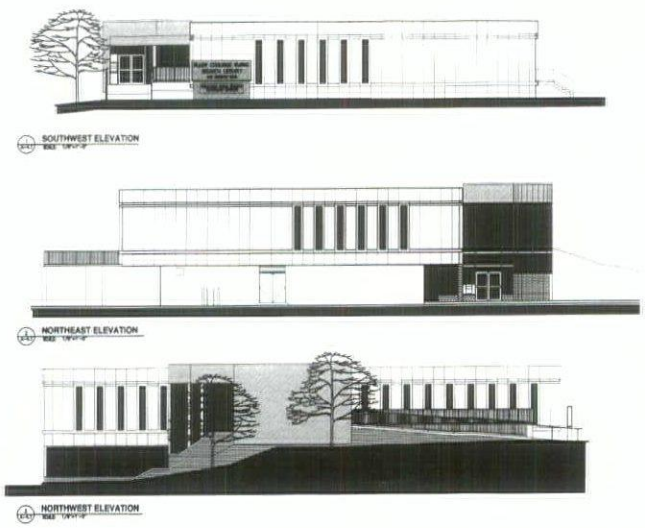
Project: Virginia DGS/Division of Consolidated Laboratory Services

The design challenge of this project at the Virginia Biotechnology Research Park is to create flexible workspaces that easily adapt to the changing mission of DCLS. This 194,000 s.f. laboratory will provide services ranging from newborn screening to motor fuels testing. Tel: 804-798-1451

Architects: Mitchell/Matthews Architects and Urban Planners, Charlottesville

Project: Kentlands Office Building

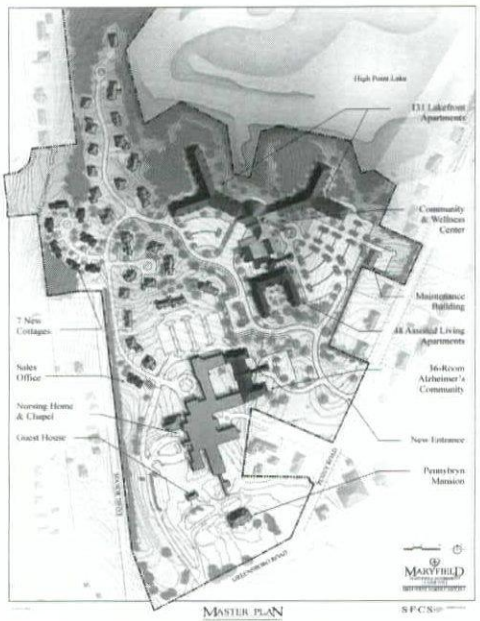
Mitchell/Matthews has just completed conceptual design work on this 30,000 s.f. law office at Kentlands in Gaithersburg, Maryland. The building's form, materials, fenestration, and site layout were influenced by the strict design code of this famous New Urbanist development. Tel: 434-979-7550



Architect: Murray & Associates, Glen Echo, Md.

Project: Ellen Coolidge Burke Branch Library

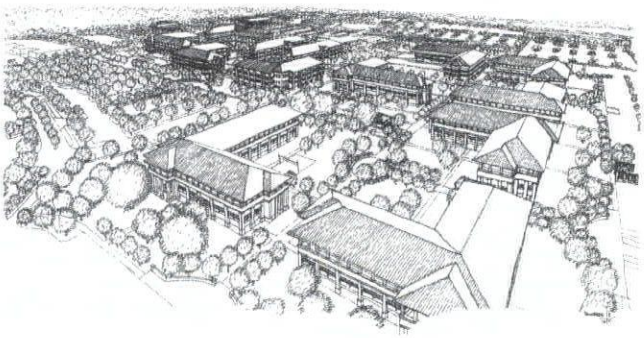
In this project the existing Alexandria Public Library is redesigned, creating a more efficient city library and a technology service facility for the Alexandria Public Schools. A new elevator lobby and stairway are being added to create a more inviting entrance. Tel: 301-320-6305



Architect: SFCS, Inc., Roanoke

Project: Maryfield

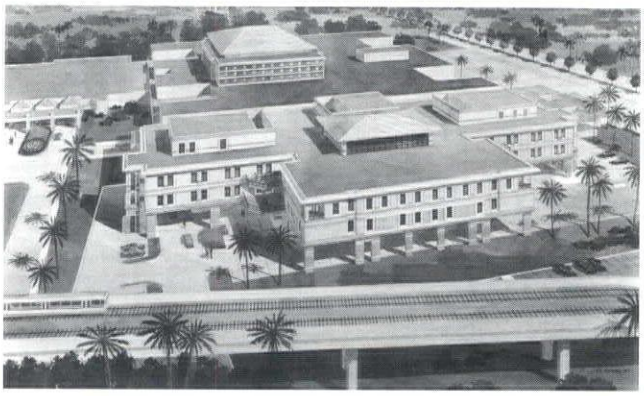
This $50 million project will add an independent living building with 130 apartments and a 50-unit assisted living facility to a High Point, N.C., retirement community. A 20-unit AL facility and new community and wellness centers are also planned. Tel: 540-344-6664 / tc@sfcs.com



Architect: The TAF Group, Virginia Beach

Project: Langley Air Force Base Master Plan

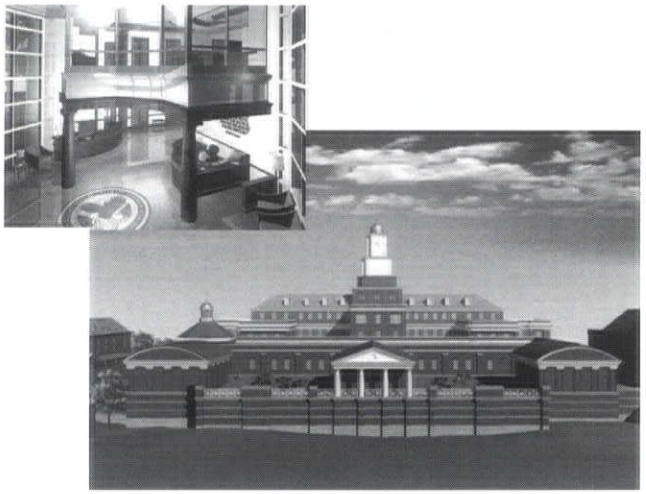
The site plan development recommendations for Langley Air Force Base will be implemented in two phases. Phase I includes the construction of 8 new dorms, adding 816 rooms, and parking lot improvements, adding 639 parking spaces. Phase II creates 4 new dorms and 170 parking spaces. Tel: 757-340-5055



Architect: URS, Washington, D.C.

Project: Hospital Addition, VAMC

This 127,000 s.f. 2-level addition in San Juan, Puerto Rico, is elevated 25 feet above grade to preserve parking and align with existing hospital functions. Seventy ICU and 90 acute beds are grouped around a central atrium and core. Garden terraces are provided for patients and visitors. Tel: 202-872-0277



Architect: URS, Washington, D.C.

Project: Ambulatory Care Center, Veterans Administration Medical Center

This 67,000 s.f. 2-level addition in Lyons, N.J., is surrounded by National Trust buildings serving other hospital functions. Ten clinics are gathered for 1-stop service in a mall-like scheme with a focal 2-story entry. Patients and visitors view the historic mall from elevated terraces. Tel: 202-872-0277

Architect: Wiley & Wilson, Lynchburg

Project: Fluvanna County Public Safety Building

Maintaining the architectural and historic character of Fluvanna County was a primary consideration while designing this new Public Safety Building. Additional services included developing architectural design standards for the 1,000-acre Pleasant Grove development. Tel: 434-947-1901

Taking Note

The Basement Redefined

People often ignore their basements. Dark, dank, and utilitarian, basements are often used to store things that really should be thrown away or to unceremoniously house water heaters and furnaces. What, thought architect Randall Mars, AIA, if one could transform the basement into more than a really big closet, more than a moldy place for junior's band practice, more, even, than thin wood paneling and a wet bar?

Pre-renovation, the basement of Randy Luskey was the rule, rather than the exception, with ductwork and steel beams complicating matters throughout. Mars, principal of Randall Mars Architects in McLean, decided to work with these obstacles, using them to suggest dropped ceilings and dictate the location of walls. The most dramatic form owes its existence to the ductwork it shelters: the central dropped, angled ceiling was sheathed in dark wood to accentuate its off-kilter orientation, pulling together the transitional area between the hallway, billiards room, and den. Other areas feature "baffles," where the ceiling was pushed up between existing floor joists for visual and acoustic effect. Walls were placed to complement the ceiling forms, situated at unorthodox angles to highlight the unusual perspectives and to define spaces.

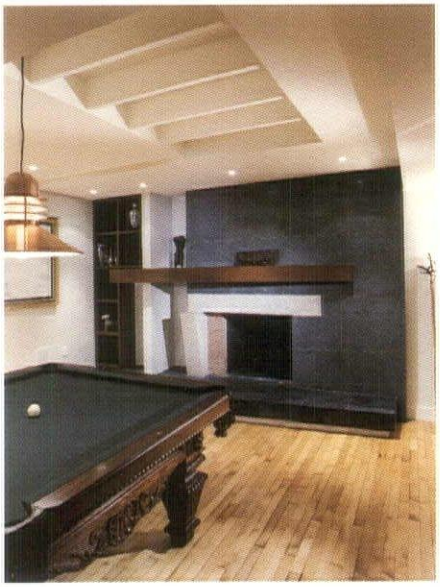
To accentuate the design's angularity, Mars installed a fireplace façade of black granite, cherry wood, brick, and Kasota stone featuring right and oblique angles. The remainder of the public area was painted white, eliminating all traces of traditional basement mustiness, and covered with a layer of light wood flooring. Mars felt one final touch was necessary, and designed a gridlike system of cabinetry.

Though the public area is decidedly the centerpiece of Mars's design, the hallway leads to a more orthodox guestroom and bath with similar finishes. There's also storage space to spare, hidden behind hallway doors. Think of it – what had previously housed only a water heater and outdated furniture is now three separate areas: one for recreation, one for guest quarters, and one not-so-tiny area for appliances and storage. If only the rest of the world were so efficient.

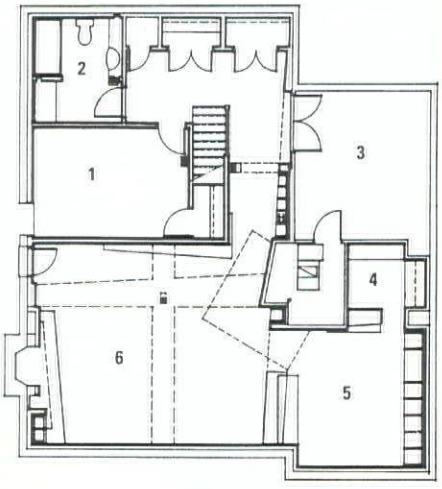
— Rebecca E. Ivey

Photos: Gordon Bealle

The architect designed the cabinetry, which employs a rigid grid of perpendicular lines, to contrast with the skewed, oblique angles of the interior architecture.



For acoustic effect and aesthetic interest, the ceiling was pushed up between floor joists, creating a baffled effect.



Basement Plan

0 5 10

1 Guest Room
2 Guest Bath
3 Storage
4 Bar
5 Den
6 Billiards Room

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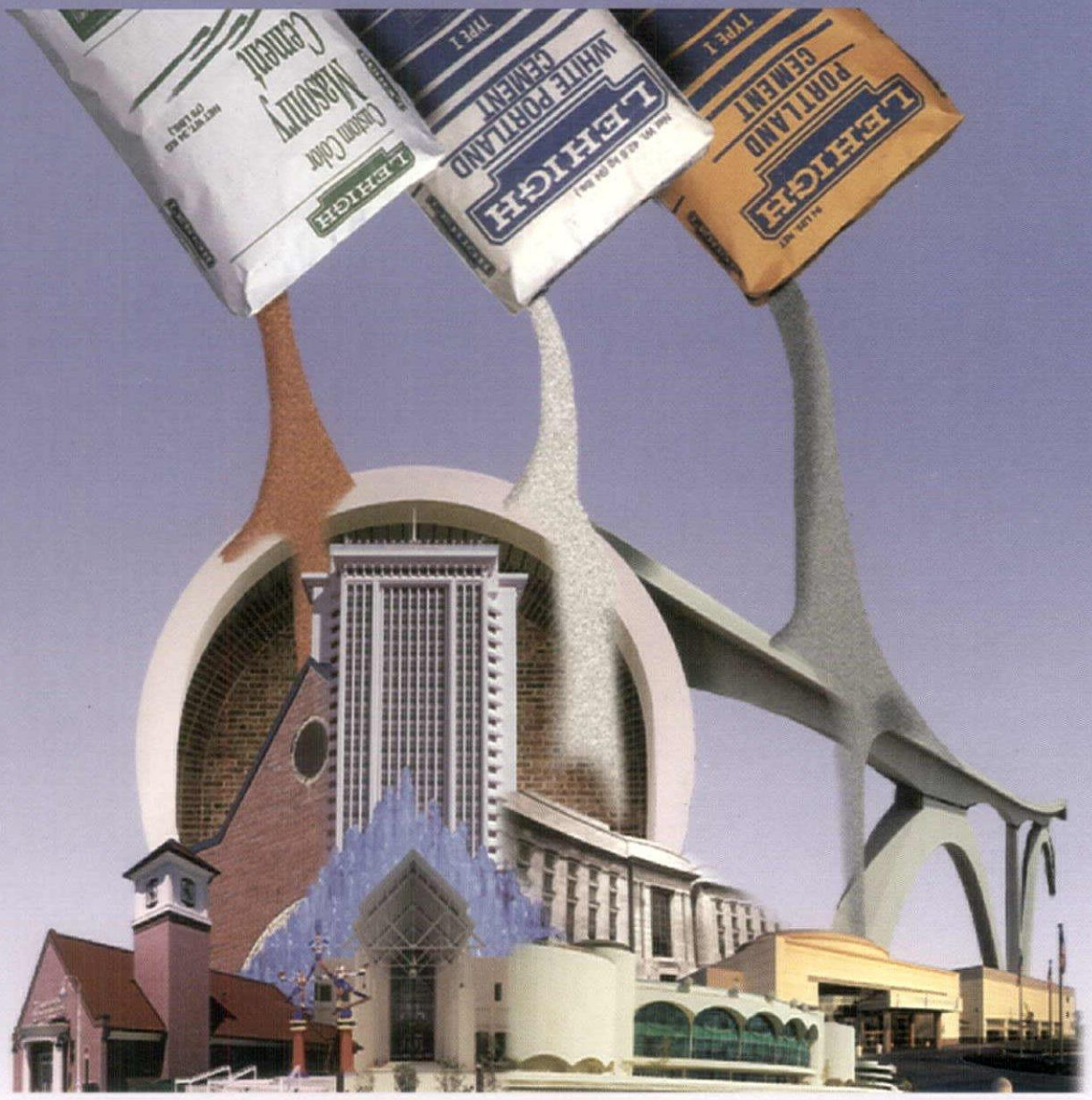

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