The typical "sidewalk superintendent" would probably claim that building structures haven't changed much over the years, that many of them are larger, but still use the same steel and concrete beams and columns. However, though not apparent to a casual observer, structural design has changed dramatically in the last twenty years. The computer, high-strength steel and concrete, and improved construction methods are resources that have become available. Advancements in structural design have occurred as the architect and engineer have found innovative ways to use these new resources. Many projects could not be built today without the cost savings which have resulted from use of advanced structural design concepts.

STEEL AND CONCRETE COMBINATION SYSTEMS: Design Flexibility

Until recently, the beams and columns of high-rise buildings have been either all concrete or all steel. In 1978, the design of One Union Square by TRA, architects, and Skilling Ward Rogers Barkshire Inc. (SWRB), structural engineers, departed from this concept by using the combination of a slipformed concrete shear-wall core surrounded by steel floor-framing and steel exterior columns. Both the strength and stiffness of concrete and the light weight and speed of erection of structural steel were used to their individual advantages. Similar structural systems have been used by SWRB in Seattle's March and McLennan Building and in the Veteran's Administration Hospital, both by The NBBJ Group.

...continued on page 4.

Comparison of three structural frames. Two, the moment-resisting frame and the concentric braced frame, are in common use. The third, the eccentric braced frame is a newly developed concept which accommodates bending locally rather than causing it to be transferred throughout the frame.

MOVEMENTS In Structural Design
From the Editor:

So many of our standards for ourselves, as well as the public's expectations of us as members of the design professions, are derived from images of The Artist intensely in pursuit of an aesthetic idea. The Craft implicit in being an architect or designer is allowed to remain uncelebrated, if not unexamined. Yet the nitty gritty of things could be the source of deep personal satisfactions for many of us. This issue of ARCADE is a venture into the design challenges and rewards of the less glamorous part of architecture without which there could be no greater whole.

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COLUMN OF MANY ORDERS

WOMEN AND MINORITY BUSINESS

people may find the business climate improving as a result of the new State of Washington requirement (SB 3230 - 1983) that state contracting be adequately shared among minorities (9.1% of the total base) and among women (5% of the labor force being 1983-84 goals). Two sources of information regarding these opportunities are the new state Office of Minority and Women Business Enterprises in Olympia and the Association of Washington Business-\n\nnes, also in Olympia, which offers semi-\n\nars of a how-to-do-business-within-the-\n\nstate-purchasing-system nature.

EARLY THIS FALL SEVERAL INDIVIDUALS who represent the informal architectural networks of our community were asked to attend a meeting to plan a day-long monthly meeting for January, the intent of which was to focus on "young offices," which seem to comprise the largest segment of the active community with the least amount of contact with the AIA. The theme seemed to evolve from the accumu-\n\nation that the AIA was not meeting the needs of the younger membership and to drive to increase new memberships, and an expressed desire to begin a design dialog, which was hoped that fresh new work would prove a critical discussion that had been lacking regarding the larger and more public work of established design firms.

The newly formed program committee (a majority were non-AIA members) deliber-\n\ated on several issues — how to generate dialog, the subject of "dialog," whose work should be shown, who to invite, and how and where to show the work. A list of "young offices" was made who were asked to present work. Most of them were not members of the AIA. The hope was that the work would be of high quality and virtually unknown, and that it would provide a stimulus for dialog. A theatrical setting was chosen to encourage communication, a la group in an un-\n\nure-like atmosphere, and possibilities for "provocateurs" — persons whose role would be to initiate discussion — were enumerated. The choices included archi-\n\ntects as well as persons in related design professions in an attempt to find some new perspectives from which to view the work.

The list of "young offices" solicited, a group of eighteen architects, designers and design-builders met in early December to discuss the January AIA meeting. They all were enthusiastic about a show and the discussion of one another's work, but the majority decided not to exhibit under the auspices of the AIA for many reasons which include the following: a concern about the AIA's motivation to sponsor this meeting, a desire to discuss other issues than their work being in the AIA, and a disregard for the opinions of the AIA as an institution. The meeting was animated and long, which was surprising considering that these people had never met as a group (or "non-\n\nmembers," as someone mentioned), that they hoped that this group will find a way to share their work and ideas more informally, with each other and with the design commu-\n\nities in Seattle.

The AIA meeting took place January 18th at A Contemporary Theatre with eight practitioners presenting their work, which was discussed by three "provocateurs." More than 300 people attended — an indica-\n\ntion of a lively interest in the discussion of design. Hopefully, other organizations, and the AIA, will take advantage of this energy to provide future opportunities to discuss local work and also address con-\n\ncerns about the organizations themselves.

IT'S NOTHING PERSONAL, RICHARD

by Elizabeth Sakson

AGENDA

by Richard Edmonds

In 1975, $650 million Central Park in Bellevue's future.

IN AN UNPRECEDENTED DECISION, eligibility for the National Register of His-\n\ntoric Places has been granted to the origi-\n\n
ral of America's most visible fast food restaura-\n\nts, McDonald's. The owners have declined actual registration, fearing limita-\n\ntions which would prevent them from de-\n
stroying the building.

The McDonald's phenomenon began in 1953 and set standards for an entire indus-\n\try. The famous golden arches, although never a structural element, were at one time a national symbol. They yielded to an emphasis on interiors as the franchise developed, probably including an outdoor performance space. Says Wundram, "Noth-\n\ning will be rejected because of its contents. What we really want is a concept, to stretch the designers' and the judges' imaginations.

SEATTLE'S URBAN PARK IMBROGLO (the infamous Westlake Mall) is about to be put into a new perspective by the appar-\n\ntee ease with which Bellevue (Seattle's counterpart to the easiest way to get to a major urban center) has positioned itself to gain both national design status and a quiet major public open space in the heart of its downtown. How? The Cen-\n\ntral Park Design Competition, sponsored by the Bellevue Parks Department and organized by Ed Wundram, the man who put together both the Portland Building and Tacoma Dome design competitions. The site is a 7.5-acre area bordered by 102nd Ave. NE, immediately south of Bellevue Square, and part of the pedestrian core in the City's master plan. Among the invitees are residents and businesses elicited 5,000 re-\n\nsponses which form the basis of the competition: entrants will receive a fifteen-page document which presents survey re-\n\nults rather than a program which interprets them. Generally, the idea is that, in place of the existing School District Head-\n\nquarters and High School facilities, a unique place for passive recreation will be developed, probably including an outdoor

Advertisement

ARCADE

February/March Issue:

WOMEN AND MINORITY BUSINESS

Column of Many Orders

PRODUCTS IDENTIFIED BY BRAND name have a 90% chance of being installed, according to a recent study by Sweet's. And even when the specs are changed, it is the original architect or engineer who make the substitution 61% of the time, and probably to save $$.

COCAS "PUBLIC COMMENTS" EXHIB-\n\n
it has been extended through 2/18, at 2216 Western, Tu-Sat 11-6 and Th 11-8.

"Public Comments" is a collection of works by seven artists presenting a remarkable variety of images and styles. A key to the exhibit's energy is the tension created by the juxtaposition of art works presenting strong political imagery from both communist and capitalist perspectives.

SEATTLE'S URBAN PARK IMBROGLO (the infamous Westlake Mall) is about to be put into a new perspective by the appare-\n\ntee ease with which Bellevue (Seattle's counterpart to the easiest way to get to a major urban center) has positioned itself to gain both national design status and a quiet major public open space in the heart of its downtown. How? The Central Park Design Competition, sponsored by the Bellevue Parks Department and organized by Ed Wundram, the man who put together both the Portland Building and Tacoma Dome design competitions. The site is a 7.5-acre area bordered by 102nd Ave. NE, immediately south of Bellevue Square, and part of the pedestrian core in the City's master plan. Among the invitees are residents and businesses elicited 5,000 responses which form the basis of the competition: entrants will receive a fifteen-page document which presents survey results rather than a program which interprets them. Generally, the idea is that, in place of the existing School District Headquarters and High School facilities, a unique place for passive recreation will be developed, probably including an outdoor performance space. Says Wundram, "Nothing will be rejected because of its contents. What we really want is a concept, to stretch the designers' and the judges' imaginations. . . . Bellevue wants the widest possible exploration of design solutions, and it wants public participation in the process — not a choice of one." Vincent Scully will act as Advisor to the jury, commenting on the site's potential and on the "renaissance" in an historic context, and analyzing the entries. Jurors include UW Professors Norman Johnston and Sally Schauernau, five Bellevue citizens appointed by City Council, the Director of the Parks Department, and the Director of Planning. Materials will be available February 15; the entry deadline ($100 registration fee) is March 15; Phase 1 entries are due May 8. Three to five winners will be selected to develop their concepts in exchange for a $150,000 fee. The ultimate winner will be commissioned to design the $5 million Central Park in Bellevue's future.

Part of the shopping arcade in the recent Madison Hotel, this column seems to have found its footing.

APPARENT CONTRADICTIONS

IN AN UNPRECEDENTED DECISION, eligibility for the National Register of Historic Places has been granted to the original of America's most visible fast food restaurants, McDonald's. The owners have declined actual registration, fearing limitations which would prevent them from destroying the building.

The McDonald's phenomenon began in 1953 and set standards for an entire industry. The famous golden arches, although never a structural element, were at one time a national symbol. They yielded to an emphasis on interiors as the franchise developed, probably including an outdoor performance space. Says Wundram, "Nothing will be rejected because of its contents. What we really want is a concept, to stretch the designers' and the judges' imaginations. . . . Bellevue wants the widest possible exploration of design solutions, and it wants public participation in the process — not a choice of one." Vincent Scully will act as Advisor to the jury, commenting on the site's potential and on the "renaissance" in an historic context, and analyzing the entries. Jurors include UW Professors Norman Johnston and Sally Schauernau, five Bellevue citizens appointed by City Council, the Director of the Parks Department, and the Director of Planning. Materials will be available February 15; the entry deadline ($100 registration fee) is March 15; Phase 1 entries are due May 8. Three to five winners will be selected to develop their concepts in exchange for a $150,000 fee. The ultimate winner will be commissioned to design the $5 million Central Park in Bellevue's future.
Dear Reader of ARCADE:

Can you find the mistake on page 3? A line of type from the first column of the Energy Code article slipped down into the title of the Joint Design article, in an unsuccessful effort to leave the issue. Please cut out the line and glue it onto the correct spot on the page. Or pretend you did. Our apologies.

The ARCADE Staff
TIGHTENS UP ON THE DESIGN OF JOINTS to the existing energy code which will influence the work of all developers and architects planning and designing buildings larger than 50,000 square feet.

HISTORY. The Seattle City Council drafted a new Ordinance because of its belief that the commercial sector was not being adequately served by the city's existing energy code. The Council also believed that there was a perception that the existing code was not being enforced or monitored as much as the residential sector, a perception promoted by local lawyers who represented all the builders and developers.

The Council responded by writing Ordinance 114,630, the Major Projects Energy Analysis Ordinance. Disagreement among design professionals also contributed to the decision to adopt a new Ordinance, a decision that was adopted because it should take and on its equitable application. In passing this new Ordinance, the Council attempted to incorporate that

One or several reasons may convince an architect to shift the design responsibility to others with various results:

a) To obtain the expertise of those who specialize in particular systems. Depending upon the needs of the bidder, this may or may not be helpful in obtaining an adequate system. As a consultant, the bidder is probably able to provide helpful advice, but may not be in a position to provide unbiased advice.

b) To try to ensure the lowest cost for a specified performance level for a particular system by allowing the bidder to utilize familiar materials, techniques, and details. This is a good approach only if the architect's performance requirements are well thought out, the criteria to measure performance are properly established, and the specifications can be enforced carefully.

c) To try to avoid showing ignorance of particular building details and costs associated with those details. Approval time may only be reduced if the architect is not notified of the problem.

d) To save on expenditures of the design fee, which can be avoided by having a bidder work it out and draw it up. Much time will be required of the architect during the Design Administration phase to check shop drawings and test results, particularly if the architect did not plan to adequately cover costs associated with the required performance.

In the final analysis, for projects of large scope where the budget will allow, a full-scale mock-up is desirable to test, under laboratory conditions, the performance of the proposed system, as well as to allow the architect to observe the appearance of the built system.

Frank Carroll and Gene Edstam are architects practicing at TRA, Frank as a Project Architect, and Gene as a Specifications Specialist.

Frank Carroll and Gene Edstam are architects practicing at TRA, Frank as a Project Architect, and Gene as a Specifications Specialist.
Designing earthquake and wind resistance into the exterior of this building would have been difficult. To solve the problem, Columbia Center's structure is designed as a braced-steel-frame core, triangular in plan. At each apex of the triangular frame is a concrete column measuring approximately six by twelve feet. Concrete in these columns is capable of bearing in excess of 9,500 psi, more than twice the allowable load of commonly specified concrete.

This structural solution freed the exterior walls of bracing and closely-spaced columns by utilizing bracing in the core’s interior walls. It reduced wind-caused sway by as much as 50% because of the stiffness of the composite concrete columns. Due to the extra strength of the concrete columns, steel tonnage was reduced by 40% and structural construction costs, even including the cost of the special concrete columns, were reduced by 25%, as compared with standard all-steel designs.

13,000 small dampers, or shock absorbers, were designed into each tower of the World Trade Center. For Columbia Center, engineers invented a new, 100-times-larger damping unit.

Typical floor framing plan of Columbia Center shows triangular braced core with 6 x 12 composite columns at each apex, a system designed to accommodate lateral loads cost-effectively.

The addition of these dampers multiplied the conventional level of damping by eight. Wind tunnel tests confirmed that this provides a very comfortable cushion for acceptable levels of acceleration. Based on their use in the Columbia Center, these units should find a wide application in high-rise structures.

COMPOSITE FLOOR SYSTEMS: Their Vibration Problems

Composite construction of concrete slabs with steel beams is a system almost 30 years old. In the last 10 years, the use of thinner slabs placed on metal decks and high-strength steel in floor beams has increased. Both practices tend to reduce structural costs. However, inherent in them is the new problem of undesirable floor vibration induced by normal use of the building. This problem has inspired new research to determine acceptable levels of floor vibration through such scientific means as the “heel drop test.” A 250-pound person stands in the test area, rises up on tiptoes, and then drops heels, creating measurable vibrations in the floor. Studies of buildings less than 35 feet have been found to be most susceptible to annoying vibrations.

Typical floor framing plan of Columbia Center shows triangular braced core with 6 x 12 composite columns at each apex, a system designed to accommodate lateral loads cost-effectively.
Frank Lloyd Wright used the concept of base isolation. He thought of the mud as isolating the building from earthquake action. Why not float the building on it?

Diagram of "building base isolation" concept which allows building and ground to move independently of each other during earthquakes.

Designers can choose between two common alternatives to reduce such floor vibrations. One is to thicken the slab, which increases its weight. The other is to increase the beam size, which adds stiffness. Both reduce vibrations, but increase structural costs.

A third way to reduce vibrations is to add damping. Such a system is being developed in Oklahoma by a developer who claims it will increase damping at a low cost. If this proprietary product becomes a reality, it could make it possible to use minimal slabs and even higher-strength steel beams. The thickness of the floor would be minimized, allowing architects to increase floor-to-floor heights or lower story heights as desired.

If a building were built on rollers, theoretically no earthquake loads would be transferred into the structure at all.

BUILDING BASE ISOLATION: Seismic Invention

Structures designed to meet seismic code requirements must be able to withstand major structural damage while being rigidly fixed to the ground. A building's first floor moves with the ground's movements, creating new loads throughout the structure. If a building were built on rollers so that the ground could move back and forth beneath it, theoretically no earthquake loads would be transferred into the structure at all. (Of course, in a wind storm, the building would roll away.) This idea is the basis of a design concept called "building base isolation," the goal of which is to reduce the coupling of the building's motion and ground motion.

The concept of base isolation is not new. Professor J.M. Kelly of the University of California at Berkeley reported in the May 1982 Shock and Vibration Digest: "In his design for the Imperial Hotel in Tokyo, which was completed in 1922, Frank Lloyd Wright used the concept of base isolation. His design was in complete contrast to accepted practice and was a subject of great controversy. A layer of eight feet of fairly good soil and substratum of soft mud underlay the site of the hotel. Wright thought of the mud as isolating the building from earthquake action. The layer of soft mud below the upper layer of eight feet of surface soil was to Wright's good cushion to relieve the terrible shocks. Why not float the building on it?"

He integrated the soil layer and the building with a set of closely spaced short piles that penetrated only the soil stratum. The piles and the building were intended to float on the mud substratum. The Imperial Hotel was one of the few western-style buildings to survive the devastating Tokyo earthquake of 1923. Economics and the effects of air pollution on the soft stone used for the building brought about its demolition in the 1960s. Contemporary designs for base isolation specify a foundation of thick, layered, load-and-rear and steel-and-rear bearing pads. These pads act as springs to allow the structure to move from side to side. The system is "tuned" to reduce building motion in the frequency range common to earthquakes in the region. The reduced building motion reduces the necessary lateral load resistance in the building design. Consequently, shear walls and other lateral force-resisting elements can be reduced, giving the building a new degree of design flexibility. Associated cost savings help to offset the added costs of bearings and other lateral force-resisting elements at the base. However, reducing the lateral movement systems at less cost than required by code, at least until there are more case histories to study. Isolation systems have been used on six buildings throughout the world, only one of which is in the U.S. The Foothill Communities Law and Justice Center in Rancho Cucamonga, California.

While the concept is intriguing, it has physical limitations, one of which is the need to completely separate the building from its base. There must be an earth-quake joint all around the building at ground level which may exceed sixteen inches in width. All pedestrian entries, underground utilities, and architectural base details must accommodate this joint. Building walls must be separated from the structure. The bearing pads' capacity imposes another limit: the building can be at most approximately fifteen stories high.

In spite of these problems, a base isolation system can be considered a reasonable design solution for computer facilities, research labs, medical facilities, or any facility with equipment sensitive to motion.

ECCENTRIC BRACED FRAMES: The Structural "Fuse"

Two types of steel frames are commonly used to resist wind and earthquake forces: the moment-resisting frame (MRF) and the concentric-braced frame (CBF). In a CBF, the centerlines of the braces, columns, and beams meet at a joint all fixed at a single common point. In a MRF, there are no braces; the frame gains its "sway resistance" from rigid connections of the beams and columns. In regions of seismic risk, building codes require a backup MRF for any CBF in buildings more than 160 feet high to improve their energy-absorbing characteristics and ductility. Even so, a CBF generally has a lower construction cost than an MRF.

Since 1976, Professor E.P. Popov of the University of California at Berkeley has been recognized for his research and advocacy of a new type of steel frame, the eccentric braced frame (EBF). An EBF is similar to a CBF, except that the braces in an EBF interlock the beams at a short distance from the beam-column intersection. This offset, or eccentricity, causes bending in the beams. During a major earthquake, this bending, while causing localized damage, dissipates some of the destructive energy of the quake. The damaged area can then be repaired, much like a broken fuse in an electrical system. The EBF system is applicable to buildings of all heights.

The EBF offers a unique option between the cost and performance characteristics of the standard systems. An EBF has an advantage over a CBF: eccentricity and brace layout have more flexibility to meet architectural requirements. A few buildings in California employ this concept, but none in the Northwest.

FUTURE DEVELOPMENTS: More to Come

If the trends of the last twenty years are any indication, the next twenty promise to be dynamic, exciting times for structural design.

Common materials will be stronger. Concrete strengths should reach 12,000 psi, and steel strengths 60,000 psi. Improved fiber-reinforced concrete will find many new uses. Much research and development will be focused on new methods of resisting earthquake loads. Some of the most important work in this area will be in the upgrading of historic buildings and buildings built before 1970.

The future promises to be exciting as well for architects and designers whose work will gain an enlarged scope of possibilities as a consequence of developing principles and techniques in structural engineering design.

Jon Magnusson
Jon Magnusson, Senior Vice President at SWRB has worked on over fifty-eight projects as either Project Director, Project Manager, or Design Engineer. He is currently Project Director for the Convention Center in Seattle. He coordinated the wind tunnel studies for the Columbia Center office building.
China: 7,000 Years of Discovery, a spectacular exhibit of some of the ancient Chinese inventions and technology, features demonstrations by 16 practicing craftsmen from the Precious Metals Conservation Center of China. Pacific Science Center, 3/1 through 8/31.

Prints and drawings by Wayne Thiebaud will be featured in a career-spanning exhibit at The Davidson Gallery. Through 4/7.


Works by Andrew Keating, an invitational show with works concerning collegiate basketball, summer Olympics, and Northwest sports works. Studio Gallery, 3/1 to 3/31. 624-0300.

The popular UNIFORM BUILDING CODE FOR ARCHITECTS course taught by Seattle's Director of DCLU, William Justen, in cooperation with the University of Washington Continuing Education program. Tuesdays, 7-9 pm, March 27-May 29.

Happy Birthday, Mies!

Andi Orr's thirtieth birthday party is today! Noon to midnight, 915 E. Pine St. For info, call 329-2950.

Raymond Hood, born 1881.

The City of Bellevue Downtown Central Park Competition. Deadline for registration, 3/15. Contact Marie O'Connell, City Clerk of the City of Bellevue, for details. (S100 Entry Fee)

Mies van der Rohe, one of the founders of the arts and crafts movement and a lifelong critic of the industrialization of construction, dies 3/9. Among his most famous works is the Guggenheim Museum. Dies 94.

Offical opening date of the Eiffel Tower. August 31, 1889.

14, 15, 22, 33rd Birthday of the Eiffel Tower. August 31, 1889.

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The Friends of Seattle's Olmsted Parks will report on the upcoming conference of the National Association of Olmsted Parks to be held in Seattle in September. The connection between landscape and urban design, and the history of the Olmsted brothers, will be discussed. The meeting will open at 7:30 at Woodland Park Zoo. For information, call 329-2950.

Rosalie Meiers presents her work at Seattle's Museum of History and Industry. Tonight at 7:30 at the Woodland Park Zoo. For information, call 329-2950.

titanic

"True and even magnificent newspapers everywhere attest the strength of the idea which supersedes: the idea to expand human freedom..." - Léonard Bloy (1872-1905), born 2/7.

Grand Coulee Dam begins operation, 1941.

Works by Paul Wonner, Cloisters, and David Wheeler, Staley Gallery, through 3/1 opening tonight.

BLUEPRINT: for Architecture. Meets 3:30 pm at Good Court, UW's Everyone's invited.

Works by Tom Caswell, Cloisters, and John Welling, Staley Gallery, through 3/1 opening tonight.

BLUEPRINT: for Architecture. Meets 3:30 pm at Good Court, UW's Everyone's invited.

"The more contagious the epidemic of the future, the more important the role of the supreme focus: to expand human freedom..." - Léonard Bloy (1872-1905), born 2/7.

Grand Coulee Dam begins operation, 1941.

Have a burger and a beer at Two Bells and catch the paintings by T. Michael Gardner, beginning through 3/26.

Friends of Seattle's Olmsted Parks presents an Olmsted Park, Seattle's best kept secret. Tonight at Hoot Art Studio in Sevenoaks Park. 10:30 pm.

Have a burger and a beer at Two Bells and catch the paintings by T. Michael Gardner, beginning through 3/26.

For those souls hearty enough to want to compete with 250 other teams from across the country, the registration deadline for the Bellevue Downtown Park Competition is 3/15. Contact Marie O'Connell, City Clerk of the City of Bellevue, for details. (S100 Entry Fee)


漆／美／工／ 1000 Years of Japanese Works by Paul Marioni, Clarice Dreyer, and Laine Sessions in the Econ Art Hall, 7:30 pm. This, along with the three lectures earlier in the month, is part of the first in what the U of O hopes will become an annual series concerning the history of architecture in the state of Oregon.

The popular UNIFORM BUILDING CODE FOR ARCHITECTS course taught by Seattle's Director of DCLU, William Justen, in cooperation with the University of Washington Continuing Education program. Tuesdays, 7-9 pm, March 27-May 29.

Richard Meiers presents his work at Seattle Center tonight at the IAIA Chapter Meeting 7:30. Call IAIA Chapter office for details.

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THE WEST SEATTLE BRIDGE

First span of the West Seattle Bridge reaches toward a structural support. January, 1962.

These columns support the West Seattle Bridge as it nears tunde. November, 1962.

Scaffolding and steelwork fragments combine to temporary lands.
During the past five years I have been documenting the essence of Seattle's growth by photographing more than twenty of its downtown construction sites and the West Seattle Bridge. In my documentation I have responded to — and photographed — the power and the drama involved in building these monuments to technology.

—K.L. Slusher
Perhaps the computer engineer who first imagined Computer-Aided Design had been a hardcore Etch-A-Sketcher.

Before the advent of computers, architects were limited by their inability to do everything at once, but now CAD systems, equipped with extensive memory, can control the details architects formerly lacked the time to consider. "On all but the smallest projects we cannot individually produce all the necessary drawings, in addition to talking to clients, constructing models of prototypes, paying bills, and so on," noted University of Washington architecture professor Brian Johnson who teaches computer graphics courses, in an article for ARCH, the college journal.

In Seattle, several local architecture firms and the College of Architecture use CAD systems. In most cases, Johnson says, they are used primarily for overlay drafting, working drawings and construction documents, chosen traditionally reserved for young designers. The Callison Partnership was the first architecture office in the Northwest to incorporate CAD into its design process. They use a Calcomp program for word processing, accounting, specification writing, space planning, and management.

The system's library of commonly-used symbols allows designers to quickly edit, reposition, or rescale parts of drawings or to update originals. This system will also

scan drawings to select a standard element like a chair, and list the size, color, quantity, and manufacturer. This simplifies the designer's tasks in compiling information for purchase orders and product schedules.

A different twist on access to CAD is the McAuto Timeshare program which leases access to its own CAD inventory in a "try before you buy" plan. Firms with hardware can access McAuto programs through telephone lines. McAuto offers a three-dimensional modeling system that creates a 3-D building model from a drawing and has the ability to convert this image into a two-dimensional finished drawing.

At the University of Washington College of Architecture, students work with several programs, their purpose being to teach students how to consider computers' capabilities rather than to give them technical training in computer technology. As the director of this program, Brian Johnson is firm in his opinion that computers can go only so far in assisting the design process. "We can calculate energy use, lighting levels, life cycle costs, and many other 'narrow focus' issues, but we are lost in the intricate, but only pseudo-quantitative relationships between the many subsystems of which buildings are composed. . . . In design, you rearrange the rules constantly to eventually resolve a problem. CAD systems work well under constrained commands and still aren't sophisticated enough to exercise the human prerogative of changing their minds. "But I don't think it's impossible," Johnson says, adding that future programs will be able to analyze more complex questions about lighting and heat loss, and may even be able to help in the early stages of schematic design.

Caroline Petrich
Caroline Petrich, a journalist, works as a sales representative for DPEnterprises, a computer brokerage.

Data manipulated by VISIT can be studied from many different viewpoints. This false color view of the Bellevue Pedestrian Corridor shows no hidden lines removed. Designing by UI architecture students using Visual Simulation Technique (VISIT) software. Applications include structural perspectives, rendering underlayment, and animation.

"You remember Etch-A-Sketch? It was an 8 1/2" x 11" x 1/2" toy with a grey screen and two knobs for horizontal and vertical lines. Depending on your age and artistic inclinations, you could create masses of squiggly lines or lopsided renovations. When you got bored with a picture, a shake or two would erase and kids: no paper, no crayons, no erasers. Perhaps the computer engineer who first imagined Computer-Aided Design (CAD, or Computer-Aided Design and Drafting, CADD) had been a hardcore Etch-A-Sketcher. CAD programs comprised of hardware (computer terminals, keyboards, and disk drives, which replaced the Etch-A-Sketcher's inspriations) can plot floor plans, construct perspectives and axonometrics, create overlay drawings, maintain a library of architectural symbols, and inventory the nuts, bolts, nails, and plumbing fixtures in a set of drawings.

Drawing by CAD, Inc., using RUCAPS and AUTOPROD software.
LAW: A Design Tool

Were it not for a fortuitous set of circumstances, I might have become a lawyer.

—Studs Terkel

 Architects are all too familiar with the changes imposed on the development industry and on their profession by the legal innovations of the past decade. These laws have marked the development industry’s conversion from a largely private one to one heavily dependent upon the governmental process. Private discretion in land use and building design is now heavily circumscribed by an increasing legal recognition of the legitimacy of public claims. Negotiations with governmental officials, imposition of project design conditions by governmental officials, and public input in the approval of major developments are now the rule rather than the exception. With these changes, increasing involvement between the architectural and legal communities is occurring. The constructive and creative role of the lawyer in the process of building design and land use approval is, however, not perceived by many architects. Lawyers are generally seen as barriers to creative architectural design or as nay-sayers — and those are the complimentary labels! Robert Venturi (a famous non-lawyer) has said that “Architects today are too educated to be either primitive or totally spontaneous, and architecture is too complex to be approached with carefully maintained ignorance.” Perhaps to overcome a “carefully maintained ignorance” about the lawyer’s role, a word on behalf of what a lawyer offers to this process is necessary.

Lawyers, unlike architects, act within an adversary system. That system often demands that lawyers act like adversaries in order to represent their clients’ interests. But adversary resolution is only one part of a lawyer’s responsibility. Lawyers should also function as counselors and problem solvers for their clients and their clients’ consultants. In the area of land use, this role often requires a lawyer to counsel a client on whether a change in a particular regulation is necessary.

Codes and regulations are designed to be flexible and to change in response to new information.

Many people perceive proposed changes to a zoning code or building regulation as manipulating the system. What is rarely understood is that such codes and regulations are in fact designed to be flexible and to change in response to new information or particular facts not anticipated by a general regulation. The legal justification for most land use regulations is that they are within the public’s general welfare. The general welfare concept, however, is obviously subject to interpretation and cannot be defined in such a way to anticipate all possible situations. Lawyers, through their training, attempt to define their clients’ interests by measuring them against what may have been interpreted as being within the general welfare as reflected in a particular code or regulation.

Despite increased regulation, creative development today is just as possible as it was in the past.

This process of analysis usually cannot be accomplished solely by a lawyer. In the land use area, architects, as well as other consultants, are essential in assisting in a thorough analysis of what the general welfare ought to be in a particular situation. New building technology or creative design solutions are in fact examples of forces which produce change. Increased public involvement in project approval also requires different hearing processes than may have been anticipated by a general land use code adopted prior to such involvement. Specific information about a certain building site may also lead to the conclusion that a general zoning classification should be changed to reflect the particular conditions of that site. These types of changes are expected and needed if a land use code is to properly respond to the dynamics of the land development process.

Lawyers are trained to question laws and regulations . . .

Despite increased governmental regulation, creative development by architects is today just as possible as it was in the past. Lawyers, with their perspective on the law as a dynamic process, can assist other professionals who are dealing with regulations to better understand the purposes of those regulations and whether such purposes will be better served through a different approach. Lawyers are trained to question such laws and other regulations in light of the general welfare concept. Changes in such regulations are possible only when the general welfare can be demonstrated to be served by a solution other than the one contemplated by the particular regulation. This process then requires us to approach these issues with cooperative efforts in order to overcome our “carefully maintained ignorance.”

Jerry Hillis

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Sculpting and assembling traditional materials brings immediate gratification. A curl of fragrant wood from a sharp blade, the comfortable heel of a fired brick, the solid bite of a 20-penny nail driven to home — each experience of this kind "cold," and "unfinished." (The cold.) It teaches the essential quality of the material. Synthetic materials, such as dryvit, glass—

Material Messages

POST-HONESTY, or Material Messages

It is useful when selecting materials to consider the sequence by which we come to fully recognize the substance of building. A distant structure appears as a silhouette against a backdrop of sky, landform, and neighboring buildings. It is first perceived as a flat shape. Color, massing, and light, shadow emerge as one draws closer. Next, fenestration and major patterns reveal themselves. Closer still, texture and articulation become apparent, and finally, surfaces can be closely inspected and physically handled — the subtle patina of use, abuse, weather, time can be observed. To the degree that this sequence holds true for a specific project context, materials should be chosen so that their inherent characteristics work to best advantage. Subtle variations of color, pattern, texture, and surface quality in natural materials often cannot be appreciated at a distance and the manufactured uniformity of machine-made materials lacking that added dimension when seen closely.

David Durrell Stone once described an aesthetic decision in order to achieve a Chicago corporate tower in gleaming Carrara marble. The appropriateness of that lovely (and scarce) material five hundred feet above the street seems questionable. A less precious white stone would probably have been just as effective and would have preserved the marble for future generations of sculptors.

Copper, bronze, cut stone, brick, and wood can respond gracefully to use and aging. Because of that responsiveness, they are vividly regarded as being "warm." Reflective glass, stainless steel, high-fired ceramics, and polished granite stubbornly remain perpetually new and bright. They seem "cold," and it's not even much fun to spray-paint graffiti on them. Unpainted concrete mellows and improves with exposure to the weather and is in favor with architects, but somehow the public is not as enthusiastic. Architects enjoy the sculptural variety and permanence it offers, but regular folks use wood and stone. "Old," "cold," and "unfinished." (The cold.)

Synthetic materials, such as dryvit, glassfibre reinforced concrete, and various plastics, often denote a compromise to low cost or maintenance — unless they emulate "(to rival successfully)" a more familiar material. Two Seattle examples are the Bumgardner Architects' Market Place Office Buildings (dryvit as pre-cast concrete) and Bassetti/Norton/Metler's First and Pine project (dryvit as stucco on masonry). A good example of "warm" materials carelessly used where they can be seen closely or touched are the pedestrian levels in and around Bassetti's new Federal Building. By the way, by contrast, Schod's "Hiram's" and various "Gretchen's Of Course" restaurateurs employ hard-surface industrial materials with such artistry and whimsy that they transcend "coldness" and reward users in their own way.

Unabashed mimicry remains the hallmark of Hollywood and Las Vegas. But what is honest?

Frank Lloyd Wright welcomed new-technology veneers that could liberate patterns buried within slabs of wood and stone, but it is doubtful that even he, showman that he was, would have admired effect photographic replications on plastic laminate. Unabashed mimicry remains the hallmark of Hollywood and Las Vegas. It just doesn't seem honest, and "honest" use of materials is equated with design integrity. But what is "honest" when it comes to the choice and use of materials? Pre-modernists didn't seem particularly worried about it. Illusion is a universal ingredient in architecture. Since the Industrial Revolution, brick and stone have been used as veneers (merely thick paint), and yet they are usually given the trappings and importance of load-bearing masonry. Our cities surround us with crenelated cornices, rusticated piers, quoins, arches, and keystones in concrete, terra cotta, stucco, and wood. Are these charming, anachronisms, legiti mate responses to a cultural need for historic reference, or an expedient language with which to explain a structure?

The so-called Post-Modern movement seems, in part, to be a setting aside of old favor in favor of still older ones. The superficial application of ancient symbols, as in Michael Graves' Portland Building, may be an expression of frustration with the enormously difficult task of discovering systems of proportion, scale, ornament, and detail appropriate to new materials and methods.

Dryvit may not know what it wants to be, it is only a first-generation material, the tip of the iceberg. As energy consumption becomes more critical and as the cost of traditional materials continues to escalate, an ever-increasing palette of substitute technologies will become available. Appropriate choices will be made according to social and economic contexts, avoiding Disneyland nostalgia and narrow intellectual judgments about "honesty." As the means, time, before the giant multinational conglomerates move in, we should prepare ourselves with potential trade names for the new all-purpose materials. I suggest: "Granoleum," "Brookshield," "Woops," "Bumgard," "Copulite," and "Pep-sid." The possibilities are endless.

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