

# On Ethics, Order and Complexity

by Moshe Safdie

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Balancing between constraints has always seemed to me to be the environment in which the process of design occurs. Our imagination and aspirations reach out within a framework of the possible, our energy deployed to expand what, indeed, is possible.

I have therefore always been suspicious of Philip Johnson's triumphant declaration made in 1978 that "There are no rules, surely no uncertainties in any of the arts and architecture, only the world of wonderful freedom." In this seemingly liberating declaration, Johnson equated architecture to the other arts, opening it up to the world of expressive power, of subjectivity. Yet he was also knowingly—or perhaps unknowingly—beginning a process of dismantling the traditional ethical framework of architecture, issuing a license to design anything that comes to mind, reassuring architects that there are no rights and no wrongs, and that they need not concern themselves with the age-old codes of conduct—not even Vitruvius's firmness, commodity, and delight—and that they certainly need not be bound by such out-of-fashion terms as "social responsibility."

Thirty years later, the field of architecture and the general state of the culture are still of a permissive disposition. The world of the visual arts and architecture pulsates from one school of thought to another: each "ism" is replaced by the next; the commercial world demonstrates the potency of branding and the brevity of fashion; the body culture endlessly debates highbrow versus lowbrow, a debate that deeply affects architecture as new themes and terminology are applied—signature architecture, starchitects, branding. These ephemeral notions replace concerns of old.

But architecture and urbanism are not the same as other art forms, nor can meaningful architectural response to the making of our environment be "in" one day and "out" the next. A profession that affects the daily life of billions, where every line drawn and design created has economic, ecological, social,

behavioral, psychological, and spiritual impact, must work within an ethical framework that is open to serious debate. An ethical framework is not a fixed dictum; it must invite discourse. It implies that the performance of architects is measurable and answerable; success or failure can be discussed in terms that transcend the private discourse of the profession to engage society as a whole.

Design as a broad general concept is obviously useful to the world of fashion and branding and a force in marketing, but architecture is too important to our lives to be dominated by market cycles of promotion and obsolescence. As Octavio Paz eloquently stated, "The market, blind and deaf, is not fond of literature and it does not know how to choose. Its censorship is not ideological: it has no ideas. It knows all about prices but nothing about values."

Ethics can be debated in many aspects of design, but nowhere is the question of right and wrong clearer than in the evolution of the form and shape of cities. In the absence of a grand plan or a singular authority, the creation of urban place is an additive process in which many designs add up over time to form an organic whole. Thus, every work of architecture is not only a response to a particular program and set of constraints and requirements, but an expression of the architect's understanding of the context. In the past, this dual concern was guided in part by convention (style), in part by the limited palette of materials and available building systems, and often accompanied by prescriptive grand plans imposed by a central authority. Today we rely on the judgment and sensibility of the individual designer, who functions within the collective whole. Johnson's "freedom" must be considered in this context. In the past, the limits imposed by the crafts and methods of construction and by architectural conventions (the classical orders, Tudor, Gothic, and so on) limited the range of options: the overall result was that one could

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take urbanism for granted. The high and low vernacular styles that evolved over time assured a certain cohesion of the urban fabric: streets, piazzas, gallerias, and other urban structures and spaces were well defined and comprehensible. The conventions did not stop at stylistic prescriptions but extended to building typologies: the townhouse created a street edge; the apartment complex defined a cornice line for a cityscape (naturally limited in height before the invention of the elevator); iconic and symbolic buildings for governance, worship, and culture clustered dramatically on principal axes to draw the eye in admiration and assert their significance. To a certain extent, urban planning before the modern era occurred as a natural process.

Some will argue that these values and constraints developed in a predemocratic era, and depended for their success on centralized religious and political power and the suppression of the individual. Like Johnson, they will see the shedding of constraints as a great innovation, the capacity to create a world of infinite expressions, in which the old, hierarchical order is replaced by multiplicity. The cacophony of styles and the raucous disorder of the urban fabric, they would contend, are appropriate to our diversity, individuality, values, and lifestyle. To call for master plans and contextual vision in urban design may be seen as conservative or dated. Indeed, many in the profession find value in the manifestation of these forces. In *Learning from Las Vegas* (1972), Denise Scott Brown and Robert Venturi praise the audacious, rampantly populist expressions of casinoland, the most outrageous expressions of our commercial culture. In *SMLXL* (1997), Rem Koolhaas urges us to surrender to the forces of megascale: “The proper response to mega-density, the only response that works, is neither resistance nor nostalgia but wholehearted embrace. In the face of apocalyptic demographics and the seeming failure of the urban, we have to dare to be utterly uncritical. It would require a second innocence to believe, at the end of the 20th century, that the urban—the built—can be planned and mastered. Too many architects’ visions have bitten the dust to propose new additions to the chimerical battalion.”

Architecture as spectacle, with its promise of economic benefits, has also contributed to the stripping of constraints. As was so dramatically demonstrated by the spectacular landmark of Frank Gehry’s Guggenheim Museum Bilbao, buildings can uplift the economy of a whole city, indeed, a region. In such circumstances, do the usual issues of deployment of

resources, material, and cost apply? If architecture can be an effective form of advertising, if the design of a shop, factory, or corporate headquarters helps sell cars or shoes, the prevailing criteria of responsible design as pertaining to economy, energy, even response to program, seem to evaporate.

Yet there are other voices emerging loud and clear; an awareness of the limits and constraints prevails around us. There is the sense that the exploitation of the planet, the consumption of land, the deployment of irrational and inefficient methods of transportation and, the breakdown of the traditional urban and social conditions are leading to economic, ecological, and social consequences that are at crisis levels. And while the questions of the appropriateness of architecture as spectacle—as a unique output of great artistry—might be treated as an exception, there is no question that 99.9 percent of the built environment must emerge out of a set of considerations that have regard for the welfare of the planet, of ecology, of an equitable society, of our general quality of life and our capacity to interact creatively and productively with our fellow beings.

Not so long ago, the prophets announced that the digitally wired world would no longer need spatial interaction in living cities. Yet as we wire up and expand our digital networks, our need to interact personally seems to be increasing. Despite expansive visions of the virtual city of the future, we find that the hunger to live and work face to face remains the dominant force in the spatial organization of the city.

In our work of the past twenty years, the issues of urban order, contextual design, and respect for the larger environment emerged and reemerged as central influences. Because I believe that our designs are answerable to society (however we might define that term); that design is about constraints and limits; that designs must respond to the timeless rather than the immediate, I constantly seek to define the component parts of an ethical framework to govern the making of architecture. I think of it as a checklist of good conduct.

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It is essentially a matter of compassion. We who are charged with conceiving our physical environment have an obligation to serve the well-being of those for whom we build. I often tell my students that if they can get into a state of mind where, when they design, as they draw each and every line, shape a model or instruct the computer, they come to identify with the individuals who will live in and use their structures to the point where they feel that they become them, this is halfway to victory. With this in mind I have, for my own convenience, framed a few principles:

- The building must define, to use Louis Kahn's term, "what it wants to be." The architect must understand the life intended in a building. This is the essence of a program. Architecture always serves a purpose and accommodates life.
- Architecture is a tectonic, material medium; inherent buildability must be deeply embedded in the process.
- The essence of place is fundamental to the creation of an architecture of belonging. Good design springs from understanding context.

These three framing principles are, of course, not new. They resonate with the voices of generations.

Beyond the timeless principles that give relevance and meaning to architecture, there are issues of the moment, specific to our time and place: the available construction technology; urban realities of density, demography and scale; the social order of the day—in short, the forces that shape our environment. Our work of the past decades has consistently addressed these issues:

- Problems of scale: mitigating the impact of megascale; humanizing the big, creating self-orienting buildings; identifying the parts within the whole; enabling the search for individual identity within the communal whole
- Connections between a building and the larger infrastructure: infrastructure as the generator of urban design; integrating the *genius loci*, the particular features of a place, with transportation networks and public works; the interaction of these civil engineering systems and the spirit of place shape a city, a district, even building clusters
- Preservation of the roots and essence of place in the face of globalization's tendency to impose uniform design; resisting the forces that favor sameness

- Creation of a space for diverse urban interaction and public discourse in the age of mobility and democracy; discovering the contemporary equivalent of the agora, the piazza, the bazaar, and the galleria
- Preservation of the ritual of public life and the identity of a community.

In designing all our projects we ask: Can architecture uplift the spirit? Can it evoke the emotions stirred by music? Can it transform us?

### **Life Intended in a Building**

When Kahn said "let the building be what it wants to be," he was alluding to the essential purpose of a building, its inherent program, the sequence of spaces required to accommodate an institution, a life, a process. The program of activities a building must accommodate has traditionally been central to the conceiving of architecture. This is what Vitruvius meant by "commodity." Other agendas are always secondary.

But what architects sometimes forget is that there is no single solution to program, no one perfect interpretation of it. What a building wants to be does not suggest a formula but a search, a search into the most *appropriate* interpretation of program. The program of a design is often connected to the client, who is usually understood to be the person or entity commissioning the building and paying the bills. But if we think seriously about the life intended in a building, we must define the client more broadly. For a school, the client of record may be a school board, but the real clients are the students and teachers who learn and teach in it, as well as the community and the neighborhoods in whose midst the school is set. The list goes on and on.

I often find myself critically torn between the program received (instructions, requirements, and requests defined) and my own critical judgment as to which requirements are valid and relevant, which might be challenged, and what needs may have been overlooked. It is necessary to be critical of program, to differentiate between an imposed design solution and a sought concept. This is important not only for ethical reasons, I must emphasize, but also because program interpretation is one of the greatest sources of invention in architecture. For each building type—library, museum, airport—there is a tension between what the clients or their advisors bring to the

Salt Lake City  
Main Public Library,  
Salt Lake City, Utah



table and the issues we are able to introduce because of our insight, experience, and particular sensibility as architects.

In the Vancouver Public Library, we discussed the program proposed by the building committee. From this emerged the idea of an urban room, a day-and-night place of community interaction forming the anteroom to the library. We were inspired by this concept and the concept of reading

galleries, which replaced the traditional reading room. These inventions surfaced in the reading of the program. They transformed the sense of what a municipal library in our time can be. These concepts evolved further in the Salt Lake City Main Public Library, inspired by and benefiting from the Vancouver experiment, and again in the Free Library of Philadelphia, each design adapting to local conditions and setting.

In both the Ben Gurion and Lester B. Pearson airports, the program called for the traditional formula: arriving passengers occupying the lower level, tucked below the principle concourse of departing passengers. In these cases, the program failed to state the obvious: that arriving and departing passengers should be treated equitably. Program writers often mistake prescriptive design solutions for requirements. In both airports, we convinced the client that the best response to the unstated program was to invert the circulation diagram and accommodate the arriving passengers in a mezzanine within the same space as the departing passengers. This scheme provided light, views, and a better sense of orientation for all travelers. It also saved millions of dollars on each project and satisfied security needs.

Increasingly, the profession of architecture is losing authority by delegating to others the role of determining program. Too often we assume that a highly specialized library or airport or museum programmer knows more and better how such buildings should be organized and planned. Specialized programmers tend to be selective and prescriptive. Their recommendations

are often based on current practice and are subject to its limitations. They tend not to encourage fresh thinking. Architects are therefore responsible for bringing curiosity and an investigative spirit to a project. By studying similar building types realized elsewhere (successes and failures) and by exposing program assumptions to a discourse of appropriateness, architects can restore their own authority. This unleashes the creative forces that should drive the design process. A program for, say, an office building may call for 30,000 square feet per floor with minimal perimeter and the most efficient core possible. While the architect must respond to these requirements, he must also bring to the design process other less visible, less economically driven needs: the aspirations of the users, provision of maximum daylight, maximization of perimeter views, and many other environmental and social considerations.

How does one find the balance between being attentive to a project's requirements as they are defined by others and one's own intuitive convictions about the essence of program? Architects remember those moments when they passionately argued for a program interpretation that defied convention and the requirements as understood by their immediate client. The diversity of solutions often presented in design competitions demonstrates that contrasting program interpretations are possible when architects are free to interpret without constraint. The resolution through discourse of these diverse views is at the center of the creative design process.

### **The Materiality of Architecture**

Architecture is tectonic: the framing of space with materials, and the construction methods and building systems inherent in those materials.

The pictorial, two-dimensional rendering of three-dimensional spaces has dominated architectural discourse. Architects have risen to fame and exerted influence based on the pictorial representation of their design concepts—sometimes for buildings never realized (Giovanni Piranesi and Antonio Sant'Elia are obvious examples from the past). Today the popular and critical admiration for such images is, if anything, more pervasive.

The reliance on two-dimensional drawings and simulations of unrealized buildings has been destructive, for it denies architecture the opportunity

to test ideas in material realization, on a real site, within the constraints of real building technology, economics, and operations. In a culture constantly stimulated visually, this leads to a taste for gross exaggerations and a hunger for stimulants akin to special effects in film. The result is that the avant-garde is increasingly distanced from influencing the mainstream of practice.

Henry-Russell Hitchcock's assessment of Frank Lloyd Wright, *In the Nature of Materials* (1942), reaffirmed the physicality of architecture and its impact on the character of space. Lacking wood for roofing, builders in the Middle East evolved the dome and the vault as ways to span buildings with small stones and bricks. Although the dome with its pendentives and the groin vault have become synonymous in our minds with the architecture of mosques and bazaars, their origins lie in the humble attempt to use the physical properties of brick and stone to span distances in space. We see this easily if we contrast the Arabic or Persian domed house with the wood, mud, and straw thatching used in roofs in northern Europe; each culture develops an architecture expressive of its own character, but emanating from its material opportunities.

Building systems have transformed in complexity in the 20th century. In 1958 I visited Kahn's Richards Medical Research Building in Philadelphia. Reading his words about servant and served spaces, I realized Kahn's radical insight into what the building implied. Traditional buildings had always been about masonry—skeleton and enclosures. But the buildings of today are made up of multiple systems. They are like the human body: skeleton, skin, veins, arteries—even regenerative systems. Kahn's building demonstrated the potential of conceiving architecture as multiple systems, integrated with each other, and anticipated the changing language and complexity of architecture.

When just about anything can be built, the question of appropriateness— inherent buildability—becomes a fundamental ethical issue for architects. For me the ethical dimension of this question is inseparable from the corresponding

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aesthetic conclusion. The charge to build efficiently with the least deployment of the most replenishable materials must be understood and embraced on ethical grounds. Economy and efficiency mean preservation of resources and translate into making the most with the least, hence making those resources more plentiful to humankind. There is an intrinsic beauty in this, as Buckminster Fuller demonstrated.

In 1908 Adolf Loos called ornament a crime. Yet the desire to embellish, to decorate, to enrich, is fundamental to humankind and has always been allied with architecture. Today, the relevance, appropriateness, and desire for ornament must be considered in the context of the value and cost of human labor. Is it an expression of power? A display of wealth? A celebration? Can we produce traditional handmade ornament by machine? And should we? Or does ornament emerge from our new modes of construction?

Contemplating the array of complex designs produced today, one cannot help reflect on the meaning of complexity in architecture. On one hand, we observe in nature the great richness and complexity of form produced by natural selection—the slow process of design in nature leading toward greater and greater fitness. The nautilus shell, the bone structure of the vulture's wings, the spider's web are all constant reminders that the formally complex is a response to fitness. There is very little capricious complexity in nature's designs! As Albert Einstein put it, “God does not play dice with the universe.”

My own response to program and site often includes what I call complexing factors—elements that bring about complexity in pursuit of a design idea. In Habitat '67, I stepped the houses atop each other to form a garden for each house on the roof of the one below and clustered the units around treelike shafts. For efficient construction I used prefabricated houses made of standard box components, but oriented them to optimize light and views, entwined with a network of walkways for access. The result—the complexing factors— included increasing the area of the perimeter walls in comparison to what a typical compact slab apartment building would have; extending the mechanical distribution systems beyond what a traditional stacked tower would use; and transmitting structural forces in circuitous routes to the ground, in contrast to the standard design of a building with continuous columns. The fundamental aim is to balance effort (cost, complexity) and the environmental payoff.



In a more recent building, the Peabody Essex Museum, site and urban considerations contributed to the project's formal complexity. The museum straddles a public street that was transformed into its internal circulation spine. I could have aligned it, straight and constant in width, with the public street it replaced. Instead I felt it should be curved and should narrow toward the south. I wanted the space to be revealed gradually. A glass

roof over this passage also narrows toward the south, curving in plan but rising in elevation from the main entrance toward the central courtyard and then descending to the southern, secondary entrance. In place of a simple glass-enclosed structure of constant cross-section and height, I designed a conduit that twists in plan and section, offering a rich visual and spatial experience.

The first sketches and models expressing these ideas resulted in a bewildering geometry that defied simple construction. I don't mean that these forms were not buildable; we have seen radically irregular forms realized in recent years. But to build these forms would have demanded heroic measures, with both economic and aesthetic consequences. They would have required hundreds of uniquely-curved steel members of varying thickness and hundreds of panes of glass of varying size and shape. The concept was buildable, but not inherently buildable. A six-month process ensued in which this complicated conglomeration of forms was disciplined, harnessed into a mathematical framework. The entire system of roofs was constructed by deploying the geometry of a singular toroid (the geometry of the surface of a donut) and a cylinder, rationalizing and standardizing the framing of steel, the aluminum members, and the glass panes: complexity was harmonized with order.

I struggled with the design for the Yitzhak Rabin Center in Tel Aviv, a memorial to the assassinated prime minister, for several years. My first design did not capture the spirit of Rabin's dramatic transformation from warrior to peacemaker. To express this was not a simple programmatic requirement, but touched on the most subtle issues of character and symbol as expressed by architecture.

Finally, in a moment of released intuition, I evolved a series of sketches of fluid white roof elements enclosing the library and great hall, floating high above the heavy base structure upon which the center was set—an electric generating station of the 1950s. The massive base became a metaphor for Rabin the warrior, and the flock of floating white curvilinear roofs his moment of insight, the realization of the futility and unwinnability of war. These free forms were translated into handmade models from which molds were made, scanned into digital programs, and then translated into construction plans, which were manufactured by Octatube in Holland of fiberglass and compressed foam. I spent time at the plant in Delft, seeing the giant handmade molds shaped, sanded, sprayed, and then transported by ship to Tel Aviv, where they were assembled and coated. This dramatic process could not but make me aware that we had accomplished an extraordinary feat, exquisite in its impact, poetic and compelling. Yet I felt I was working in the tradition of the intuitive sculptor who shapes his or her scale model and calls on an army of artisans to execute it.

In 2003, we were called on to design the headquarters for the United States Institute of Peace on the National Mall in Washington, D.C. This project had some themes in common with the Rabin memorial. The Institute of Peace, across from the Lincoln and Vietnam memorials, is by definition the physical symbol of peace in the capital's skyline. The building is designed to accommodate research and conference space as well as a museum. The plan is organized around two atria—a large one serving the public and facing the Mall, and a private one serving the staff overlooking the Potomac River.

Beyond its programmatic requirements, the building had to communicate the spirit of peace. I began exploring a scheme of roofing the atria with a series of translucent white shells. I explored several geometries, thinking that a dynamic expression was appropriate. Yet I also wanted the white shells to echo the serene white dome of the Jefferson Memorial and other buildings across the Mall.



Digital roof model of the  
Yitzhak Rabin Center for  
Israel Studies, Tel Aviv, Israel

The freeform roofs of the Rabin building were molded from an opaque malleable material. But for the Peace Institute, I wanted roofs that were translucent, glowing within while reading as opaque and white from the outside by day, and reversing at night, glowing in the skyline. To create this effect, we used panels of white glass.

We were determined to conceive the structure and skin so as to allow the individual panels to be manufactured and assembled rationally and economically. Hence, we rationalized the cascading forms within the geometry of spheres and toroids, disciplining the overall geometry of the roof structures so that every structural member is of identical radius. The members are placed on the great circle's alignments of the sphere, and each panel of glass, while differing in size, has an identical double-curved radius that is the surface of the sphere in question.

There is a considerable difference of character between the Rabin and the Peace Institute structures. Rabin is opaque; light enters by reflection through clerestories. The Peace Institute is translucent, shifting with the hours from opacity to luminescence.

The reconciliation of complexity with buildability is perhaps described in overly simplistic terms in these examples. They demonstrate the desire for formal richness and complexity, realizable through the deployment of rational construction sequences, contributing to economy of both labor and material. But similar issues arise in every facet of architectural conception. Balance must once again become central to architectural discourse. The inclination is to conceive of space, form, shape, surface, even texture freely, without constraint. This is accentuated by today's particular design processes. In the traditional process, the sketching hand, the handmade model—whether employing cardboard, clay, or wood—were constrained by the very materiality of the pencil on the paper, the limits to the flexibility of a hand, and the materiality of the model-making process. But with computers and their array of three-dimensional software programs, there is no limit to what can emerge. There is something seductive in the process; the urge is to pursue the infinite possibilities enabled by the software. As a result, engineers frequently end up asking, “How are we going to build this?” Often the search for the method of building tends to follow rather than inform the process of formal definition. This is inefficient and encourages designs whose conception has not been informed

by the processes through which they are likely to be realized. The deeper our knowledge and understanding of these processes, the more we understand the behavior, production potential, and field conditions that make one process more economical or liberating or appropriate than another; the more intense the dialogue between architect and engineer at the embryonic phases, the more whole and integrated, efficient, economical, and beautiful the result.

### **The Essence of Place**

For me the first spark, the seed of a design, often occurs when I first visit the site. It is a kind of detective process, seeking to decode the secrets of the site. I cannot, therefore, work on a design if I have not visited a site.

The familiar school of contextualism admonishes the architect to respect the cultural essence of place, its heritage, its prevailing models, its vernacular. But some architects transcend contextualism; for them, site is the source of invention. A most dramatic example of a design inseparable from its site is Wright's Fallingwater. In my youth, such places as Petra, the Native American cave settlements of Mesa Verde, the ancient temples and tombs perched high in the rocky landscape of Cappadocia, and the monasteries of Saint George and Mar Saba built into the cliffs in the Judean Desert taught me how enriched architecture becomes as it weaves seamlessly into its setting. Great architecture seizes the particular opportunity: in the island palaces and gardens of Lago Maggiore and the Château de Chenonceau bridging the Loire River, water, architecture, and landscape become one. The lesson is this: for a design to achieve a sense of belonging, for the secrets of site to be unraveled, for a structure to capture the essence of its cultural setting requires that it evolve relatively free of formal preconceptions.

When I first visited Wichita, Kansas, for the interview for the Exploration Place project, I walked along the Arkansas River adjacent to the site.



Lago Maggiore, Italy

Exploration Place,  
Wichita, Kansas



At one spot on the shoreline two tributaries merged, sending gushing rapids into the river. I lamented the fact that the actual site was separated from the river shoreline by a parkway, and that this magic spot, as I called it, was out of bounds. In the interview some hours later, I spoke of the spot, marked it on the map, and talked of the possibility of rerouting the highway around the site so that building, landscape, park, and

river could be totally integrated. I flashed a slide of the Lago Maggiore islands to highlight the potential of connecting architecture and water. I vowed to do my best, if chosen for the commission, to relocate the parkway. It took six months to convince a community group, Friends of McLean Boulevard, to reroute the highway. Today the building is in part an island, with the river flowing all around.

Deciphering the secrets of site often involves the specific placement of a building, its relationship to the form of the land or the city, its relationship or its counterpoint to that which surrounds it. In the National Gallery of Canada, a great hall forms the transparent, ascending, crystalline counterpoint to the Neo-Gothic conical masonry buttressed roof of the Library of Parliament across the ravine. In the Khalsa Heritage Centre, a museum of the Sikh people in Anandpur Sahib, the volumes of the structure rise from sand cliffs, clad with sandstone in the tradition of the fortress cities of Rajasthan, Gwalior, and Punjab. The roofs are sheathed in stainless steel, reflecting the south light toward the ancient *gurdwara* (temple) nearby. This complements the traditional reflective gilded domes of Sikh temples such as the famous Golden Temple, but downscaled to silver, as befits a secular institution.

Whereas for Le Corbusier the plan was the generator, for me the site is the generator. To start with the site is to initiate a process of cleansing, stripping away preconceptions, editing out previous achievements that might or might not be relevant to a particular project or place. Nowhere is this more apparent than in the consideration of the building methods appropriate

to a particular place and the impact this has on the design. This is not without paradox: we seem most comfortable when art is recognizable and classifiable. In a world that seeks to brand the readily recognizable, the pressure is on an artist to maintain consistency and uniqueness of style. Moreover, in the age of globalization, the finest high-tech products can be assembled in the remotest desert, so such consistency is possible. Hence, to seek an architecture that belongs to its site is a choice.

I find this subordination to place enriching. I once designed two airports simultaneously, for Toronto and Tel Aviv. Toronto got a sophisticated exposed steel structure with large-scale spans and delicate steel vaults and trusses—an architecture where the slender braced-steel members define space. In Tel Aviv I used precast concrete for the structure, and stone walls. Structural steel was scarce and relatively expensive, so the steel-structure formula was inappropriate in this case. I marveled, as the buildings emerged, at how different in character they were, how much each terminal reflected the spirit of its place. To capture the essence of place, one must avoid the trap of mimicking familiar stylistic elements. One must reach for the familiar, to be sure, but even more for the unfamiliar. The architect's antennae must be tuned to capture the quality of a culture, its music, its literature, its religion, its myths.

### **Mitigating Megascale**

Megascale pervades almost everything we do. In our own lifetime, we have witnessed the transformation of almost every building type. In 1973, when I first visited China, Beijing and Shanghai had no high-rise towers and few cars. Today both cities have repeated almost every mistake we have committed in the West: the urban freeway, stacked two and three levels high, cutting through the cities, dividing and segmenting; the myriad high-rises strung along the traffic arteries, office buildings and residential towers each a sealed microcosm.

Air conditioning brought about perhaps the greatest paradigm shift in the history of architecture, greater in its impact than the introduction of any new building material or other technology. Air conditioning liberated the perimeter of a building and allowed it to expand without limit, while only a small percentage of its inhabitants have access to daylight or exterior views. Today an increasing



number of people spend their lives in artificial environments. Only residential buildings cling to the idea of a window in every room. Building codes long ago abandoned the mandate of access to fresh air and light in other building types. Europe is beginning to see a reversal of such trends, as the workspace is increasingly scrutinized for its long-term impact on the well-being of workers.

Size affects us throughout the urban environment as well as within the individual building. City streets surround us with giant structures that cut off light and sky, overbearing and overwhelming. We traverse housing complexes of repetitive, identical, massive facades rising to 60 or 70 floors in undifferentiated rhythms. We are made to feel like insects inhabiting little cells, without identity. How removed this experience is from that of the inhabitant of a traditional village whose individual dwellings were recognizable within the whole, whose contact with nature was taken for granted, whose balance between privacy and community was satisfying and productive.

Nowhere is the change more apparent than in public buildings such as the hospital, with its colored ribbons on the floor leading one through a confusing array of passages, or the government office where a map is required to find one's destination. Everywhere we depend on ever more signs as the only way of navigating a confusing environment.

The initial response to megascale as it emerged in the early 20th century was acceptance, even excitement. The repetition and sameness inherently characteristic of these buildings were thought to express a new social order of equality. Ludwig Hilberseimer's *Highrise City* (1924) and Le Corbusier's *Ville Radieuse* (1930) were new urban images of modernism that celebrated the so-called equality of accommodations. The realizations of some of these concepts after World War II led to reactions: for example, Team X, a group of European architects, drew on the vernacular, traditional low-rise, high-density urban fabric for inspiration. Urban models of the past that had been rejected were now reexamined. The value of pedestrian paths in the city, as distinct from the vehicular, was reestablished.

The new cities—Brasília and Chandigarh and the less celebrated British, German, and French new towns—gave me much food for thought. I came to recognize that to combat megascale, we must embrace strategies that made the big an assembly of comprehensible parts. If repetition was inevitable

in large-scale building, strategies to create hierarchies and differentiation of forms were needed to counterbalance size.

The most potent device for this—using infrastructure as a generator of urban design—had been neglected by the generalizing trends of modernism. By infrastructure I mean a constellation of elements: the civil engineering response to site-specific features such as rivers, harbors, terrain; the salient urban features such as the *cardo maximus*, or central artery; the bazaar; the aqueduct; the boulevard; the galleria; the highway; the transportation systems. This interconnection of specific site features and urban constructions has traditionally given order, structure, and scale and provided the lifelines for a city.

The more site-specific such interventions are, the more effective and less formulaic they are. Every plan of district or city scale—the Western Wall precinct, Mamilla, the Superconducting Super Collider in Texas, the Old Port in Montréal, Modi'in in Israel—seeks to merge site and infrastructure.

These strategies for dealing with megascale also apply to individual large, complex buildings. When I came to design the National Gallery of Canada, I was impressed that it was similar in size to the Metropolitan Museum of Art in New York. I always used to get lost in the Metropolitan. Despite the charm of wandering, the Metropolitan is a case study in megascale gone wrong. Surely a museum of that size could be legible, could make the whole comprehensible as one explored its parts. Hence, for the National Gallery I concluded that the large complex must be broken down into sections attached or linked by a specific architecture of connection, a path with its own particular architectural language, distinct from the spaces it serves. I came to think of it as a small city, with its *cardo*, *decumanus*, and agoras.

Certain rules contribute to legibility: each section of a building complex must be entered and exited at the same place, so that one has the opportunity to reorient oneself before moving on to the next part. Shortcuts



National Gallery of Canada, Ottawa, Ontario

from one section to another lead only to confusion. If we can apprehend the parts within the whole, we have a better appreciation of what a complex has to offer. As we are able to navigate freely, the path becomes naturally a place of community interaction, an urban experience within a building. References to familiar views and landmarks reorient us, acting as an urban compass.

Because the public gathering spaces within the National Gallery were distinctly differentiated, the building drew activities well beyond its anticipated program. It became an extension of the city, attracting ceremonial, civic, and social events of all sorts. This lesson inspired every institution that we designed thereafter. In the Vancouver and Salt Lake City libraries, the concept of a building that can be approached from many directions led to the concept of the urban piazza and urban room—public gathering spaces that were open to the public day and night. The seven floors of the Vancouver Public Library are unveiled, one after another, as you view them through the glass wall of the urban room. Similarly, the entire volume of the Salt Lake City Main Public Library—all its departments and destinations—become instantly understandable upon entry to its urban room.

Orientation and organization are even more essential in buildings for transportation such as airports and other terminals. At the Ben Gurion and Pearson airports, the path of passengers follows the light. The source of daylight through a system of skylights is also a marker of the principal paths, which lead the departing passenger from check-in through security to the plane, and the arriving passenger from the plane to immigration and customs and baggage claim to ground transportation. The spatial hierarchy of the architecture, accentuated by daylight, is fundamentally self-orienting: the airport is an architecture of paths and gathering nodes.

The city of Modi'in lies in a network of east-west valleys articulated by hills and ridges. Here the concept of organizing the city into a system of community

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spines that integrate parks, community services, transportation, and shopping is realized by placing these elements in the valleys. The topography is accentuated by the massing of the architecture: apartment buildings of similar height define the valley's edges and step up the hills, which are dramatized by taller buildings on the ridges. The convention of segregating vehicular transportation from pedestrian paths, schools from parks, is reversed. Instead, traffic arteries, pedestrian paths, schools, shops, and parks are integrated. In the west the valleys merge into one major *wadi* (valley), a natural place to locate the town center. Downstream from this is a nature preserve. The undifferentiated supergrid of new cities of the 1930s and 1950s, with their autonomous neighborhoods, their community centers placed as a nucleus within the neighborhood, is replaced by a treelike network of spines in which the definition of each neighborhood is ambiguous. The result is a hierarchy legible at both the vehicular and pedestrian scales, dramatically transforming the urban experience.

Ultimately, the solution lies in giving expression to the diversity of uses within a building and an urban fabric. We must craft buildings that are oriented effectively, with envelopes that are more responsive to climate. Mixed-use complexes, communal spaces, terracing, gardens, the integration of plant life into architecture—all these have the potential to break down megascale, humanize it, and affirm the identity of the individual within the whole. Someday size and density may reach such levels that visual and spatial devices fail to overcome the feeling of claustrophobia. There are those who insist that the human species is adaptable and that our sensibilities will in time be transformed to accept intense crowding. As a specimen of the not-yet-transformed species, I abhor this diminished sense of self. We have choices. We can and must place limits on the scale of our constructions.