Fifty years is a long time to have practiced architecture—long enough to begin seeing the patterns of change, a profession transformed. An architect in the age of complexity is a fundamentally different professional from the 19th-century master builder. The master builder conceived, detailed, and oversaw construction, assisted by skilled and knowledgeable craftsmen. Today, several specialists focus on construction, detailing, building codes, lighting, and more, all orchestrated by the architect. As a composer-conductor, the architect depends on the skills of others, bringing out the best in them, directing the focus of their efforts, not unlike the conductor who brings out the art of the many performers in an orchestra. The metaphor can be extended. The composer-conductor sets the score and guides it through its performance; each instrumentalist, singer, or choir member contributes to the success of the whole performance, which is highly dependent on direction and inspiration.

Architectural education, indeed the very public image of the profession as it was enshrined in Ayn Rand’s *The Fountainhead*, privileges the concept of the superhero, the inspired master. In that world, talent and inspiration reign supreme. But while both qualities are fundamental to the process of architectural creation, professionalism is now an equally significant ingredient. Professionalism assumes a deep knowledge of building systems and the building process, with an equally deep knowledge and passion for the program of requirements and the performance criteria for building. It depends on a profound understanding of the behavioral and experiential impact of the proposed environment.

No single individual can command all the knowledge required, and only the most open and receptive composer-conductor, inquisitive and questioning, can navigate the myriad inputs that become part of the architectural creation process. The traditional two-part process—abstract form-making followed by implementation by technical experts—is not a workable mode in this context. It is bound to end up as a caricature of reality, where one aspect of design is exaggerated at the expense of others, where inspiration displaces professionalism; it is the breeding ground for the one-liners, for captivating images that fade in time; it is what currently fuels the disjointed architectural discourse, absent of consensus, reducing architecture to the simplistic level of “I like” or “I don’t like.”

Herein lies the fundamental dilemma of the ethic of the profession: an expanded responsibility, impacting the lives of the entire population, is performed in the context where the architect operates with relatively little control; where clients, building authorities, and financiers often dictate priorities. Yet in the final analysis, the responsibility for how a work of architecture will impact the lives of those within it, and by extension, how it will impact the lives of the community within which it is set, is entrusted to the architect.

These thoughts are often misunderstood to be the conflict between expressionism and functionalism. Not so—the freedom to express, manipulate, and shape forms and materials need not counter the considerations of program and performance.

What then is the nature of constraints in the design process? Are constraints a compromising force or can they be potentially enriching? In the design evolution of living organisms, constraints become formative forces, the outcome of natural selection, and the evolution of the most efficient life-sustaining features. The quest for light in photosynthesis, for example, generates the glory of a leaf’s shape and geometry, and the array of plant forms that adapt to particular climates each take on their own unique forms. The quest for continuity and reproduction sets up the intricate interdependency of animal and plant life, the deployment of all the colors of the spectrum, and patterns of great beauty. Growth and change depend on complex geometries, an additive cellular arrangement, as so beautifully described in D’Arcy Thompson’s *On Growth and Form* (1917). Beauty as we conceive it in observing nature is an outcome, not a quality that is consciously sought out; our own consciousness recognizes its presence. This applies equally to human-made design. Constraints, limits, indeed deprivations, must inform the design process so as to optimize the particular aspect of the relevant performance, each constraint introduces a
level of complexity within the overall order. In time, our consciousness will recognize that fitness as beauty, it will yield all the pleasures and fulfillment that nature’s order gives us.

Architecture—from basic shelter to sophisticated buildings for culture, the celebration of memory, worship, and the ritual of public life—extends through levels of complexity and emotional charge. To that extent, the human-made environment cannot be fully understood in the restricted physiological criteria of adaptation. There is a vast component of psychological and spiritual charge, one that we recognize in the role of music in our lives, in the deep desire to decorate and embellish, and in the ritual of celebrations and festivals. Music may have its origin in communication in pre-language societies, and it has its equivalent in the sounds and communications of the animal world, but music as it has evolved in human experience is capable of bringing out the deepest emotional responses, of touching our soul. Architecture must at times rise to that occasion. Architecture accomplishes its highest calling when reaching for the sublime.

Inherent Buildability

The term “inherent buildability” is something one could have taken for granted in the past. Designers and builders (often they were the same) deeply understood the nature of the materials available to them. It was rare that a form would be conceived that was antithetical to the logical order of materials and the technology of construction.

Visiting a school of architecture today makes us aware of the extent to which this age-long sensibility no longer reflects the attitude of contemporary architects. Guided by faculty, students deploy the latest tools (3-D printermakers, CNC routers, BIM software) to conceive an infinite range of concepts and forms in every possible shape and configuration, independently and with little consideration for materiality or construction methodology. It is as if the old “ether” has been rejuvenated—a magic building material that is perfect in tension and compression, can be stretched and shaped, defying gravity, possessing all the relevant qualities such as fire- and water-proofing. While this is an exaggeration, it is fundamentally what happens over and over in studios today, echoing the general prevailing attitude. The teachings of Frank Lloyd Wright on the nature of materials, of Mies van der Rohe, who created a vernacular of steel construction, and of Louis Kahn, who both in his buildings and poetic iterations expounded on the intrinsic connection between form and materiality, are too often marginalized.

Architects today come armed not with conventions, but an absence of conventions. The result is the personal language of motifs and sensibilities. Today, there is a wide range of choices—of materials, forms, or as the public would express it, a choice of styles. The very idea “choice of styles” or a “signature style” presents a paradox. To what extent is a building’s pre-existing context relevant? Should there be a concern or regard for palettes of material and/or stylistic characteristics of the context as a whole? What is the place of a signature style in this predicament? What, in fact, is a signature style? How does it bode with policies that aim to create historic conservation: the “build in stone” law in Jerusalem, or brick in Cambridge, Massachusetts, or the required stylistic rules of new urbanism towns?

Herein lies the paradox. Signature style most often relates to a particular set of building technologies and materials; we think of the international style as the forms, shapes, built in concrete and smooth plaster, architecture vulnerable to weathering and permanence. Richard Meier is credited as having transformed that to a more durable and industrialized technology of white metal panels, large glazed areas, and sunscreens. We think of the signature style of Frank Gehry as a combination of complex shapes, intricate steel framing and geometries deployed in a combination of metal paneling, glass, and (sometimes) masonry. These are formally powerful shapes of great complexity that might or might not relate to pre-existing urban settings.

Buildings that Belong

When I designed Habitat, I was not concerned with issues of style or pre-existing urban context. The peninsula jutting into the St. Lawrence River felt like a tabula rasa, and the building system of modular boxes generated its own

“Beauty as we conceive it in observing nature is an outcome, not a quality that is consciously sought out; our own consciousness recognizes its presence.”
urban continuum. Building in Jerusalem—initially on the hills surrounding the Old City, and then within the City Walls, facing the Temple Mount and the Western Wall—I first felt the power of context. As we began work on Yeshiva Porat Yosef, the question was put to me by the Rabbis: “Will you make a traditional building for us or a modern one?” For them “traditional” was a stone building with the arches and domes of the surrounding Ottoman architecture; “modern” involved a preponderance of glass and abstract forms (as was proposed to them by one New York architect). I responded intuitively: “If I succeed, you won’t be able to answer the question.”

In the spirit of the large scale pre-fabricated building blocks that I explored in Habitat (and other projects at the time), I proposed that the yeshiva be the cohabitation of two construction technologies: traditional load-bearing masonry walls three meters thick, containing the building and its parts (walls thick enough to accommodate arcades, passages, and mechanical shafts), married to a system of lace-like precast concrete arched elements that could be stacked and combined to form smaller and larger rooms. As the building terraced uphill, fiberglass domes enclosed spaces for winter use, sliding open to the sky in summer. The intention was to reinterpret the traditional stone domes of the surrounding architecture as a lightweight equivalent, capable of transforming outdoor spaces through the seasons. Yet to create an architecture that belonged, I had to go further and draw on the essence of the traditional typology. For example, I organized spaces around courtyards lined with arcades, which become outdoor living rooms in the Mediterranean setting.

The outcome was a building clearly contemporary, but rooted in its context in multiple ways. The massive surrounding walls resonated with the Old City Walls; the lace-like concrete structure protruding above echoed the scale of the Ottoman domestic architecture in the Old City.

These lessons of the Old City I thereafter applied with greater confidence to other Jerusalem projects, including the Hebrew Union College and Mamilla. The experience transcended countries as well. A few years later, facing the tight urban site in Québec City for the Museum of Civilization, and again a year later, the escarpment overlooking the Ottawa River and Parliament in Ottawa for the National Gallery of Canada, the Jerusalem experience of designing for place was inescapable. In each case, the design evolved to seize the opportunity of the site and its particular context.

In Québec, the stairs rising from the St. Lawrence River echo the stepped docking platforms that fronted the old Québec Market in the 18th century. The limestone walls of the museum crowned by copper roofs with intricate skylights resonate with the surrounding rooftops of snow-shedding historic structures.

In Ottawa at the National Gallery, the glass-crystalline Great Hall echoes Parliament’s Library Chapter House. Yet where the latter is a solid unit of stone and copper, the former is transparent; where the Chapter House is smooth in its detail, the Great Hall is geometrically crystalline and additive.
“Architects face an eternal balancing act between preconceived ideas and the specificity of each architectural work and its context.”

To me it seemed that the uniqueness of a place and its particular character informed my projects in urban contexts, as in the Vancouver Library Square; in culturally charged contexts, as in the Khalsa Heritage Centre in Punjab; and in the open landscape, as in the case of Crystal Bridges.

Crystal Bridges Museum of American Art is set in a beautiful tree-filled estate, where two ridges frame a ravine fed by the rains and by Crystal Springs. There I faced the dilemma of choosing the specific location on the site—on the hilltops overlooking the horizon and the rolling landscape; or in the ravines, like the old mill towns used to be, by the water source and water power.

To save many of the mature trees on the ridges, I chose the streambed site. The stream was to be dammed to create two ponds, 12 feet apart in elevation, one flowing into the other, to center the museum and create a sense of place. The gallery pavilions were to cluster around the ponds with two structures forming bridges, set upon the dam walls. Flanked by galleries on both shores, with the bridges the buildings would ultimately form a circulation diagram shaped like a figure 8.

Building in a ravine came with the risk of floods. Could a precious art collection be put at such risk? Would the US Corps of Engineers approve a scheme that intervenes with the water flow in what was a federal waterway? Extensive studies were undertaken; a 3000 year flood was set as the goal protection level, and the design was adjusted to accommodate the most unlikely of floods. The ponds were made part of the natural system of flow, a sustainability measure that would allow the stream water and rains to feed the ponds as they would in a natural situation.

I could present similar moments of genesis for almost every project in this monograph. In each case, the resulting design becomes specific to site and content. In the end, for each project the focus lies on the creation of buildings that belong—to their site and their context (whether virgin or urban), to architecture’s material and tectonic nature, and to the life each building is intended to foster.

Urban Design:
The Sum is Greater than the Parts

Architects face an eternal balancing act between preconceived ideas and the specificity of each architectural work and its context. In traditional societies conventions evolved, and their modifications were relatively slow. This was true of all designed objects. Consider dress, for example the sari, or the Indian kurta, or the galabia: all prevailed for centuries with only subtle changes.

In architecture, conventions remained most stable where the architectural syntax evolved over time, responding to a limited technology of building. Consider Georgian London, characterized by brick and stone as dominant materials, load-bearing construction, classical details, porticoes and pediments arranged along streets, squares and crescents. One could argue that these conventions, having evolved over time, present a reasonable fit to the overall environmental imperatives. Where daylight was scarce, large windows evolved, and in hot desert like climates, cross-ventilation and smaller openings and porches for shading structures prevailed. What was assured in these cities and towns was the continuity and cohesiveness of the urban whole; the sum total was greater than the parts.

While the individual buildings in the Back Bay of Boston are elegant variations on the theme—brick, sandstone, limestone, some granite, classical and rustic in detail—the sum total of Commonwealth Avenue (and the surrounding streets) is greater than the parts. Even more dramatic and cohesive examples...
can be seen in such cities as Bath, sections of London, and in more formal iterations, such as the Place Royale and the Place des Vosges in Paris.

What we take for granted today, and perhaps overlook, is that in the past there was always a “unified field theory,” to use a scientific term, between architectural and urban concepts. Individual buildings evolved to serve their designated purpose and also as building blocks for the whole urban place.

At the beginning of the 20th century, with the emergence of the new typology of tall buildings, there were early attempts to create a new field theory, a concept of the city composed of high-rise towers as the basic building block. The proposals from the 1920s and 1930s by CIAM, Le Corbusier, Hilberseimer, and others, sought to integrate a new hierarchy of roads, introducing the freeway into the urban context, separating a field of towers set on a grand grid.

The problem was that this gridded tall-tower typology overlooked fundamental urban qualities and needs: the pedestrian domain, the places of gathering, in short a continuous, vital public realm was absent. The city, born to facilitate communication and interaction, became a disjointed network of transportation and isolated building precincts. Each and every attempt to apply these theories to actual cities—in Brasilia, Chandigarh, the post-war new towns of Britain and Israel, and in many post-World War II reconstructions—demonstrated the limits and shortcomings of these concepts. American cities including New York, Philadelphia, Boston, Chicago, and St. Louis, are filled with testimonies to this grand failure.

Today, more than a century after the evolution of the high-rise tower and the introduction of expressways into the urban scene, we have yet to evolve urban concepts and structures that successfully deploy the tower as an effective building block of the public realm.

At best, we have evolved mixed-used districts comprising several city blocks in which offices, apartments, and hotels are set in towers atop podiums that contain parking and retail malls. These are introverted, conceptually “self-sufficient” complexes, rarely connecting at a pedestrian scale to the next and the next and the next developments. Residential developments of similar scale, clustered apartment towers, have the same shortcomings; in their most common permutations they neither connect nor provide a meaningful place for community life. Even when the public realm is high on the agenda, as in Singapore’s new towns, the typology of a tall building is so dominant and the resulting space between them so constrained that much of the resulting open space is anything but an effective public realm.

If we reject the present formula of clustered tall buildings atop podiums, and instead strive for an urban structure where towers are the major building blocks, where would we start? The key is to recognize that towers do not function as freestanding objects in the urban landscape. They cast shadows, block light, and impact their surroundings. Therefore they must be conceived as additive, connectable elements that define and intertwine active and passive pedestrian places. This conception must be governed by facilitating light and sun to penetrate as needed. The real and only constraint on density is our ability to provide light, sun, and sense of openness. It is a puzzle of solids and voids that would likely depart from the grid-like regular massing with which we are familiar. It is the fallacy of our time that a single tower can be considered a self-contained entity.

Only a group of towers together can be organized to solve the riddle of light, sun, and their impact on habitable space within the towers and the spaces formed between them, under them, and the multiple links that can connect them. Traditional zoning cannot resolve this new reality of the three-dimensional city.

City Design in the Third Dimension

Since the traditional method of land parcelization, with individual building projects composing the urban fabric, does not seem workable at these high densities, it begs the question of what planning methods or regulatory system must be put in place to enable better development; it raises the issue of private- versus public-sector responsibility and action.

In the past, the parcelization of land constituted the public act of planning. Within the rules in place, the private sector built individual buildings. The infrastructure was, by and large, a public responsibility, while the construction of buildings was mostly private. While we have come to accept, almost...
“We are ripe and ready for a new kind of public sector urban design, conceived and expressed in three dimensions, expanding the notion of zoning into a new realm of qualitative prescriptions and regulations.”

universally, the public role in the parcelization of land, with the accompanying zoning regulations as the act of master planning, we have yet to develop, let alone accept, the expanded public role of master planning in the three-dimensional city.

The limits of current city design tools accelerate the process that has already begun. The assemblage of greater and greater parcels forms enlarged urban sectors or districts, such as New York City’s Rockefeller Center or Pudong, Shanghai, in which private sector developers are in charge of multiple mixed-use towers, creating within an internalized world of the public realm. In these circumstances, the three-dimensional juxtaposition of volumes in space and interconnectivity at various levels are all possible under the umbrella of a single master planner. But the tendency of such developments is to be self-contained and introverted—parking, access, pedestrian circulation, and open spaces are all configured as belonging to an individual mini-city. In time, the outcome will be a city broken down into mini-cities, connected by transit stations and freeways, but without the traditional connectivity at the pedestrian scale of a singular city. This is not a speculation; it is happening as we speak, and its impact on urban life, our institutions, and their nature of the public realm is profound.

The seed of the possibility of public intervention beyond traditional zoning can be seen in Singapore, where the Urban Redevelopment Authority has labored to establish guidelines and invested in infrastructure toward the goal of connecting the parts into a greater whole. The guidelines go further than most others in attempting to define qualitatively the nature of public space and its character within development parcels.

We are ripe and ready for a new kind of public sector urban design, conceived and expressed in three dimensions, expanding the notion of zoning into a new realm of qualitative prescriptions and regulations. Such three-dimensional city design must, above all, attempt to make sense of the relationship between the new dominant building block, the high-rise tower (residential, office, or other use), and the network of institutional and commercial spaces that have always formed the public realm within it. The tools of such design are in infrastructure, but also in influencing the character of development and promoting a vibrant public realm within projects that help to form a cohesive urban whole.

I would describe this as a new kind of city design. Imagine Haussmann, the designer of Paris for Napoleon II, entrusted with the task today, and with the ambition and power to create a cohesive and unified city with a rich and diverse public realm, which forms the spine of public life.

Recurring Themes and Obsessions

In the final analysis, a design is the combination of responding to place and site, striving for inherent buildability, and responding to program. Yet design is also informed by a subjective sensibility—I would call these recurring themes and obsessions.

Light

Leading the list is the obsession with daylight: daylight as a source of life and well-being; daylight in working spaces and living spaces; daylight in every place of public activity that can tolerate it; daylight in malls and lobbies; daylight that is not selective, in each and every working space in an institution or office building. With daylight comes a consideration for views, openness, and a connection with the outdoors and nature.

Gardens

A useful metaphor for many projects becomes “the garden”: the Garden of Eden, the Hanging Gardens of Babylon, the landscape of agriculture gardens on roofs and terraces, and gardens in Mother Earth. With this...
comes the idea of integration of architecture and plant life — plant life as an extension of architecture, the opportunities for its growth and sustenance conceived as part of the building systems.

From Habitat’s terraces and flying streets, and subsequent housing projects, to the SkyPark of Marina Bay Sands, to the courtyards of the Hebrew Union College in Jerusalem or the Skirball Cultural Center in Los Angeles, the Biblical Garden of Ben Gurion International Airport, the rooftop reading garden of the Salt Lake City Public Library, or the public roof park on the podium of Chongqing Chaotianmen in China: in each case the strategy is to create gardens appropriate to their place and circumstance.

**Steps**

Another central theme is extending the ground toward to the upper reaches of a structure. Stairs, climbable buildings, buildings that attempt to connect metaphorical earth and heavens, are inspired by the mythic Tower of Babel, by the terraced gardens of Ancient Egypt, or by the climbable hill towns of Asia and the Mediterranean. This revelation of Jacob’s dream of the Ladder, reaching from earth to sky, takes on many forms.

**Building Blocks**

We all experienced playing with building blocks, the traditional wood blocks and the contemporary Legos; for some, the game never ends. The notion of prefabrication led me to consider the three-dimensional block, the box with its many variations, as a repetitive, assemble-able building unit. In this conception, a building becomes a system, a composition, rather than a finite building with a beginning and an end.

The building block obsession seems natural to pre-fabricated housing, but in my case it was extended to such projects such as Yeshiva Porat Yosef, The San Francisco State College, and even the crystalline additive geometry of the National Gallery of Canada. The standard repeated module of housing gave way to elements that could be combined into many permutations to result in smaller and larger spaces, moving beyond the repetitive cells of domestic living units.

With larger, more complex structures — airports, libraries, and taller buildings — repetitive assemblages reached their natural limits. In their place, I began exploring the idea of overall generating geometries, geometries that embodied within them the organization of the building’s structural and spatial systems, which could interface with the specificity of site and plan so as to generate a rich array of forms. These were first investigated in Exploration Place, in Wichita, and then developed further in such projects as the Kaufmann Center for the Performing Arts, the Khalsa Heritage Center, and the National Art Museum of China. What fascinated me is that these generating geometries were able to not only affect structure, but to order the modulation of light and the building envelope.

**The Cardo Maximus: The Ritual of Public Life**

Think of the Grand Bernini Colonnade at the Vatican, the remnants of the Cardo Maximus of Roman cities, the grand colonnade of the rhythmic repetitive monumental spine of urban life. In the concept of the Cardo I see a direct analogy to the connection between the vertebrae of the animal world, the spines from which limbs, organs, nervous system, and brain command are organized. In the world of urban design, the Cardo acts as the spinal vertebrae of institutions, districts, and cities. This theme reoccurs in many forms in my work: in the city of Modi’in as the valley’s parkways, at the Lester B. Pearson International Airport, at the grand crossing ramps of Ben Gurion International Airport, and similarly at Marina Bay Sands. It is what gives clarity and a sense of orientation to a complex place. But beyond orientation, the Cardo Maximus celebrates the public realm. It is the stuff of bazaars and souks, gallerias and boulevards, without which chaos prevails.

**Towards Greater Complexity: The Magic Machine**

In Beyond Habitat, 40 years ago, I wrote about a Magic Machine:

“Our problem is always to combine order and freedom; freedom without chaos and order without sterility. Therefore we have thought of building in..."
“Rather than appear as an intrusion onto nature, architecture will be as a continuous extension of nature.”

terms of the technology of today—the stamping machine, repetition. But the technology of building will become all-capable, like a computer punch card with millions of possibilities extended in four dimensions or fluids capable of limitless forming. Ultimately, I would like to design a magic housing machine to do just that. Conceive of a tube pipe behind which is a reservoir of magic plastic. A range of air-pressure nozzles around the opening, control this material as it is forced through the edges of the pipe. By varying the air pressure at each nozzle one could theoretically extrude any conceivable shape, complex free forms, and mathematically non-defined forms. People could go and push the buttons to design their own dwellings. One restriction built into the machine would be that it would have to make sure that all its extrusions interlocked to form one building by insuring that all designs included certain fixed points of contact.

This is a very exciting idea, indeed, because it suggests that in the ultimate evolution of technology in the building process, we may find that the highest form of organization means the least standardization, that technology can make industry as flexible as nature.”

Today the 3D printer hints to the future. I think of it as the magic that will help us transcend the limitations imposed on us heretofore by the materials that have been common to construction.

Consider the typical glass-office tower, perhaps the most common of typologies to be found everywhere—near the Arctic Circle, in the heart of the tropics, in the sub-tropics of the Middle East. What motivates such buildings, ignorant as they are of the movement of sun, unsustainable, simplistic, and absurd compared to even the most primitive natural organism? These buildings seek transparency, views, and simplicity of construction. Yet their objectives are compromised by the necessity of deploying performance glass, the architectural equivalent of perpetually wearing sunglasses to provide needed insulation, glare protection, and shading coefficients. Their designers deploy the same material toward all orientations, even though conditions facing each cardinal direction in the Northern Hemisphere are drastically different. They seek to maximize daylight, but compromise and interfere with it; they seek economies with standardized repetitive construction, but they prevent the introduction of outdoor spaces and make difficult the provision of natural ventilation when weather permits.

Consider the organic equivalent: the eye that provides for variable light transmissions depending on conditions, or the transformation from winter to summer displayed by plant organisms by shedding in winter and maximizing exposure again in summer—indeed, the dynamic quality of most organisms in nature, adapting and adjusting to changing conditions. Above all, consider the multitasking characteristics of organic materials. In time, we should be able to mimic these multitasking variable characteristics in the materials we invent and develop for building. In time, our buildings will take on the complex aesthetic of the organic world. Rather than appear as an intrusion onto nature, architecture will be as a continuous extension of nature.
He who seeks Truth
Shall find Beauty
He who seeks Beauty
Shall find Vanity
He who seeks Order
Shall find Gratification
He who seeks Gratification
Shall be Disappointed
He who considers himself as the servant of his fellow being
Shall find the joy of Self-Expression
He who seeks Self-Expression
Shall fall into the pit of Arrogance
Arrogance is incompatible with nature
Through the nature of the universe and the nature of man
we shall seek Truth
If we seek truth we shall find Beauty