SOLID STATES
CHANGING TIME FOR CONCRETE

WOOD AUDITORIUM, AVERY HALL
GSAPP, COLUMBIA UNIVERSITY

OCTOBER 1—3, 2008

Convened by
Graduate School of Architecture, Planning and
Preservation, Columbia University
Mark Wigley, Dean
Michael Bell, Professor, Conference Chair

in collaboration with
Fu Foundation School of Engineering and Applied Science,
Department of Civil Engineering and Engineering
Mechanics, Columbia University
Christian Meyer, Chair and Professor

Exclusive sponsor: Lafarge

The conference will be accompanied by the exhibition Concrete Trajectories
Curator: Rosana Rubio Hernandez
Associate Curator: Jesús Donaire García de la Mora
On display in Avery Hall 200 level September 29—October 3, 2008
CONCRETE IS ENTERING A RENEWED ERA OF DEVELOPMENT WITH WORLDWIDE IMPLICATIONS AND UNDER RADICALLY NEW ECONOMIC CIRCUMSTANCES. WHAT ARE THE FUTURES OF CONCRETE IN ARCHITECTURE AND ENGINEERING IN TERMS OF TECHNOLOGIES OF REINFORCEMENT, MATERIALS SCIENCE, EMERGING MARKETS AND CAPITALIZATION, GEOGRAPHIC PRODUCTION, INSTALLATION, AND ENVIRONMENTAL IMPACT? WHERE WILL INNOVATION HAPPEN AND WHAT WILL INSTIGATE POTENTIALS IN DESIGN AND ENGINEERING?

THE GOAL OF THIS CONFERENCE IS TO OPEN NEW UNDERSTANDINGS OF THIS PERVERSIVE, YET EVER-EVOLVING MATERIAL. BRINGING TOGETHER A WIDE RANGE OF LEADING ARCHITECTS, ENGINEERS, AND SCHOLARS, THE COLUMBIA CONFERENCE ON ARCHITECTURE, ENGINEERING, AND MATERIALS IS A MULTI-YEAR PROJECT TO EXPLORE THE DRAMATICALLY CHANGING LIMITS OF KNOWN AND NEW MATERIALS IN AN ERA OF RAPID URBANIZATION AND WITHIN UNPRECEDENTED FORMS OF TECHNICAL MEASUREMENT, COORDINATION, AND PRODUCTION THAT INCREASINGLY BLUR THE BOUNDARIES OF PROFESSIONS AND OF MATERIALS. DO CONTEMPORARY MEANS OF STRUCTURAL AND MATERIAL ANALYSIS SUGGEST A WAY OF MODELING MATERIAL ATTRIBUTES SUCH THAT ANALYSIS ITSELF MIGHT PRODUCE A NEW MATERIAL? WILL ALTERNATE TECHNIQUES CREATE A VIRTUAL STRAIN OR QUASI-ALLOY, LEADING TO A POTENTIAL REALM OF COORDINATED MATERIAL ACTION?

THE COLUMBIA CONFERENCE ON ARCHITECTURE, ENGINEERING, AND MATERIALS EXPLORES THE BOUNDARIES BETWEEN MATERIALS SCIENCE, ENGINEERING AND DESIGN BY MOBILIZING SYMPOSIA, STUDIOS, EXHIBITIONS, BOOKS, AND FILMS IN AN INTENSELY FOCUSED INVESTIGATION. HOW IS A NEW GENERATION OF PROFESSIONALS AND MANUFACTURERS FUSING ENGINEERING AND ARCHITECTURAL PRACTICES INTO RADICAL PLATFORMS FOR DECISIVE URBAN ACTION?
how something is built and in the case of contemporary global trade it also its own chemical engineering. Industries are still segregate as well, and their might have been; material offers innovation at its own inherent levels and within Material persists in isolation even as it cannot be as easily segregated as it once was. Aspects of time and duration—the nature of material in time and its application, as well as the modeling of complex or coordinated behavior of structural form? directed to the building material that virtually assured and verified the rise of modern engineered cities. Reinforced concrete, the composite of concrete and steel, instigated more than one hundred years of invention in building form and structure and is the predominant system in use today. The fusion relies on both concrete and steel, but it is arguably concrete that gains the accolades for the plastic shaping of building and space—both today and historically—even as this shaping would not be possible without reinforcement. What, then, is concrete, and what are the futures of concrete not only in terms of its reinforcement but also in terms of its chemical engineering, its capitalization, its geographic production and installation, and its role in energy and environmental impact? Is it still fruitful today to examine a material in isolation?

In the matrix of reinforced concrete it is concrete that seems to be the colloquial focus—the role of steel, even as reinforcement, is essential and integral yet it has less value in the popular discussion of building. The confidence to imagine new forms of plastic work, however, was sourced and manifest in this hybrid of steel and concrete. The rationalization of structure lies with the fusion of two materials—the synergy between the properties of the two materials. Today the techniques both of reinforcement and concrete are dramatically changing even as rapid urbanization does not fully allow change to incubate. What future roles do we see for both aspects of hybrid structures—both for reinforced concrete and for the wider aspect of hybrid or concerted action?

PARALLEL ACTION

In the past decade the concept of a composite or what would constitute concerted but separate behavior between materials has come under a new lens of evaluation and opportunity. Can we still talk about reinforced concrete with the operative word reinforced—or is a more complex interaction now the key to our thinking about material coordination? Is concrete still reinforced or can we suppose that term with new more accurate terms? What constitutes coordinated materials today and how are we reinventing the control of coordinated structural assemblies both before and after construction? What are the limits of the modeling of complex or coordinated behavior of structural form?

Aspects of time and duration—the nature of material in time and its application, but also under effects such as thermal action or long-term deterioration—are central to our work and are more carefully examined today. Engineers, architects, and materials scientists are more able to predict and anticipate the interaction and dynamic relationships between materials with a level of accuracy that was not possible even ten years ago. These examinations of material behavior arguably more fully constitute the cutting edge in architecture and engineering than the material itself—that is, the techniques of measurement and prediction might be seen as equal to and in part constitute a mode of material. In this regard do we begin to see materials as approaching or differentiating themselves from each other forms of behavior rather than as intrinsic differences? Are species of material modeling attributes of material: do they form a circumstance that is by nature material and intrinsic?

NEW LOCATIONS, SAME MATERIAL

Material persists in isolation even as it cannot be as easily segregated as it once might have been; material offers innovation at its own inherent levels and within its own chemical engineering. Industries are still segregate as well, and their locations, means of capitalization, and relation to labor and economies are key to how something is built and in the case of contemporary global trade it also affects aspects of sustainability. With this in mind, what then, can we say about concrete in architecture or engineering that we don’t already know—that is, after a discussion of its historical role, of its role as indicator of mass, weight, and presence—of its seeming permanence in monumental works?

The persistence of concrete as both a renewed material and a new application is more urgent then ever if we gauge its current implementation—the scope of its uses. New species of concrete and reinforced concrete are entering the world’s markets and rapid urbanization creates as much as 80 percent of the worldwide market for concrete. These factors are instigating a wave of new works drawn from new circumstances. What are the critical dimensions of this expansion in terms of urbanity or architectural space and structure—the plastic aspects of design? What are the futures of concrete in regard to contracting and implementation of coordination of economic circumstance as much as labor or materials?

URBANISM AND INFRASTRUCTURE: CONCRETE PLUS

In its known roles concrete has never been far from urbanism or from being vested as a form of civil life itself. From its essential chemical engineering to its place in formal aesthetics and the plastic arts, concrete has been seen as the source of a kind of pragmatic brilliance: as basic and essential, yet also lofting the indices of social life and public progress and carrying the weight of perceived urban success and urban failures. Concrete has also been expected to provide aspects of the ineffable. Its properties provide a sense of permanence, but it also has been the very material to provide everything but permanence: concrete is intrinsically based in concepts of time and of movement—of flow and the formalization of flow, and here it can perhaps be renewed as a temporal medium—as something that is both actual and a model. It is both fixed and in transition—solid, but only as a stage that indicates attributes of solidity. Recall the use of concrete in the banked test tracks at the Fiat factory in Turin completed in 1923; concrete as the substratum upon which acceleration and centrifugal force were played out above a factory where column span was a component of production, labor, and efficiency. Compare this to the stilled and expanded grandeur of the欺诈工厂，and concave modeling of the surfaces of Le Corbusier’s Ronchamp. Concrete as we have historically received it has always been concrete plus form—but also concrete plus speed plus aesthetics plus abstraction.

What don’t we know about concrete going forward—to the day after tomorrow? To next year? Ten years from now?

These histories can be projected into future states: to uses of concrete in infrastructure, in waterworks, in airports, in military installations, and, predominately, within the rapid development of cities today. This conference brings leading architects, scholars, and engineers to Columbia University to discuss the implications of new technologies in concrete within architecture and engineering, at the scale of building and at the scale of infrastructure—with new forms of measurement, coordination, and production.

—Michael Bell, Conference Chair
WEDNESDAY
OCTOBER 1

6:30—8:00 PM

WELCOMING REMARKS AND INTRODUCTION TO CONFERENCE
Mark Wigley
Dean, GSAPP, Columbia University
Bruno Lafont
Chairman and CEO, Lafarge

KEYNOTE LECTURE
Steven Holl
Professor, GSAPP, Columbia University
If concrete has virtually constituted a material history of the antique city and its infrastructure it is also understood and referenced by an often narrowly received history that presents its links to modern urbanization and metropolitan life as inevitable, robust, and vigorous. Concrete in this regard is fundamentally central to modern architecture and to the modern city. Based in the work of Auguste Perret, reinforced concrete is, however, situated as a rational, pragmatic material that is also given tenuous balance and tremendously delicate installation: it is pushed to limits of structure, formwork, and execution and it weaves between the rationalized aspects of a modern society and the traces and signifiers of historical programs and building types such as the basilica. Perret showed a deeply restrained relation to the plastic aspects of concrete that are commonly known in the work of Le Corbusier. Plasticity of form and the rationalization of construction dominate architectural thought in the 20th century and Le Corbusier’s architecture made both cases emphatically, but there were hybrid directions that were more often tenuous and they bear renewed examination in light of new advances in concrete today that show it to be a material of more technical refinement. Giuseppe Terragni’s work in concrete replaced an expected robustness with a severe and thinned surface planarity easily associated with Mies van der Rohe’s work in glass, marble, and/or travertine. Richard Neutra’s Lovell Health House (indeed his entire career) fused light steel framing technologies with similarly planar readings that made concrete seem as planar and as liquid as glass in his work. His Lovell Health House was a hybrid structure of steel stiffened by the diaphragm action of concrete. Terragni and Le Corbusier both used ferroconcrete for thinner, more planar installations—in stair balustrades and other details—narrowing the wall from the normal robust installation in structure or building volume. Today can these be seen as precursors to new problems in concrete: are the histories of concrete too narrowly understood and can they be reopened to provide new tributaries? How, for example, do concrete and construction materials integrate with other systems today and those from the outset of the 20th century? How are concrete works dismantled—is there innovation in the expected life span of materials that affect design? Do we still expect material properties to affect space in architecture and engineering, how is material understood as plastic and expressive? What constitutes a material’s limits?

Le Corbusier worked in concrete for an entire career. Mies approached a quasi-nihilism in his and a-plastic spaces realized in steel, glass, and quarried stone—he did not pursue concrete after his early works, but his work represents an instrumental role of measure, calculation, and precision of tectonic expression that seems more central today than ever. For all its weight, concrete has almost always been simultaneously an indicator of empty space—by way of surface and volume, and at times of lightness [as in the work of Perret]. These ideas are renewed as we reexamine concrete not only as surface and form but also as integral to and coordinated with other materials; as composites that are not so much assemblies but alloys—new materials in total with new potentials.
FORMWORK: BUILDING A BUILDING TWICE

Advanced work in the chemical makeup of concrete allows new methods of formwork and newly extensive pours. Yet to build in concrete is still to build twice: one builds the formwork prior to the pour. What aspects of formwork change in light of new concrete mixtures? What evolutions in formwork such as precasting or lost formwork have greatest implications for our work? At the small scale, formwork is often literally rented and relocated from site to site. Does the formwork constitute an absent origin—the trace of a once immense outward force—or is its significance less critical than in previous generations? What aspects of formwork can be seen as essential and/or intrinsic to the work—how is it designed and understood as a temporal medium versus an unacknowledged pre-structure?

What role will cementitious structural insulated panels play in future work—in relation to sustainability but also to labor, organization of construction, and architectural space?

CONCRETE TECHNOLOGIES: NEW FORMS OF FLOW AND OF TIME

Still recent advances in the workability and flow properties of concrete dramatically alter what we can achieve in concrete construction and design. Self-consolidating concrete has revolutionized the field in recent years and these changes coincide with concepts of flow in a wide range of disciplines.

Woven into existing circumstances, concrete requires focus, precision, and an ultimate willingness to see the work last—it is not a temporary material and its execution requires a view to what will likely be the next century. How do we measure doubt and apprehension in light of a long-lasting material? What concepts of flow present in the formation of concrete can be applied to themes of use, space, or the other aspects of the life of the concrete building?

What role do new technologies—be they of or aside from concrete—offer the concrete work produced today? How was concrete understood in the early part of the 20th century as an attribute of technical achievement and/or a political device and what do these trajectories mean in contemporary work?

What aspects of major work readied for emerging economies can be related to the rise of the mid-century state-sponsored infrastructural and/or industrial projects by international contractors such as Bechtel or Brown and Root; to concrete as an apparatus of the state or of states—the World Bank and/or global corporations? How has your work fused concepts of material to concepts of flow, of time, and increasingly, to new forms of economic flow?
STRUCTURAL CONCRETE: AFTER STEEL REINFORCEMENT

Reinforced concrete is being reengineered; both the means and techniques of reinforcement are changing, as are the plasticity and nature of admixtures. New innovations allow more contiguous pours and thus newly continuous surfaces, newly elastic forms. What are the futures of reinforcement in concrete and what applications do we imagine they will as a catalyst for change in design and engineering?

Potential new work includes:

—Micro-thin concrete; fiber-reinforced concretes are examples of the migration of reinforcement technologies.

—Quality: Concrete is unique, compared with other materials, especially steel and glass, as it requires an elaborate quality-assurance program to assure that both off- and on-site work meets specifications.

—Ductility/Brittleness: Concrete is a very brittle material. But by properly reinforcing it, can be made ductile. This is of particular importance in seismic regions. In a transition to fiber-reinforced concrete, engineers are elevating this “art of reinforcing” to a new level, in which the material is now basically ductile.

—Serviceability/Durability/High Performance: Not long ago, a “good” concrete meant simply concrete with high compressive strength. In recent years, the concept of durability has taken hold, because we want to assure that the concrete maintains its properties throughout its design life. “High-performance concrete” is now understood as a material that assures superior performance throughout its design life. This concept allows a new mean to address problems associated with the life span of infrastructure.

CONCRETE: SUSTAINABILITY, DEVELOPMENT, AND NEW INITIATIVES

The concrete industry is addressing sustainability issues on several fronts. Advances are necessarily measured against the global production of concrete and also against smaller regional and local dimensions. As with all building materials, questions of embedded energy, eventual use, and local advantages, such as proximity to building site for shipping, are all both global in nature and local and contingent on immediate detail: the degree of modernization at plants worldwide affects wider sustainability goals and emissions; and the nature of aggregate and the sourcing of materials. Sustainability in this regard is far from a direct equation even as direct action is possible—increasingly it will be embedded in issues such as carbon trading and global markets but the question is, what role can we add to this equation today that lies within both technical and political or social dimensions.

An immediate issue is the successful development of Portland cement substitutes, typically by-products of other industrial processes, such as fly ash and slags. Aggregate can be partially replaced by recycled materials such as construction debris, including recycled concrete aggregate and also glass, paper mill residues, and tires. These efforts not only result in the value-added secondary uses of what otherwise would become waste materials (often land filled at high cost), but they often improve the properties of the end product. What is possible to further reduce the environmental footprint of the concrete industry?

How is sustainability a unique project for concrete and what are the goals beyond sustainability? What are the key social and political dimensions of concrete and sustainability issues.

—Water: Approximately one billion cubic meters of water are used each year in producing concrete. Regions that lack a ready water supply can be inordinately affected by the amount of water needed to produce concrete.

—Reuse and Recycling: Post-production is also a central issue: the demolition and disposal of concrete structures, pavements, and the like constitutes an environmental question that has unique parameters when compared to other building materials. Construction debris contributes a large fraction of our solid-waste disposal problem, with concrete being its largest single component.

—Plant Modernization: It has been estimated that more than ten billion tons of concrete are produced each year worldwide. In the United States this translates to a ratio of approximately two tons of concrete per person a year. This requires an unequaled amount of natural resources to provide the aggregate and the raw materials for cement production. Of equal concern is the fact that the production of Portland cement has historically released large quantities of CO₂ into the atmosphere, making not only advancements in the design of plants critical but also the use of recycled aggregates. The cement industry is believed to account for five to seven percent of all carbon dioxide released worldwide, but as major
advances are made in how cement production is accomplished, these advances are measured against both the location and region of production. Are there advantages in the regional aspects of production, such as the levels of modernization and investment at plants, production demands, and levels/speeds of urbanization?

New forms of urbanization create as much as 80 percent of the worldwide market for concrete today. The persistence of concrete as both a renewed material and as a new application is more urgent than ever if we gauge its current implementation. How do we gauge the fact that the speed of urbanization means that concrete will effectively become the primary material of new cities in the next decade? Will design and technical innovation be more likely to occur in certain locations where there is a confluence of key factors such as accessibility of materials and investment? What does an architect or engineer offer in light of the global aspects of building materials today—in terms of construction and contracting, and also in light of the speed, liquidity, and processes of urban change? Where do we place our concerns and establish a stake in the situation—how do these development scenarios affect forms of architecture in terms of region or even aspects of architecture and urban design that often have addressed disinvestment rather than rapid change?

Are the goals of practice in relation to macro-scale or smaller-scale work outpaced by urbanization, or do we have new capabilities that arise from this rapid urbanization?

—What distribution or outlines of production describe relations between material manufacturing, installation, and use in work today—where a material originates and where it meets design and installation goals?

—How does work on infrastructure change in light of what we know of evolving economies or evolving demand? Has the arena of infrastructure expanded to included a wider range of technologies, a more prevalent awareness of new means and methods from leveraging economic potentials, off-site work, embedded digital technologies, and smart materials?

—Does concrete still portend plastic architectural space: is it still an architectural project or has concrete migrated to being a question of infrastructure even at the level of building design in which virtual city-scale works are realized as near singular events; indeed as forms of evolved infrastructure?

2:00–3:15 PM

**Moderator:** Reinhold Martin

Professor and Director, Temple Hoyne Buell Center for American Architecture, GSAPP, Columbia University

Carlos Eduardo Comas

Professor and Chair, Graduate Studies Program in Architecture, Universidade Federal do Rio Grande do Sul, Porto Alegre

Qingyung Ma

Dean, School of Architecture, University of Southern California

Marc Mimram

Architect/engineer, Marc Mimram Paris

Kate Orff

Professor, GSAPP, Columbia University

**URBANIZATION AND THE GLOBAL ASPECTS OF CONCRETE PRODUCTION**

New forms of urbanization create as much as 80 percent of the worldwide market for concrete today. The persistence of concrete as both a renewed material and as a new application is more urgent than ever if we gauge its current implementation. How do we gauge the fact that the speed of urbanization means that concrete will effectively become the primary material of new cities in the next decade? Will design and technical innovation be more likely to occur in certain locations where there is a confluence of key factors such as accessibility of materials and investment? What does an architect or engineer offer in light of the global aspects of building materials today—in terms of construction and contracting, and also in light of the speed, liquidity, and processes of urban change? Where do we place our concerns and establish a stake in the situation—how do these development scenarios affect forms of architecture in terms of region or even aspects of architecture and urban design that often have addressed disinvestment rather than rapid change?

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—Does concrete still portend plastic architectural space: is it still an architectural project or has concrete migrated to being a question of infrastructure even at the level of building design in which virtual city-scale works are realized as near singular events; indeed as forms of evolved infrastructure?
Bound to material and its spatial organization, architecture and engineering practices are also tied to intricate layers of commodity practices and investment that today have almost inevitably become global in nature. The nature of practice is more tightly woven into and responsive to investment than it ever has been; yet it is also frequently less weighted by overt characteristics of place and instead tied to trans-locations and interconnected matrices of development as well as consultants and partner practices. During the past 20 years, practice often seemed to have been indexed by way of a constellation of world cities and their particular relations—the city in this sense superseded the nation as the nexus of interchange.

Yet today trade and barriers between emerging economies are changing dramatically and at times reinforcing the role of national relations in development and design. In this realm, the anticipated roles of architectural and engineering practice, in terms of both cities and wider themes of urban life, are often fused. That is, they form unified practices that take on characteristics of one another, as architecture, engineering, and, increasingly, economics. These practices at times produce work that is more quasi-infrastructure than architecture.

What forms of practice have emerged today in this arena—how have concepts of architectural space and technique been reorganized within practices of engineering and architecture to allow us to operate at levels that may have been previously the domain of international contractors or state organizations? What is the role of the architectural concept in an era of deeply engineered materials and equally instrumental economic demands on design?

Generations of architects since the 1930s have helped write a story of international and then global practice, yet the global practice, as a socially critical instrument, is still relatively young. If the practices of Archigram or Superstudio and others depicted infrastructural worlds that borrowed industrial metaphors as well as outright techniques from history while promoting radical forms of social life, what can we say of today’s critical practices? What is the role of the image of infrastructure and its material techniques—what is the role of space, of event, or of nonmaterial design in an era of deeply coordinated material value?

Have practitioners of the generation that began work in the 1970s and 80s on what were often disinvested and neglected urban sites now emerged as global participants in the rise of a new city? How do building materials and their new means of capitalization and distribution affect design practice: within the global exchange of real estate, high-tech forms of construction and materials management are relatively new—so, too, is the need to again examine cities as a central frontier of social life. Is material a significant attribute of this condition or can we examine it still as an attribute of design rather than a determining factor?
Michael Bell is a Professor of Architecture at Columbia University’s Graduate School of Architecture, Planning and Preservation, where he is Director of the Core Design Studios and Chair of the Program in Architecture, Engineering, and Materials. He is the founder of Michael Bell Architecture, a New York City-based practice. His design work has been exhibited in the United States, Europe, and South America. Bell is a graduate of the University of California, Berkeley, and the Architectural Association in London. He has taught at the University of California, Berkeley; Rice University; and Harvard University. He is Director of the Core Design Studios at Columbia University and Chair of the Columbia Conference on Architecture and Urban Design at the University of California, Los Angeles. His office currently is engaged with projects of various scales throughout the United States, Europe, and Asia.

Cohen has received the two of the missing books: Interrupted Projections (1996) and Gyroscopic Horizons (1999).

JACQUES FERRIER
Architect Jacques Ferrier lives and works in Paris, France. He is a graduate of the École des Beaux-Arts, the Université de Paris VIII in 1985 and from the Ecole Centrale in 1991. Ferrier founded the associates JF Architecture in 1990 and his work now includes the design of town halls, museums, cultural centers, institutional offices, and housing. The firm’s output of urbanization of an architecture for a sustainable society. In parallel, Ferrier also conducts innovative research activity in partnership with industries. His projects, which include the Concept Office and the Hypergreen skyscraper, initiated a reflection on the future role of architecture, which takes into consideration the challenges represented by megalopolises and the planet’s needs.

In March 2008, he was selected to design the French pavilion for the 2010 World Expo in Shanghai, on the theme “Living at the Edge.” Jacques Ferrier has received several architectural prizes and is the author of a number of books, including The Poetry of Useful Things (2004).

KENNETH FRAMPON

Benjamin A. Graybeal is a research structural engineer with the U.S. Federal Highway Administration (FHWA) at its Turner-Fairbank Highway Research Center. He manages the structural concrete research program for FHWA with a distinct emphasis toward application of advanced cementitious materials and construction of current, high-performance concrete (UHPC) research program. Dr. Graybeal received his PhD in Civil Engineering from Texas A&M University. He is a registered professional engineer in Louisiana and Virginia. His professional career includes full-scale structural testing of UHPC components and field deployment of UHPC technology.

Laurie Hawkinson is a partner of Smith-Miller + Hawkinson Architects—a New York City-based architecture and urban planning firm. The firm’s projects include the expansion of the Carnegie Institute of Washington, New York; the Wall Street Ferry Terminal at Pier 11, in New York City; the Outline of America, an architectural theater at the North Carolina Museum of Art in Raleigh; and a recently completed house in Sagaponack, Long Island. The firm was a finalist for the Olympic Village Design Competition sponsored by the New York City Development Commission. Among its current projects are the U.S. Land Ports of Entry at Champlain and Massena, New York, and General Services Administration. Hawkinson is Professor of Architecture at the University of Pennsylvania’s Graduate School of Architecture, Planning and Preservation.

Juan Herrera is Professor of the Escuela Técnica Superior de Arquitectura de Madrid and Visiting Professor at The Graduate School of Architecture, Planning and Preservation, Columbus University.
Sanford Kwinter is Professor at Rice University's School of Architecture. He obtained his B.A. degree from the University of São Paulo and his master and Ph.D. degrees from the Catholic University of Leuven, Belgium. His interests have shifted toward concrete materials science and technology research, particularly on the beneficial use of recycled waste materials for the production of building products, with a focus on glass, fiber, and forged material from New York Harbor. This work extends from basic scientific research through technology development to technology transfer. A leading expert in the field, he has published over 200 technical articles, including a textbook on concrete construction and numerous book chapters and technical reports. He has also served as a consultant to cement companies, government agencies, and international organizations. His research interests include the development of new cementitious systems, such as low-temperature scanning electron microscopy, soft X-ray microscopy, and X-ray computed tomography. He is also a co-author of the book "Concrete Structures: Theory and Design."
GUY NORDENSON
Guy Nordenson is a structural engi-
neer and Professor of Structural
Engineering at Princeton University’s
School of Architecture. He served as a
Faculty Associate at the Princeton
University Center for Human
Values. After studying at MIT and
the University of California, Berkeley, he
began his career as a draftsman in the
joint studio of R Buckminster Fuller
and Isamu Noguchi in Long Island City
in 1976. Nordenson has worked as a
structural engineer in San Francisco
and New York. He established the New
York office of Ove Arup & Partners
in 1987 and was its director until
1997, when he began his own prac-
tice, Guy Nordenson and Associates
Struc tural Engineers, LLP. In 1993—
94 he was a Loeb Fellow at Harvard
University. In 2003 he was the first
recipient of the new American
Academy of Arts and Letters Academy
Award in Architecture for contribu-
tions to architecture by a non-archi-
tect. He was appointed Commissioner
of the New York City Art Commission
in 2006 by Mayor Michael Bloomberg
and the New York City Council, the
earliest such appointment. The Art
Commission was established in 1988.
Nordenson's work was the subject
of "The New York Art: A City of
Architecture" exhibition at the
City Art Commission: 1988–1998: A
History of Collecting and Exhibition"
in 2003, both held at MoMA. His
research interests include prestressed
concrete, high-performance fiber-rein-
forced cement composites, ferrocce,
and the development of advanced con-
struction materials to improve structural performance.

ANTOINE PICON
Antoine Piccon is Professor of the
History of Architecture and Technology
at Harvard University, School of Design
where he is also serving as Director of
Doctoral Programs. He has published
extensively on the relations between
architecture, urban design, science and
technology with a special focus on
construction history and theory. Among
other publications, he co-founded the
Structural Engineers and Architects in
trans., 1992), Claude-Perrault (1613-
1688) ou la curiosité d’un classiciste

NANAKO UMEMOTO
Nakano Umemoto has prac ticed
in New York City since 1986. Her
international
and nationally acclaimed firm, Reiser + Umemoto, has
realized projects at a wide range of scales—forty-foot-long
residential and commercial structures,
up to the scale of landscape design and infrastructure.
Reiser and Umemoto have taught and lec-
tured throughout the United States, includ-
ing the New York City Art Commission.
The first recipient of the New York City Art
Commission Award in Architecture for contribu-
tions to architecture by a non-architect,
Umemoto has been named as one of
the foremost architectural figures of her generation.

MATHIAS SCHULER
Mathias Schuler is a Managing
Director of the New York City Art
Commission. He was appointed Commis-
ioner in 1988 following the 1987 death
of his predecessor. Schuler attended
School of Architecture and Urban Design
at the Osaka University of Art. He
received the degree of Master of
Architecture in 1975 and, with Stanley
Reiser, has established a practice that
has completed numerous building
and landscape projects, including hous-
ing projects, libraries, wineries, symphonies,
churches, commercial and residen-
tial developments, and landscape designs.
These projects have received national and international recognition. Among many awards, the Transvaal House was declared a National Monument by the
Republic of South Africa in 1997.

SANDY SEINUK
Seinuk is the recipient of numer-
ous awards for his professional work,
including the 2006 Henry Bacon Medal from
the American Institute of Architects for
his work on the Freedom Tower.
Seinuk has completed more than 300
architectural projects, including hous-
ing, commercial and institutional fac-
ilities, and road- and railway bridges.
Seinuk is recognized internationally
as one of the foremost structural engi-
neers and pioneers in the field of
structural engineering.
mathematicians. He also received the 2006 Huxley Medal Award for Lifetime Achievements in Structural Engineering from the American Society of Civil Engineers. He is a co-author of the 2005 Urban Visionaries Award for engineer- ing from The Cooper Union School of Architecture and Engineering of the Year from the Association of Cuban Engineers; and the Leader of Industry Award from The Concrete Industry Board in 1999. His firm, Ysrael A. Seinuk, P.C., has an exten- sive portfolio of projects in every prob- lems, processing, rheology, nano- technology, and use of solid-waste materials. Both he and his colleagues have written books. Fiber Reinforced Cement Based Composites (1992) and Fracture Mechanics of Concrete (1994). He has published more than 400 jour- nal articles and edited more than 20 books. He is past editor of the RILEM journal, Materials and Structures. Shah is a member of the National Academy of Engineering. He has received many awards, including the Swedish Concrete Award, American Concrete Institute’s Anderson Award, RILEM Gold Medal, ASTM Thompson Medal, American Society of Civil Engineer’s Charles Pankow Award, and Engineering News-Record News Maker Award. He was named one of the ten most influential people in concrete by Concrete Construction. Recently, he spent time at the Indian Institute of Technology, Mumbai, as an Honorary Professor under the aus- pices of a Fulbright Grant. In addition to teaching at Northwestern, Shah has taught at the University of Illinois, Chicago, and served as a visiting pro- fessor at Massachusetts Institute of Technology, University of Sydney, Denmark Technical University, University of Singapore, Darmstadt University, and Laboratory Central des Ponts et Chaussées, Paris. He cur- rently serves as Honorary Professor at Hong Kong Polytechnical University.

Werner Sobek Werner Sobek studied architecture and structural engineering at the University of Stuttgart in Germany. In 1987 he founded his own engineer- ing consulting firm. In 1995, Sobek took over the renowned Institute for Lightweight Structures at the University of Stuttgart as successor to Frei Otto. In 2001 he also assumed the chair of structural engineer. Joerg Schlaich, fusing the two institutes into the new Institute for Lightweight Structures and Conceptual Design (ILEK), which he directs. ILEK spe- cializes in research on new mate- rials and design of lightweight and adaptive structures. Werner Sobek’s firm is one of the leading engineering and design firms in Europe. It is dedicated to combin- ing the highest levels of engineer- ing and design of structural ele- ments and sophisticated concepts for sustainable buildings. A par- ticular focus is on special struc- tures in steel, glass, titanium, con- crete, textiles, and wood. Werner Sobek has offices in Stuttgart, Caire, Dubai, Frankfurt, Moscow, and New York. Sobek’s designs have received numerous awards in various countries, including the DuPont Benedictus Award, Enneus Gold Award, Fritz Schumacher Award, IF Design Award, SEADI Structural Engineering Award, the “Building of the Award” from the American Institute of Architecture, Hugo Haering Award, Fazlur Rahman Khan Medal, and the UIA’s Auguste Perret Prize.

BERNARD TSCHUMI An architect based in New York and Paris, Bernard Tschumi is Professor at Columbia University’s Graduate School of Architecture, Planning and Preservation, where he served as Dean from 1988 to 2003. First known as a theorist, he exhibited and pub- lished The Manhattan Transcripts (1981) and wrote Architecture and Disjunction, a series of theoretical essays (1984). In 1982 he won the prestigious competition for the design of the Parc de la Villette, a 125-acre public park in the northeast edge of Paris containing dramatic build- ings, walkways, bridges, and gar- dens. Currently, his projects include the New Acropolis Museum in Athens, as well as an archaeological museum and a cultural center, both in France. He recently completed a 6,000-seat conc- ert hall in Limoges, France, as well as a residential tower in New York City. His most recent books are Tschumi on Architecture. Conversations with Enrique Wolfer (2006) and a biogra- phy and monograph by Gilles De Bure. Bernard Tschumi (2008).

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Solid States is the second in a series of conferences on architecture, engineering and materials. The series originated as a plan to collaborate; Mark Wigley, Dean, GSAPP, and Christian Meyer, Chair, Civil Engineering and Engineering Mechanics, began discussions to host a joint conference as a new model of exchange between architecture and engineering. The first conference in the series, Engineered Transparency, on glass, was held at GSAPP in September 2007. The third conference, on metals, will be held at GSAPP in autumn 2009.

For information about this and future GSAPP events, please contact Benjamin Prosky, Director of Special Events, at 212 854 9248; bjp2171@columbia.edu

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