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Unless a hidden stash of documents suddenly turns up, we will never know why John Wiley, my grandfather’s grandfather, developed an interest in architecture. Without documents, we are forced to parse the logic of John’s publishing program, which was shaped in part by his experiences working with his father, Charles, the founder of the company. We do know two things. Soon after John revived his father’s faltering publishing house, he developed an interest in what we publishers like to call "need to know" information. Both John and his father played formative roles in the origins of American literature, publishing writers such as James Fenimore Cooper, Washington Irving, Nathaniel Hawthorne, Herman Melville, and Edgar Allan Poe. Working with his partner, George Palmer Putnam, John evinced an interest in more practical subjects, such as architecture, engineering, landscape design, and surveying, and consequently, Wiley & Putnam would come to play a comparable role in the development of an American architecture.

Wiley’s 200-year history is filled with important publications that have helped shape the built environment. Wiley & Putnam published Andrew Jackson Downing’s Theory and Practice of Landscape Gardening with a View to the Improvement of Country Residences and Cottage Residences in 1841 and 1842, respectively. Downing was an important figure in the development of a distinctive American architecture, one closely associated with the country’s early suburbs, where John would move in the 1850s. Downing also influenced the shape of the urban landscape perusing large-scale urban park designs with his assistant, Calvin Vaux.

John Wiley’s other interest, which looks something like a personal obsession, was John Ruskin, the renowned British aesthete, artist, social reformer, and architectural critic. Beginning in 1851, and for the rest of John’s active publishing life, he and his offspring, as John Wiley & Sons, published endless sets and single monographs penned by Ruskin.

Soon after John split amicably with Putnam in 1848, he gave up on fiction and moved slowly but decidedly into publishing for the academy and the professions, a move that was accelerated by the arrival of a second son, William Halsted Wiley, a civil engineer. John published books that would be used by carpenter-builders, draftsmen, and architects and then, with his sons, branched out more and more into related engineering professions. As with the history of Architectural Graphic Standards, one can trace the evolution of home, commercial, and industrial construction—railroad and bridge building, ship and fortification design, highway construction, all of those physical features associated with the industrialization of America—by delving into Wiley books.

Our company was particularly adept at handbook publishing, and Frank E. Kidder’s Architects’ and Builders’ Pocket-book, later rewritten by Harry Parker, went through 18 editions between its original publication in 1884 and 1986, when it finally went out of print.

The arrival of Architectural Graphic Standards in 1932 was part of a natural progression. It was very much in the tradition of Wiley’s century-long commitment to quality publishing for a particular profession or group of professions. Charles G. Ramsey and Harold R. Sleeper authored and designed the first edition and continued to do so until Sleeper’s death. Sleeper, as George B. Johnston points out in his introductory essay, published other books with Wiley. At one point in the 1950s, when Wiley was beginning to outgrow its offices at 440 Park Avenue South, my father asked Sleeper to design a building for the company. However, Wiley was neither large nor profitable enough at the time to undertake such an ambitious project, and the project was not realized.

From the start, AGS acquired the reputation as an indispensable tool for architects and others, a reputation that has been sustained by constant revision to assure that the content keeps up with changes in all aspects of design and construction. I must add that even from the perspective of a nonprofessional, the book itself is an appealing work of art. Beginning in the mid-1990s, constant revision has been supplemented by the delivery of AGS’s content in a digital format. The fourth release of the CD-ROM coincides with the publication of this 11th edition. AGS offers its readers not only must have content, but also now provides tools to work with that content.

We at Wiley are proud of our role in the birthing of AGS and of our association with the AIA. AGS represents our very finest work while demonstrating our continuing commitment to meeting the needs of our readers.

Peter Booth Wiley
Chairman of the Board
John Wiley & Sons Inc.
As part of a graduate project at Yale, I went to Ireland during the autumn of 1975 to design and build a solar house in rural County Cork. I had never built a building before, and no one had ever built a modern solar house in Ireland, so I quickly realized that my ambition surpassed my knowledge. There I was, shivering in a cold drizzle, one moment dreaming of a solar-powered world, the next trying to figure out how to build a sturdy, dry, and warm rural house by hand. Thankfully, I remembered to bring my Architectural Graphic Standards.

Indeed, Architectural Graphic Standards was my bible. When I needed to know how to lay out a wall, I found it here. To figure out the loads on the slate roof, I found it here. Day after day, I wore out the pages of my third edition, poring over its rich collection of details and drawings. Studying the book, as much as making the building, was my initiation into the world of the practical, experienced architect.

As deeply personal as that experience was, it was not unique. If you are a professional architect, this book has, at one time or another, been your mentor. Its encyclopedic representation of architecture’s best ideas and practices has not only shaped your understanding of what it means to make a building, but also it has helped you make better buildings, for what you find here is the tried and true, rock-solid, indispensable wisdom that underlies our craft and our art.

Yet Architectural Graphic Standards can also be seen as a living document. While the book’s time-honored reliability makes it an able keeper of rich traditions, its content is always evolving. The volume I carried with me to Ireland, for example, is not the same as the one you hold in your hands. Like preceding editions, this 11th edition preserves the detailed knowledge of the past; however, it contains forward-looking sections on solar collectors, porous paving, and green roofs, which I could only wish for while I was searching and innovating relentlessly thirty years ago. There is also a wealth of new information that shows the importance of considering the specific qualities of each site—its geography and climate, its ecology and cultural history—when applying the universal standards illustrated in these pages. Gone are the days of Le Corbusier’s “one single building for all nations and climates.”

The evolution of Architectural Graphic Standards, then, represents more than a simple accumulation of facts; it actually enables change in the way we think about and practice architecture; not change for change sake, but intelligent innovations that answer the needs of the future and introduce a new layer of quality to building design. Consider the new chapter on sustainability. Here we find a treasury of ideas and practices that enables designers to respond to a diverse range of economic, social, and environmental concerns. Indeed, architecture has always been a multidisciplinary profession, but appreciating the rich connectivity of economy, ecology, and equity has become a crucial dimension of our work as we have come to see each building as a part of a complex community of events affecting everything from the health of architecture’s provisioners, makers, and users all the way to the long-term prospects of the planet.

Too often, the news from this expanded purview—how buildings waste energy and resources or contribute to climate change, for example—has either been ignored or read too narrowly. Ignoring this news is negligence, plain and simple—a strategy of tragedy. But a narrow response, like trying to limit the negative impacts of architecture by using an environmentally damaging energy source more efficiently, doesn’t get to the heart of the matter either. Rather than creatively addressing the design flaws that create pollution and waste in the first place, minimizing strategies only make architecture “less bad.” Or “differently bad,” as we saw in the 1970s when a single-minded response to the shortage of fossil fuels yielded a host of energy-efficient buildings that made their occupants sick. Less is not more in this context.

If we have come far since then, we still need a principled framework for good design that offers a positive, regenerative course for the future of architecture. The new case studies presented here offer just that. Illustrating the many ways in which architects, landscape designers, and engineers have been effectively applying the intelligence of natural systems to building and site design, the case studies show that we can create architecture that is not simply less polluting or less energy intensive, but architecture that generates a wide spectrum of positive effects, enhancing environmental health, social well-being, and economic vitality. This is the work Vitruvius began millennia ago.

In each of these examples, we see a design process built on a dialogue with natural processes, a creative interaction with the flows of sunlight, wind, water, and nutrient cycles in a particular place. By integrating this dialogue into our technological discourse on building and energy systems, architects and designers are developing magnificent innovations. We see safe, healthful materials designed to be perpetually recycled or returned to the earth to nourish the soil, effectively closing the loop on material flows. We see durable public buildings powered by the energy of the sun and private residences heated and cooled by geothermal currents rising from underground. We see green-roofed manufacturing plants that create habitat, restore landscapes, and cost-effectively filter storm water while providing safe, comfortable places to work. We see a profusion of inspired designs that are not only surpassing conventional standards of cost and performance, but...
also are creating beautiful, deeply satisfying places to live, work, learn, and participate in community life.

As ecological design principles become a part of Architectural Graphic Standards, they become a part of our culture; if a practice appears between the covers of this book, it has been done and will be done again. That’s not to say that Architectural Graphic Standards is prone to the whims of fashion. On the contrary, showing how to construct a human habitat in harmony with nature is an important act of historical and cultural restoration, for the story of architecture and building—from the Roman Pantheon to the University of Virginia, from the cathedral to the vernacular house—can be read as a long, fruitful dialogue between our buildings and the sun.

It seems, somehow, in the last century, much of this knowledge was lost or ignored. In 1975, when I was designing the first of my solar buildings, a visiting professor at Yale, a celebrated modernist, admonished me, saying "solar energy has nothing to do with architecture." Twenty-five years later, at a joint meeting of the American Institute of Architects and the International Union of Architects, less than a dozen of thousands of architects in attendance raised their hands when I asked who knew how to find true south. But that skill is the true cornerstone of building intelligence. We see it in the deep history of building in places like Athens or Mykonos, where orientation and the play of light and shadow were fundamental elements of design and human celebration.

The Mediterranean house was built with thick walls that transferred the heat of the winter sun or the coolness of the summer night into the interior, while deep, whitewashed window reveals reflected sunlight coolly and deeply into the space. In Vitruvius's 1st century BC encyclopedia of architecture, a seminal antecedent to Architectural Graphic Standards, these vernacular skills become the art of building, and one finds entire chapters devoted to the profound significance of the sun's movement in relation to the location of rooms, the size of apertures, and thermal mass. Fourteen hundred years later, Palladio was deeply influenced by Vitruvius, and Thomas Jefferson, in turn, studied them both, drawing inspiration from the masters' classical forms as well as from their keen attention to site and solar flux. Indeed, Monticello and the University of Virginia make art of an intense engagement with history, landscape, and the movement of the sun. Armed with the technology and ecological insights of our age, 21st century architects can surely do the same.

One can imagine the self-taught Jefferson studying his Vitruvius as we study our Architectural Graphic Standards. And one can imagine the architects of the future poring over this book as we pore over Vitruvius. That is the singular place Architectural Graphic Standards holds in our profession: It is, all at once, a repository of our stories, a comprehensive resource for practicing architects, a record of what it means to make a building in our time, and a signal to forthcoming generations that we stayed in touch with our sources as we anticipated the needs of the future. Feedback and feed-forward all in one volume.

In that sense, Architectural Graphic Standards plays a pivotal role in both cultural memory and cultural evolution. In the absence of time and practical mentors, it fills the role of the elder craftsman, much like the father or grandfather on the intergenerational teams that build temples in Japan. There, wooden temples are deconstructed and rebuilt each generation so that the local building arts are never lost. The grandfather's third time building the temple is the grandson's first, and board by board, cut by cut, joint by joint, the grandfather transfers ancestral knowledge and skills into living memory. At the same time, high-speed change is a 21st century reality, which demands that we practice anticipatory design—a strategic, purposeful approach to architecture that uses sophisticated, regenerative technologies, and a new architectural language to nurture and celebrate the future of life.

Both of these roles are value-laden, and so, they begin to suggest a value-based framework for the application of the tools of our trade. Quite simply, architects need to follow all of the laws of nature as diligently as we follow the laws of gravity. This is a blessing, not a burden. We live on a wondrous, biologically rich planet daily renewed by sunlight and new growth. Working with, rather than against, all of the processes that make the surface of our world a dynamic living biosphere—the energy of the sun, wind and waves; the vital synergies of biochemistry; the dynamics of photosynthesis—we can create buildings that celebrate our interdependence with other living systems and make architecture itself a regenerative force. Imagine a building that makes oxygen, sequesters carbon, fixes nitrogen, distills water, provides habitat for thousands of species, accrues solar energy as fuel, builds soil, creates microclimates, changes with the seasons, and is beautiful. Such buildings already exist, and they show how our tools can serve a principled, creative dialogue with Earth that generates a living architectural language for our time—an aesthetically rich, technologically sophisticated language that celebrates sunlight and landscape, people and place, community and creativity, as well as the immensely rich traditions of the past. At this fertile crossroads is Architectural Graphic Standards, preserver and creator of architecture's dynamic legacy.

William McDonough, FAIA
Founder and Principal
William McDonough + Partners
INTRODUCTION

FROM THE INTRODUCTION TO ARCHITECTURAL GRAPHIC STANDARDS, 11TH EDITION
Dennis J. Hall, FAIA, FCSI

Architectural Graphic Standards (AGS) has long been revered as an indispensable resource in architectural offices, presenting design and technical information on building subject matter. It is also a historic record of the materials, construction practices, and techniques commonly in use at each edition’s time of publication, in effect creating a snapshot of the era’s standards of practice. AGS celebrates its 75th anniversary in 2007. In recognition of this milestone, the 11th edition builds on its venerable tradition to cover contemporary issues of architectural practice in this age of exploding design technology, thereby, establishing AGS as documentation of past, present, and future standards of practice in architecture.

Our vision for this edition was to create a volume that is more relevant to today’s practicing architects and related practitioners. It is intended to be used as a design and reference tool during the earliest stages of project conception through production of detailed construction documents. A new content paradigm and updated design enables AGS to achieve this goal and remain the flagship architectural title that it has always been. This edition of AGS is divided into three sections and completely reorganized. The contents of each section are organized using established construction classification systems.

Section 1, “Building Elements,” applies the Construction Specifications Institute (CSI)/Construction Specifications Canada (CSC) UniFormat™, a classification system for organizing construction information by functional building elements. It is the primary organizational structure used by architects and contractors for preliminary design documentation, which includes schematic design drawings, preliminary project descriptions, and preliminary cost estimates. UniFormat™ characterizes building systems and assemblies by their function without identifying specific products or work results that compose them. Joseph Demkin, AIA, provides a discussion on the advantages of this organizational structure over CSI/CSC MasterFormat™ for AGS on page xiv.

Additionally, Section 1 addresses emerging strategies in building design, such as rainscreen wall design, heat, air and moisture considerations, and the impact of climatic differences. It also introduces case studies for each building element that demonstrate architectural responses to specific design considerations and serve to foster critical thinking in design by providing examples of the standards at work.

Section 2, “Materials,” uses four of the MasterFormat™ division titles to organize information on the primary building materials—concrete, masonry, metals, and wood—used in construction. These chapters focus on the characteristics and properties of these materials and associated work results without regard for the types of building elements in which they may be used. For example, Chapter 9, “Masonry” includes such subjects as masonry masonry mortaring and grouting, masonry anchorage, reinforcing, and accessories, unit masonry, glass unit masonry, and stone assemblies.

Section 3, “Issues in Contemporary Practice,” includes four current issues of architectural practice that influence design and the development of construction documents. These issues represent current challenges facing all architects in an ever-changing profession. These topics include, a framework for environmentally-sensitive and sustainable design as a design philosophy; expanded and updated coverage of inclusive, universal, and accessible design strategies, using real-world examples to highlight key principles; emerging project-delivery methods, including Building Information Modeling and CAD/CAM, focusing on the movement from site-built construction processes to shop-fabricated/site-erected projects; and finally, the value of conducting, disseminating, and applying architectural research. By inclusion and expansion of this information from previous AGS editions, the hope is to provoke creative thought and analysis of design solutions that will advance the practice of architecture.

Careful attention has been paid to ensure the consistent use of proper construction terminology throughout AGS. Terminology has been coordinated with the 2004 edition of MasterFormat™ and the OmniClass Construction Classification System™ tables, which are being used by the National Institute of Building Sciences as the basis of terminology for the National Building Information Model Standard. At the end of each topic is a listing of MasterFormat™ titles that are found in that portion of the chapter. These are identified as "See Also" and are intended to assist users in finding subject matter and transitioning between the preliminary design organizational structure and work results titles used in specifications. The electronic version of the professional edition of AGS may be searched by construction entities, spaces, elements, work results, or products as defined in OmniClass™.

Also new to this edition is the updated design. Our colleagues at Bruce Mau Design, Inc. of Toronto were instrumental in evaluating AGS and creating a bold new look and feel. Inspired by the floor plan of the Abbey of St.
Gaul, the design of AGS was achieved by an underlying grid of squares. The design, in most simple terms, provides a logical place for everything. Using a grid system and a new typeface, the pages are liberated; topics are no longer confined to one page, allowing content to flow across pages and providing more room for additional information. The numbering system and the bold new second color provide a wayfinding tool for the reader. The color highlights key elements of the page—chapter titles appear in red on every page followed by the topic in black, and the use of red on the printed page highlights the start of a new subtopic. All details, drawings, and tables have been numbered by chapter for easy reference, and notes to those images are now located at the bottom of the page.

The new generation of Architectural Graphic Standards is a first step in the evolution of presenting building information that will inspire critical thinking about design solutions, and uphold the profession’s highest standards of care for the health, safety, and welfare of the public.

ORGANIZATION OF AGS CORE CONTENT
Joseph A. Demkin, AIA

The intrinsic value of a technical reference such as Architectural Graphic Standards lies in the quality of its content, and that value is undoubtedly what has made AGS so well-respected and widely used for the past 75 years. Because of the extensive amount of information that AGS embodies, how that information is organized also contributes, at least in part, to the value and utility of this venerable work. To enhance its ease of use, the 11th edition has adopted a new organizational framework. After a brief overview of how past AGS editions addressed content organization, the framework for organizing content in the 11th edition is described.

ORGANIZATION OF PAST EDITIONS
Each of the first four AGS editions (published between 1932 and 1956) organized material based on the general sequence of construction for buildings. The preface of the first edition explains, “The progression of the book follows the usual building construction procedure from foundation to furniture, with the most-needed miscellaneous sheets placed at the end.” A shortcoming of this arrangement was that it lacked any kind of hierarchy. The table of contents at the front of the book is presented in a long continuous list, which became increasingly harder to use as the 213 pages of the first edition expanded to 566 pages in the fourth edition. Fortunately, the comprehensive and extensive indexes accompanying the first four editions compensated for this shortcoming.

The fifth edition (published in 1956) adopted a new organizational approach based on construction trades and practices. This approach—first formalized in 1963 in CSI Format for Building Specifications—later evolved into the CSI 16-division classification system that formed the basis for the Uniform System for Construction Specifications and the MasterFormat™ system. Despite a strong orientation toward construction trades and practices, the 16-division MasterFormat™ framework would be widely adopted over the next four decades for many design-related uses, including the content organization of publications such as AGS.

As the number of AGS pages ballooned, a considerable amount of the new material did not easily fit into the MasterFormat™ work results classifications. Consequently, in the sixth through tenth editions, new chapters containing information on subjects not readily accommodated within MasterFormat’s™ 16 divisions were progressively tacked on at the end of the book. By the release of the tenth edition in 2000, AGS had grown to 21 chapters.

ORGANIZATION OF 11th EDITION
To address the limitations and shortcomings of MasterFormat™ for organizing AGS content, the 11th edition incorporates the UniFormat™ classification system. The Project Resource Manual: CSI Manual of Practice (fifth edition) defines UniFormat™ as “a uniform classification system for organizing preliminary construction information into a standard order or sequence on the basis of systems and assemblies.” The UniFormat™ system describes building components starting from the ground up and from the outside to the inside of a building. UniFormat™ is organized by the function performed by each building element, rather than the products and materials specified for it. Thus, a metal roof and a wood shake roof are found in the same section, rather than in chapters on metal and wood. The functional orientation of UniFormat™ makes it particularly suited for planning, conceptual, and early design tasks (e.g., preparing preliminary project descriptions, developing preliminary cost estimates, and evaluating alternative schematic building elements).

To align AGS with the functional aspects of building elements, the organization of the 11th edition’s core content of building details in Section 1,
"Building Elements," tracks with UniFormat™ categories A through G as listed below:

(A) Substructure
(B) Shell
(C) Interiors
(D) Services
(E) Equipment and Furnishings
(F) Special Construction and Demolition
(G) Building Sitework

Each of the categories contains both classes and subclasses. For example, Category B, Shell, includes classes for superstructure, exterior enclosure, and roofing. Each class, in turn, contains subclass elements. The exterior enclosure class, for example, includes subclasses for exterior walls, exterior windows, and exterior doors. [Note: The 11th edition carries only the letter tags for the UniFormat™ categories. The letter-number tags for UniFormat™ classes and subclasses are not used. This allows greater flexibility to modify class and subclass elements and simplifies the referencing of AGS details in non-UniFormat™ chapters].

**AN ENHANCED AGS**

The use of UniFormat™ promises to make the 11th edition more "user-friendly." The organization by functional building elements better accommodates the visually delineated components that make up AGS core content. Additionally, because UniFormat™ generically defines a total facility by functional components, users can find information for developing a specific building element in one location. In a broader sense, AGS use of UniFormat™ tracks with the AEC community's efforts to develop design-related databases for application in powerful digital technologies such as object-oriented programming, industry foundation classes (IFCs), and building information modeling (BIM). The 11th edition repositions AGS as a resource suited to planning and design tasks, and anyone tapping into its rich and extensive content will benefit from the new organizational structure.
We are flooded daily it seems with stories in magazines, newspapers, and e-publications describing newly designed buildings that stretch the limits of construction technology, and profiling the designers who have become experts in sustainable design or in generating unique forms and aesthetic finishes. In recognition of these accomplishments, the American Institute of Architects (AIA) designates a firm of the year and gives awards for outstanding achievements in design and technology for a variety of building types.

Thus enthralled by beautiful photographs and tales of success, the fledgling design student may wonder what distinguishes a successful career in the design and construction professions. More poignantly, they may ask how can they set out on a career in design, and what can they do to facilitate success? The answer to these questions is at least partly obvious—get an education, read about architecture and architects, visit notable buildings, study architectural details, become familiar with materials, work around construction sites, study human behavior, understand energy issues and sustainability, work with color and light, and so on.

Equally essential for design students is to spend time around seasoned professionals with expertise in very specific areas of design, technology, and construction. That is precisely what the new Architectural Graphic Standards Student Edition makes possible, for it makes available to the beginning design student a wealth of professional expertise. Hundreds of design and construction professionals, educators, editors, publishers, and graphic designers were instrumental in the development of the 11th Edition of Architectural Graphic Standards and this new Student Edition.

For example, the student having difficulty understanding the relationships between climate and cladding/fenestration need only seek out the climatic design considerations guidelines offered in the work by Hillier Architecture of Philadelphia, Pennsylvania. The student confused by the new International Building Code can refer to the code-based superstructure considerations developed by Hansen Lind Meyer of Orlando, Florida, for help in developing a schematic structural concept. For understanding something as specific as stair details, Krommehoek/McKeown and Associates of San Diego, California, and Karlsberger and Companies of Columbus, Ohio, show code-compliant stair and landing widths, proper nosing, tread and riser details, and headroom clearances. And for contemporary insight into the "hot" topic of sustainability, William McDonough + Partners of Charlottesville, Virginia, relates the principles of sustainable design and sustainable design process.

I encourage you, the design student, to search through this new edition, for you will find a trove of design and detailing treasures. Take time to examine the guidelines and details that have facilitated the success of the numerous contributing professionals. Do not hesitate to utilize their expertise in your design process and detail development. Be sure to check out the section on environmental impact and material life cycles. The diagram showing energy systems utilizing photovoltaics, passive water preheaters, and cloches is very informative, as are the diagrams of constant-volume multi-zone HVAC systems.

Best wishes as you advance in your career, with the coaching of some of the best in the profession. Perhaps one day, you, too, will be asked to contribute your own expertise in green design or building diagnostics, facilitating success for those a few rungs lower on the ladder of experience.

Bruce Bassler
NCARB