Signage and Wayfinding Design

A Complete Guide
to Creating
Environmental Graphic
Design Systems

Signage and Wayfinding Design

Second Edition

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To our esteemed colleagues who made enormous contributions to the design profession:

- Jack Biesek
- Deborah Sussman
- Massimo Vignelli

And to Hanley Bloom, who contributed so much to the EGD industry before his passing.

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Foreword to the Second Edition

We experience the physical world in different ways at different times.

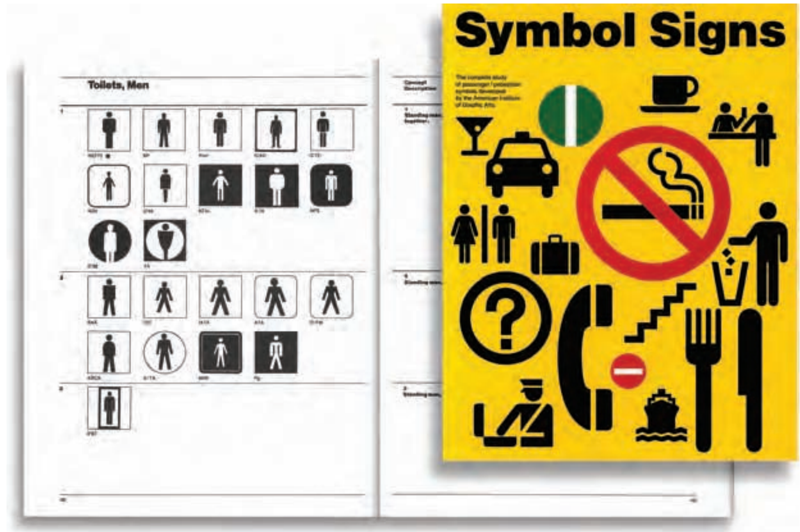
On a vacation trip to Paris, just wandering through the streets and passageways of the Left Bank with no pre-determined route can be a joyful and serendipitous experience. But when first arriving in the city, whether at the airport or train station, we basically just want to know how to find the Metro or a taxi, and we rely on clearly visible and unambiguous signs to direct us.

When we need to see a doctor in a large metropolitan hospital, we follow signs and other visual clues that will hopefully get us through the maze of floors, disciplines, and services to the correct destination. But when we are a patient in that hospital, we would like the physical environment to be as calm and pleasant as possible.

Environmental graphic design plays a role in both aspects of these places. The signs directing us in and out of Charles De Gaulle Airport were undoubtedly the work of environmental graphic designers, working along with the facilities architects and planners. But in central Paris itself, signs of a different kind help define the character and ambience of that place we think of as "Paris." Many of the shop signs, with their beautiful scripts and richly ornate letterforms, were the work of generations of skilled craftsmen. Professional architects and planners contributed in other ways. For example, the architect Hector Guimard's Paris Metro entrances, with their famous Art Nouveau lettering, are used to symbolize Paris in many tourist brochures.

And while environmental graphic designers are often challenged to provide clear, functional and attractive wayfinding for hospital labyrinths, they also have a role in helping make patient areas visually calm and pleasant through the use of carefully selected color and artwork. In this sense, environmental graphic design clearly ties into the idea of "branding" when the design is helping to establish an environment that delivers an image and experience consistent with and appropriate to the goals of the institution or place.

As these examples indicate, environmental graphic designers, generally working behind the scenes, can have significant impact on how we experience the physical world. Since their work often directly effects



Tom Geismar chaired the effort by the American Institute of Graphic Arts (AIGA) to research and design the now-familiar Symbol Signs system of travel-related pictograms for the United States Department of Transportation.

people's actions, the designer needs to understand human psychology as well as the basics of architecture, industrial design, color theory, and graphic design and typography. And today, continual advances in digital technology demand yet another complex discipline to understand and exploit for more effective signage, wayfinding and placemaking, to help people experience the physical world in appropriate and meaningful ways.

This book, more than any other I've seen, clearly and succinctly describes the many overlapping aspects of the field, and presents proven approaches to a wide variety of real issues that the designer faces. Written by long-time practitioners, it is clearly a labor of love, providing a great deal of information about this still-evolving, multi-disciplined field of design.

Tom Geismar
Chermayeff & Geismar & Haviv

Foreword to the First Edition

Regarding wayfinding, it might be noted that after you get there, in an ideal world, there would be very little that needs to be told about where to go, because on arriving at an unfamiliar destination the next directions would be self-evident. Within the best architecture, finding one's way around should hopefully require a relatively minimal effort and, at least, little signage.

If some sign is needed at all, it should be one of confirmation, to make a visitor comfortable with the path taken. It is far better to say too little than too much. To quote Mies: "Less is more."

Signage either adds some degree of quality to the environment in which it finds itself or it takes something away, diminishing the experience by being distracting to a visitor. If a message is there and is unnecessary, that's a serious distraction that should be avoided.

If a message is too big or too visually loud, if it overwhelms and negates other things such as the feeling of architectural materials, the play of light, reflections, the texture of surfaces, transparency, distant views, and a myriad of other environmental elements, including the presence and contribution of art or even the presence of other people, then the message is not quite right.

Too small a message or a direction misplaced by being too low or too high when its meaning must be instantly grasped and acted upon, doesn't help those who are insecure or hesitant and in need of help.

The best signage is in the right place at the right time, considers the viewer, and is neither overly repetitive nor demanding.

In fact, the best signage seems to take on an air of invisibility. It's there, but is taken in and taken for granted.

Of course, the opportunity exists for signage to add considerably to the excellence of any built environment, adding, by careful attention to details, color, compatible materials, and most importantly good typography that is easy to read and has character, often to reinforce the style and standards of the place, institution, or company which stands behind it.

Chermayeff & Geismar's iconic placemaking sign that has engaged and delighted millions of people passing by 9 West 57th Street in New York City since 1972, and will continue to do so for years to come.

The meticulous specification of all the elements going into the making of signage to meet the reality of each situation, to stay in balance, finding the best point between the most basic adequacy at one extreme and the performance of refined and sophisticated excellence in design terms at the other end of the spectrum, is what Calori & Vanden-Eynden consistently deliver time and time again.

Ivan Chermayeff
Chermayeff & Geismar & Haviv

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Davies Associates
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All of you have helped make this happen, and we thank all of you from the bottom of our hearts.

Introduction

Conversation with a New York City cabbie:

Cabbie: "Whaddaya do?"

Reply: "I'm a designer."

Cabbie: "Oh yeah, designer. So you're in fashion design, right?"

Reply: "No. I design signs."

Cabbie: "Whaddaya mean, you design signs?"

Reply: "I design signs. I mean, when you drive fares to LaGuardia, how do you know where to drop them off?"

Cabbie: "I follow the signs. Wait, you mean someone designs those things? Never woulda figured that someone designed signs."

Reply: "Well, God didn't put them here."

Cabbie: "People really do that, huh? I mean, design signs?"

Reply: "Yep."

It's been eight years since this book was first published. A lot has changed and a lot has stayed the same, including the relevance of the fictional dialogue above.

Environmental graphic design, or EGD, a relatively new hybrid of the design field, is fairly long on practice but short on theory and formalized methodology. The first edition of this book filled that knowledge gap by putting forth the first formal methodology for solving signage and wayfinding problems: the Signage Pyramid model.

This second edition—the first we know of for any book on signage and EGD—builds on the Signage Pyramid method with updated content and full color throughout. David Vanden-Eynden, my partner in design, business, and life, is co-authoring this second edition. His insight and hard work has made this edition even better than the first.

This second edition acknowledges some of the changes that have impacted EGD since the first edition. For openers, our professional organization, the SEGD, has changed the root word for the "E" in "SEGD" from "Environmental" to "Experiential," but this book's primary focus is still on environmental graphic design, as in graphics in the built environment.

This edition continues to discuss the design process in detail because this process is so important to the work of all designers. In the meantime, the business community has taken an interest in the design process, so while the design process remains the same, you may better recognize it repackaged as design thinking and repurposed for corporate problem-solving.

Branding is now a core element of identity strategies and EGD plays an ever-increasing role in creating brand identities, be it for large corporations, small businesses, nonprofit institutions, events, community initiatives, and the like.

Many people now possess smart phones, which give them personalized access to tailored information, including some wayfinding information. And *digital signage* is a hot term, but it mainly means deployed, nonmobile screens that deliver advertising/marketing information—when you enter a store, at the checkout lane, at the transit stop, on a city street, and so forth.

The Americans with Disabilities Act's (ADA's) 2010 Standards for Accessible Design (SAD) are significantly different regarding signage than the original 1991 Americans with Disabilities Act Accessibility Guidelines (ADAAG). SAD or not, the basic principles of typography, a key element of signage, remain true after nearly six centuries of practical application and refinement.

The physical world still exists and we still live in it and we still need to find our way through it. There are now multiple channels for communicating wayfinding information—digital and static—but the basic need for orientation still exists. After all, if the power goes out, that little blue dot on your smart phone map doesn't exist, but physical signs do and you suddenly realize how essential they are to conducting your life.

This edition, which acknowledges all of the above, still focuses on the very complex task of designing static signage and wayfinding systems that help people navigate their physical surroundings. This edition is for all those who work to make life better by designing signage and wayfinding programs that help fellow humans find their way through the real world.

Signage is visual communication design at its most elemental level, helping people read the world. You are what you see. And yes, *people* design signs.

1 What Is Environmental Graphic Design?

Our need to hear and be heard, see and be seen, touch and be touched, that is, to communicate with our fellow humans, is fundamental to our well-being and, indeed, our survival.

Long before paper was invented, humans made marks on objects, such as cave walls, in their surrounding environment. The intent of making these marks, or signs, was to communicate information visually. This communication imbued these marks with meaning and they became a shared language among the people who made and understood them. (See Figures 1.1 and 1.2.) As such, environmental graphic design, or EGD, which can be defined as the graphic communication of information in the built environment, is one of the world's oldest professions.

And you thought something else was.

Since the invention of paper and the electronic screen, most people think of graphic communication as taking place primarily in those two media. But just like early humans making meaningful marks on environmental objects, in the present era an enormous amount of information is communicated on signs and other objects located in the built environment.

The contemporary incarnation of EGD is a relatively new, cross-disciplinary field that has gained recognition and importance over the past 40 years. Sure, signs existed prior to that point, but they tended to pop up in an ad hoc, unplanned, almost reactionary manner—in other words, pretty much as an afterthought. (See Figures 1.3 and 1.4.) As cities grew and mobility increased, making the built environment more complex, people's need for information to better understand, navigate, and use their surroundings also grew. Simultaneously, technological developments, such as photomechanical reproduction techniques and computer-driven cutting devices, aided accurate large-scale rendition of graphic elements, such as typefaces and symbols, on signs. Thus, the need for proactive, systematically planned, visually unified signage and wayfinding programs emerged.

If you don't think EGD is important, ask yourself: Could you understand how to use a large international airport or an urban rail transit system if there were no signs at all, or if the signs were a disparate mishmash of messages, graphics, and physical forms? The answer is most definitively no! As such, contemporary signage and wayfinding programs give a singular, unified voice to an environment or a site within it.

1.1

1.1 Before the written word, graphics communicated information and recorded events, as in these cave paintings at Lascaux, France.

Looking to the future, there has been much speculation whether mobile computer devices with digital mapping and augmented reality applications will spell the end of physical signs. We say no, for many reasons, two of which are: Physical signs don't need a mobile device, signal, or battery power to operate; and not everyone is equipped with mobile computer devices. While there's no doubt that the various wayfinding applications on such devices have enhanced the way millions of people navigate the built environment—and will continue to do so—the word *enhance* is key. Our belief is that physical signs are here to stay, and that mobile digital devices offer rich opportunities for augmenting the communication function of those physical signs. More about digital communication systems,

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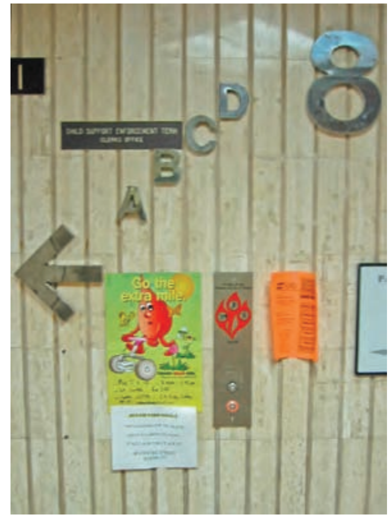
1.2 Environmental graphics from ancient Rome.

1.3



1.4

1.3 A collection of ad hoc signs in Greece.

1.4 Unplanned and uncontrolled signage in a building lobby.

including mobile devices, appears later in this chapter and in Chapter 6, "The Hardware System."

To underscore the relative youth of EGD as a field, consider that the terms *environmental graphics, signage,* and *wayfinding* were barely in use 40 years ago. In fact, the word *signage*, whose origins are attributed to Canadian designer Paul Arthur, didn't even appear in U.S. dictionaries until the 1980s. Nevertheless, in the 1970s, a group of designers found themselves designing graphics for a coordinated group of signs rather than for print. And because they often worked in architectural offices, and their design work related to architectural spaces, their work product was often referred to as *architectural graphics* or *architectural signing.*

These architectural graphic designers realized that there were significant differences between their design and print design (digital design didn't exist then)—most notably that architectural graphics encompassed the planning and communication of information on three-dimensional (3D) objects in the built environment, which is far more complex than designing a two-dimensional printed piece, such as a poster, book, or brochure. As these architectural graphic designers discovered each other and the commonalties of their professional interests, they joined together to form the Society of Environmental Graphic Designers (SEGD). The words relating to SEGD were slightly changed several years ago to the "Society for Environmental Graphic Design" to focus on the field rather than its practitioners, and changed again in 2014 to the "Society for Experiential Graphic Design."

With the birth of the SEGD, the term *environmental graphics* replaced *architectural graphics,* for two reasons. First, *architectural* was viewed as too limiting, in that this form of graphic design is often geared toward nonarchitectural open spaces, such as roadways, cities, theme parks, and

SEGD

The SEGD (Society for Experiential Graphic Design) is a global community of professionals who create experiences that connect people to place. Through educational programs, its website www.SEGD.org, publications, and research, SEGD's mission is to provide learning opportunities and resources for professionals involved in Environmental and Experiential Graphic Design (EGD/XGD), promote the importance of the discipline in establishing place, and continue to refine standards of practice for the field. SEGD members are leading developers of wayfinding programs; placemaking and identity projects; immersive media environments; exhibition and experience designs; and design research, strategy, and planning.

SEGD, 1000 Vermont Ave., Suite 400, Washington, DC 20005, 202.638.5555,www.segd.org

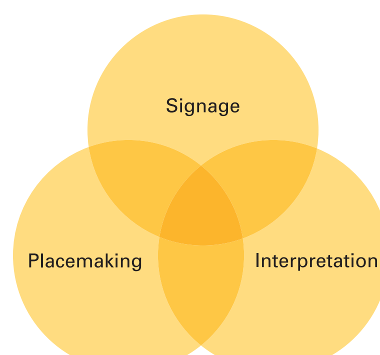
so on—that is, the larger sphere of the built environment. Second, the term *architectural graphics* could be confused with the drawings architects create to document their building designs.

As noted above, in 2014 the SEGD changed the referential word for the "E" in "SEGD" to "Experiential" to broaden the SEGD member base. This has created some confusion and consternation as to what EGD activity is, particularly in the context of this book. As with the first edition, EGD is considered to focus on environmental graphic design, that is, the design of graphics in the built environment.

Regardless of whether the "E" refers to "environmental" or "experiential," the SEGD has grown to become the premier professional organization for all designers who practice EGD. And *signage* is now in the dictionary.

The Spectrum of EGD Activity

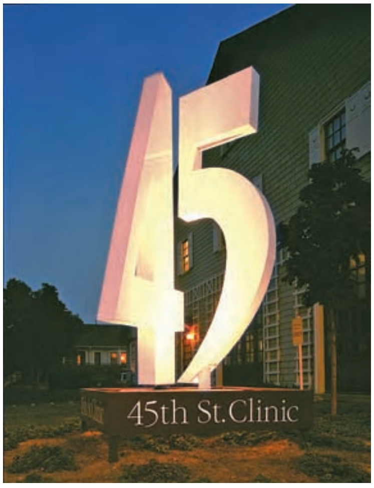
We've established that contemporary EGD activity involves the development of a systematic, informationally-cohesive, and visually unified graphic communication system for a given site within the built environment. Such sites can range from a single building to a complex of buildings to a city or to a transportation network connecting multiple sites on a regional or national scope—all of which have complex communication needs. EGD can respond to those environmental communication needs in three distinct but often overlapping arenas. As shown in Figure 1.5, these have been identified by one of our colleagues, Wayne Hunt, as:



1.5 The three main components of EGD and how they can overlap.

- **Signage and wayfinding,** which orients people to a site and helps them navigate it.

1.6 Directional and identification sign at Philadelphia's 30th Street Station.



1.7 An identification and placemaking sign for a health clinic.

- **Interpretation,** which tells a story about a site.
- **Placemaking,** which creates a distinctive image for a site.

Although this book focuses on physical signage and wayfinding design—and in particular static, nonelectronic signage—the above three communication facets of EGD and their interaction apply to both the physical and digital realms, and warrant a bit more exploration.

Signage and Wayfinding

Signage and wayfinding are most commonly expressed in unified sign programs that informationally and visually knit together a site, a collection of related sites, such as regional parks or global corporate facilities; or networks, such as a transportation system. Examples of signage and wayfinding programs are shown in the Gallery section at the end of this book, as well as throughout this chapter and others in the book. In the sense that well-designed sign programs serve to visually unify a site, signage can perform a placemaking role by establishing a unique identity and sense of place, thereby creating a brand image in environmental form. (See Figures 1.6 and 1.7.) In addition to wayfinding and placemaking roles, signage programs can also communicate other kinds of information, such as warning, operational, and interpretive information, as examined further in Chapter 4, "The Information Content System."

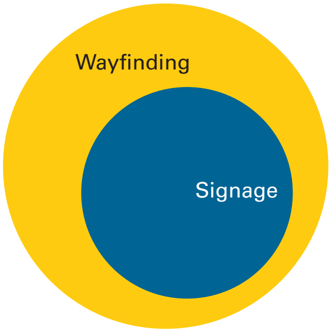
Although the terms *signage* and *wayfinding* are often used interchangeably, it's very important to keep in mind this distinction in mind: Typically, the primary objective of a signage program is to help people find their way through an environment, whereas effective wayfinding solutions often involve more than signage alone. (See Figure 1.8.) Clear, well-defined pathways and other visual cues, such as prominent landmarks, all aid wayfinding, as do printed maps, human guides, and, more recently, mobile computer devices that utilize GPS and augmented reality technology.

A key objective in wayfinding design, which our colleague Per Mollerup terms "wayshowing," is to enable each person to form a mental map of a site or environment, so the clearer the physical layout of a site, the clearer those mental maps will be. In other words, even the most carefully conceived sign program can't solve all the problems of navigating a site that contains confusing, circuitous pathways. In such cases, the sign program is like using a Band-Aid to patch together a rather large wound: It's some help, but not a panacea. Think about it: How many times have you blamed the signs when you're having difficulty navigating a complicated highway interchange? In many such cases, the signs themselves aren't the problem; they can only do so much to guide you through what *is* the underlying problem—a poorly laid-out interchange.

Wayfinding is an active process, requiring mental engagement and attention to the environment one is trying to navigate. That is why in a sports car rally, the navigator is just as important as the driver. The fact is, however, that many people are better at understanding information given to them verbally and so would rather ask someone how to go from point A to point B than to follow the signs or read a map. Signage and other visual wayfinding cues can, however, help even these people navigate their environment when there's no one around to ask.

Interpretation

Interpretive information tells a story about the meaning of a concept or theme (e.g., democracy or science), an object (e.g., the Constitution or



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1.9

1.8 Signage plays a major role within the broader realm of wayfinding.

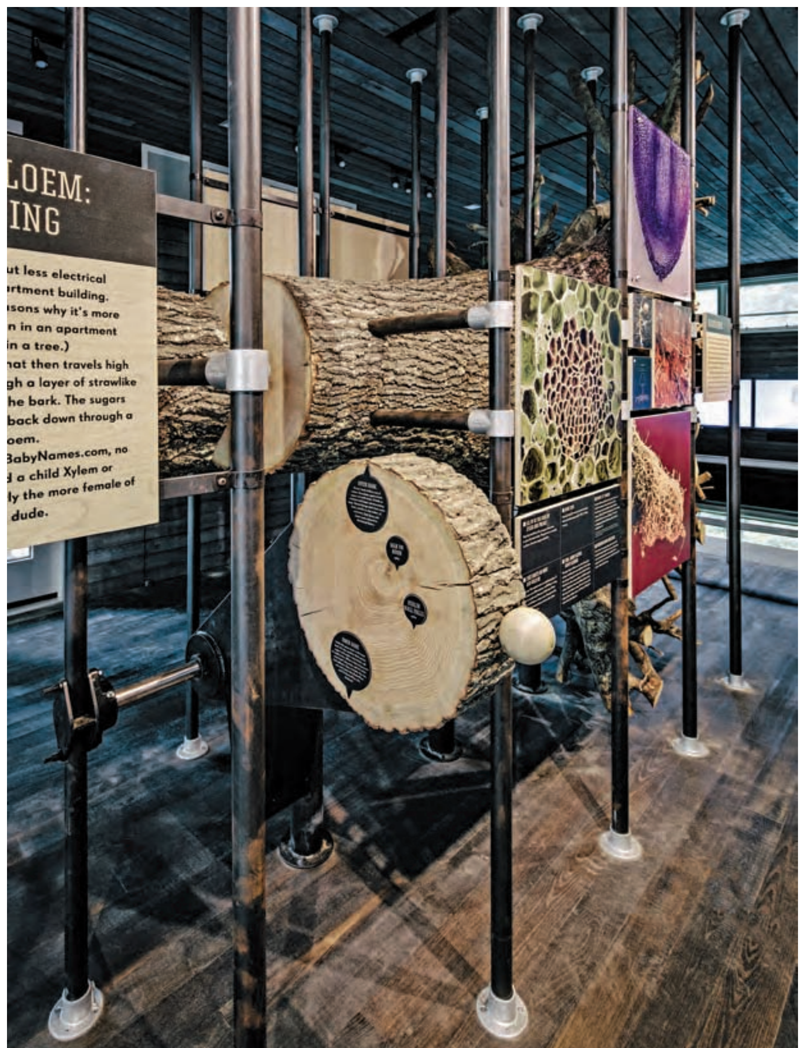
1.9 Directional signage combined with interpretive information for a walking trail in Victoria, Australia.

1.10 Interpretive signage tells the story of Atlantic City's early beginnings.

1.11 Interpretive information is often displayed in exhibits, such as this exhibit on sustainability for the Boy Scouts of America's Summit Bechtel Reserve in West Virginia.

an aircraft), a site (e.g., an automobile manufacturing plant or a national park), an event (e.g., the battle of Gettysburg or the Jamestown flood), a historical figure (e.g., Franklin Delano Roosevelt or Martin Luther King), a corporation and its products, and so on. Interpretive information is most often expressed in the form of *exhibitry,* which can be composed of a site itself, physical artifacts, audiovisual (A/V) and interactive media, static images and graphics, casework, and more. Interpretive exhibits can be temporary or permanent or exterior or interior. Exhibits can serve a placemaking role in that they often become destinations unto themselves. Interpretive information intersects with signage, in that interpretive information in the form of text and images can also be displayed in signage programs. (See Figures 1.9 through 1.12.)

1.10



1.11

1.12

1.12 Interpretive and orientation panels on a kiosk unit in Bellingham, Washington.

Placemaking

Placemaking creates a distinctive image for a site, and can be expressed in several ways. As already discussed, signage and interpretive exhibits can create a sense of place, as can gateways, portals, gathering points, and landmarks. What separates placemaking, in the EGD sense, from other forms of placemaking is the explicit communication of information through both static and digital channels.

Without this explicit communication intent, placemaking becomes an exercise of architecture, interior design, sculpture, theater, and so on. This is not to discount that EG designers may team with any of those disciplines in order to create placemaking objects or events, which are often monumental—typically in scale, but sometimes also in quantity—even if sometimes temporary.

New York's Grand Central Terminal or an exquisitely designed restaurant interior may convey a wonderful sense of place but they are not placemaking in the EGD sense, because their inherent purpose is not to communicate information. Times Square, on the other hand, derives its entire sense of place from the sheer concentration of signage—both static and electronic—surrounding it. And because the intent of all that signage is to communicate, even if primarily marketing messages, Times Square does represent placemaking in an EGD sense. (See Figures 1.13 through 1.15.)

1.13

1.13 Placemaking at the entrance to Williams Gateway Airport in Mesa, Arizona, with sculptural flight elements.

1.14 Banners are effective thematic placemaking elements as depicted in this study for the ANZ Stadium, Sydney Olympic Park.

The Importance of EGD Today

As explained, the difference between EGD and other types of design is the explicit purpose of EGD to communicate meaningful information via words, symbols, diagrams, and images. Because of this expressed communication function, EGD plays a key—and increasingly recognized—role in how people use and experience the built environment.

Furthermore, the signage and wayfinding aspect of EGD is being recognized as a key contributor to a sense of personal well-being, safety,

1.14

1.15

1.15 A kiosk provides orientation and interpretive information at the same time it creates a sense of place for New York City's Chinatown district.

and security in unfamiliar and often high-stress environments, such as airports, hospitals, and cities. Additionally, EGD has gained importance for its capability to create a sense of place for a given site and for its power to reinforce a brand image.

Signage was once considered a necessary evil—or worse, an afterthought—but a growing number of people in the design, construction, development, marketing, and policy arenas have gained an understanding of signage and EGD's role in humanizing and demystifying the complexities of the built environment. They have found that well-designed signage and environmental graphic programs not only fulfill their communication function of informing, directing, and identifying but also serve to enhance the aesthetic and psychological qualities of an environment.

Certainly, EG designers are often part of the consultant team assembled by architects for a building design or renovation project, but EG design has finally come into its own, as well. Cities and universities are engaging EG designers, sans architects, to create signage and other EG design programs. Real estate managers are engaging EG designers, sans architects, to revitalize the image of a building or facility. Corporations and institutions, including transportation agencies, are engaging EG designers, sans architects, to unify environmental communication systems on regional, national, and global scales. Even general contractors and construction

1.16

1.16 (a) and (b) The contemporary version of the University of Pennsylvania's crest brands every sign in its campus-wide program.

managers are including signage as a line item in their procurement budgets. All this has happened, in part, because people have recognized that signage and EG design have a unique branding power. (See Figure 1.16.)

Signage and EGD: The Brand Connection

The importance of brand strategy and management has risen to top attention within many organizations, large and small, commercial and institutional. Brand strategies recognize that people come into contact with a brand via several types of "touchpoints," and seek to maximize not only the quantity of those touchpoints, but also the quality.

A comprehensive brand strategy embraces signage and EGD programs as important touchpoints that have the power to build brand images in three-dimensional, environmental form. This can take place through *harmony* or *imposition* strategies.

Using the harmony strategy, the visual characteristics of a sign program can reflect and reinforce the visual characteristics of a site's design or architecture to create a seamless, totally integrated identity. (See Figures 1.17 and 1.18.) The harmony approach works well when the signage program is being designed for an environment with a high level of visual unity, be it an existing site or, more commonly, a new development or major renovation, when design details can be coordinated among all the design professionals involved in the project.

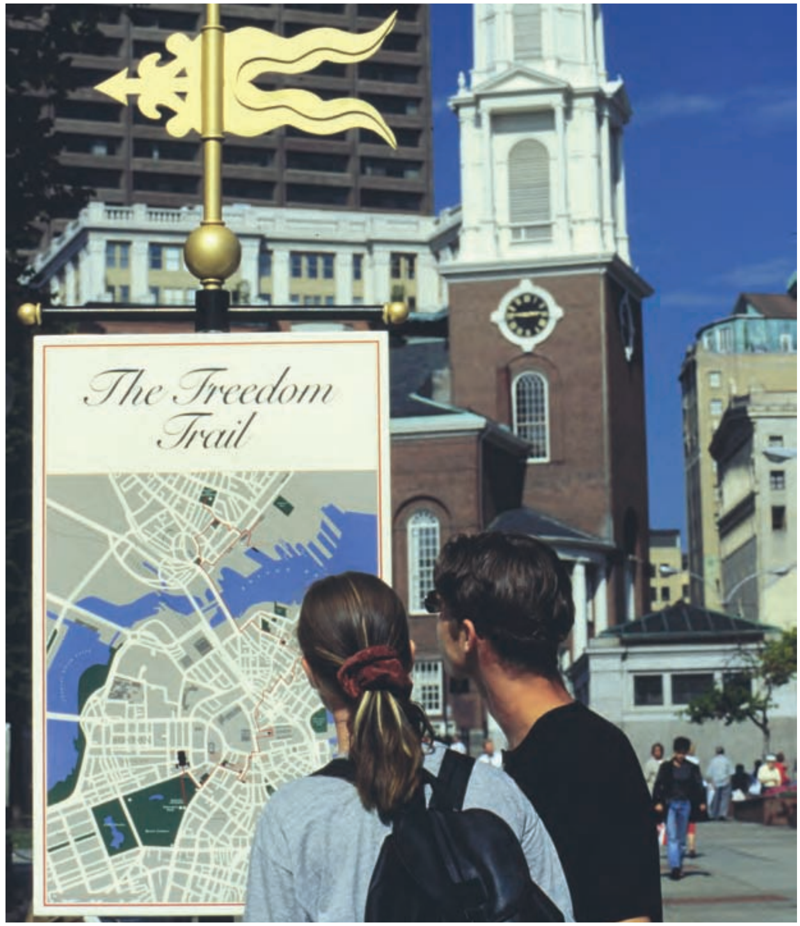
Using the imposition approach, signage can create or impose a unique, singular identity on a site—an identity that's completely independent of the site's visual characteristics. This approach works well for existing sites that have disparate visual elements, such as cities, college campuses, corporate facilities, and transportation networks, that can be linked together by the metabranding of the signage program. (See Figures 1.19 through 1.21.)

In an ideal branding situation, signage relates to an organization's or a site's other communication channels, such as its website, mobile device applications, and electronic directories in a seamless brand expression. This is often not easily accomplished, since many large organizations have different departments responsible for these various communication channels. For example, a university's marketing department oversees the website, its communications department oversees electronic screens, and the facilities department oversees physical static signage—and seldom are these departments' efforts coordinated. Add in the fact that each department may have different procurement procedures and it can become quite difficult to impose a unified brand persona across all of an organization's communication channels.

Whether a signage program brands by harmony or imposition, signage provides needed information to people using it, engendering feelings of goodwill and security, thus enhancing the quality of the brand experience. And since signage programs provide information that people actively seek, signage links this sought-after information directly to the brand. There is no doubt that good signage builds good relationships with any given

1.17 Freedom Trail signage harmonizes with Boston's historical sites.

1.18 Signage at the Owensboro Convention Center in Kentucky integrates and harmonizes with the facility's contemporary architecture.



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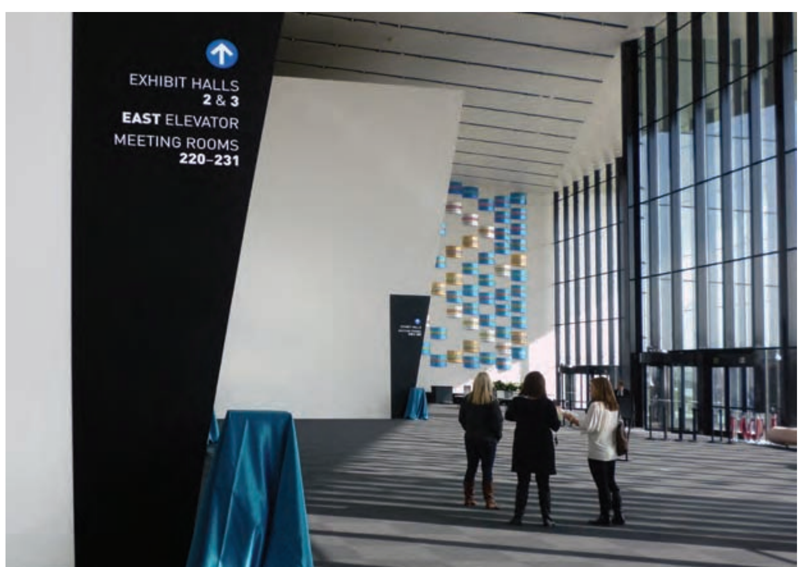


1.18

1.19

1.20

1.19 The metabrand image of the Amtrak Acela signage links diverse station architecture from Boston to Washington, DC.

1.20 The 1984 Los Angeles Olympics signage linked a wide array of remote venues by imposing a strong brand image distinctive of the city's spirit.

1.21

1.21 Signage for an AIGA conference imposes the event's theme onto the venue.

audience and that signage is a valuable component of a comprehensive brand strategy.

Digital Information Systems and EGD

Digital information systems that display graphics on electronic screens have become an important part of everyone's daily life, and since these systems serve a communication function, they have a relationship to EGD. This relationship is somewhat nebulous at this time but more clarity should evolve as the future progresses.

1.22

1.22 Digital signage: Amtrak train information signs provide arrival and departure information.

The focus of this book is on static, nonelectronic signage programs, but some discussion of the digital realm is in order. We'll start with some basic definitions of types of digital systems currently in use. These definitions build on those offered on the Digital Screenmedia Association website. More information on digital display units is presented in Chapter 6, "The Hardware System."

Digital Signage

Digital signage refers to electronic display screens, which are typically large but increasingly include smaller tablet-sized screens, deployed in a permanent, fixed position to display information content to a mass audience. Digital signage content is typically preprogrammed and noninteractive, that is, not selected by individual user, and is often of an advertising or entertainment nature. In fact, the term *digital signage* is currently somewhat misleading because most "digital signage" is used to display advertising content, not wayfinding or other informational content that helps people navigate an environment. That said, digital signage is being used for EGD applications, such as flight or train schedule information and exhibit interpretation, and more will emerge with time and as the cost of infrastructure and deployment diminishes. (See Figure 1.22.)

Interactive Kiosks

Interactive kiosks are a form of digital signage in that they use display screens deployed in a fixed position with preprogrammed content, but they have the distinction of allowing individual users to access information or perform a transaction as selected by each user from the kiosk's preprogrammed information pool. The classic example of an interactive kiosk is an ATM. EGD examples include the New York City MTA's On The Go! interactive wayfinding kiosks, which display customized, user-selected travel and local information; and electronic building directories, which a user accesses to find a tenant in an office building. Users interact with these devices via touchscreen or keyboard/pad interfaces; gesture-based interaction may become more commonplace in the future. (See Figure 1.23.)

Mobile Devices

Mobile devices, also known as handheld digital devices or smart phones, are small, self-contained portable computer devices, such as phones or tablets, which people carry with them. Mobile devices are completely interactive and personalized by the individual owner of the device. By connecting to the Internet via phone/data or Wi-Fi service, mobile users have access to the universe of digital information and can select any information they want or need. Most mobile devices are

1.23

1.23 Interactive kiosks: New York City MTA On The Go! kiosks allow users to select customized wayfinding and other information from a preprogrammed menu of choices.

equipped with GPS technology, which locates the phone's geographic position; this in turn, has led to many mobile wayfinding applications, including the map applications that are native to most mobile operating systems. Since GPS currently only works outdoors, these wayfinding apps are suitable for navigating exterior environments, but developments in mobile interior wayfinding include use of augmented reality and Wi-Fi triangulation. In addition to the more generalized map apps, there are specialized wayfinding apps for specific locations, like the myNav: Central Park app, which provides wayfinding and other information about the park. (See Figure 1.24.) Also in the EGD realm, specific mobile apps provide enriched interpretive information to museum visitors.

As stated previously, the explosion of digital information systems has created some flux in the EGD world. The above basic definitions attempt to impose some order on the flux, but are necessarily brief and general. They don't get into the technical nitty gritty of the hardware and software infrastructures that deliver content to each of the above digital systems. This infrastructure is complex, expensive, in need of relatively frequent upgrading, and generally beyond the skills set of most EGD practitioners and sign fabricators, and certainly beyond the scope of this book.

Even digital content production can elude EG designers if it involves writing code or the production of video or animated content. Yet content is the key to effective, engaging, relevant digital communication; after all, the digital sign, kiosk, or mobile device

1.24

1.24 Mobile devices: With wayfinding apps such as myNav: Central Park, users can carry useful orientation information in their pocket.

is just a blank screen waiting to be filled with content, similar to a blank canvas waiting to be filled with paint—and the quality of that content affects the user's perception of the message being conveyed. In this respect, EG designers can use their communication skills to shape and direct digital content's structure, theme, and visual appearance, often by partnering with technical specialists who can transform the EG designer's vision into pixels on a screen. EG designers can also use their 3D design skills in developing the appearance of the physical housings for deployed digital signage and kiosks, again often by teaming with the developers of the content delivery infrastructure.

The impact of digital information systems on EGD is profound and evolving, as is the world of digital communications itself. Some resources on current developments and trends include the websites and events of the SEGD, the International Sign Association, the Digital Screenmedia Association, and the Digital Signage Federation.

There is no final, definitive word on digital information systems and EGD, as the area of digital communications is in its infancy. As stated earlier in this chapter, digital signage, interactive kiosks, and mobile devices can complement and augment physical, static signage, particularly in a coordinated multichannel communications program, such as a branding campaign. Digital information systems will likely never completely replace physical signs, however, for various reasons: expense, relatively rapid technological obsolescence, power consumption, resource depletion, plus the fact that lots of people just like the reassurance and permanence—let alone the placemaking qualities—of physical signs and interpretive graphics. The challenge for the EGD community, including sign fabricators, is how to harness the rich potential of digital information systems for communicating relevant information about the built environment, together with more conventional media, such as static signage, in a coordinated, meaningful way. The possibilities are endless and the creative imagination is the only limit!

You Can't Learn This in College

EGD projects are typically complex, with many problems and subproblems, which cross the boundaries of various design disciplines. Accordingly, EGD is a cross-disciplinary specialty field that combines aspects of the graphic design, architecture, and industrial and interior design professions. (See Figure 1.25.) Currently, there are no comprehensive undergraduate EGD degree–granting programs in the United States (of which the authors are aware), although certain undergraduate design programs, typically in graphic design, do offer students exposure to EGD in a specific course. These courses either may be exclusively dedicated to EGD or incorporate EGD within a broader course of study, such as a brand identity design course. On the graduate level, Iowa State University offers an MA in Environmental Graphic Design, the first EGD graduate program in the United States.

Due to the lack of comprehensive EGD educational programs, and because of the cross-disciplinary nature of the field, the only way EGD practitioners can fill gaps in their knowledge base is by learning in the workplace. For example, a graphic designer must learn about three-dimensional forms and materials, working in scale, interpreting architectural drawings, and basic drafting. An architect or industrial designer must learn about graphic communication purposes and

1.25 The spectrum of design disciplines and their products.

City Planning / Urban Design	**Landscape Architecture**	**Architecture**	**Interior Design**	**Industrial Design**	**Graphic Design**
Cities, Towns, Campuses	Planned Open Spaces, Parks	Buildings	Interior Spaces	Objects for Living & Work	Objects that Communicate

Macro → **Micro**

1.25

techniques, two-dimensional design principles, and graphic application techniques. This book aims to fill in those gaps for both aspiring and current practitioners, including students.

This book is also for clients who procure EGD services, including brand managers, communication directors, architects, landscape architects, urban designers, planners, public administrators, transportation officials, real estate developers, general contractors, and facility and construction managers. This book will help those who engage the services of environmental graphic designers gain an understanding of EGD processes and methodologies, leading to more effective working relationships with EG designers.

What's Ahead in This Book

This book will take you, the reader, into the wonderful world of EG design, with the focus on static, nonelectronic signage and wayfinding design, although many of its broad principles apply to the digital realm. Think of it as a guidebook, which leads you first into the design process as it relates to EG design, then reveals what we call the Signage Pyramid methodology, which Chris Calori developed in graduate school. This methodology divides signage into three interrelated focus areas or components: the Information Content System, the Graphic System, and the Hardware System. This divide-and-conquer strategy makes it easier to solve the complex problems and subproblems posed in the design of a comprehensive signage program. Along the way, you'll also find lots of tips, and a relatively small dose of opinion.

Ultimately, this book is about the design process and methodology that leads to the end product of a built, functioning signage program. The Gallery section at the end of this book showcases the built signage programs that are products of the process while the photos and diagrams throughout the book reflect aspects of the process itself. The photos in the book represent the work of our office, as well as that of several leading EGD consulting firms, primarily firms located in the United States but also some located throughout the world.

As you read, keep in mind that every signage and wayfinding project is different—different sites, different sizes, different clients, different everything! So the generalized, idealized process and methodology presented in this book won't directly mirror the process for each and every signage project an EG designer or client has encountered or will encounter. But though signage and wayfinding design is complex, it's not rocket science. There are few hard-and-fast rules, and there are many ways to approach many of the items discussed in this book. There's also a multitude of signage and wayfinding issues and technicalities that this book doesn't address. In sum, we recommend you use this as a big-picture book, and adapt what you learn to your own projects.

2 The Design Process

Design is a creative problem-solving process.

The design of signage and wayfinding programs is part of a broader design discipline that has come to be known as environmental graphic design, or EGD. As defined in Chapter 1, EGD activity is concerned with the graphic communication of information in the built environment, which is just about anything built by human intent, be it a single building, such as a hotel or stadium; an assemblage of buildings, such as a city or campus; a planned open space, such as a park or historical site; or a transportation network, such as a subway or rail system.

While the primary communication goal of signage and wayfinding design is to help people navigate the built environment, EGD encompasses two other important communication functions, placemaking and interpretation, and signage design often intersects with these other EGD activities, as discussed and illustrated in Chapter 1, "What Is Environmental Graphic Design?"

Though this book focuses on the signage aspect of EGD, the terms *signage design* and *EGD* are used interchangeably. EGD exists in a broader design universe and is, in fact, the ultimate hybrid—or, if you're less charitable, mongrel—of design. EGD is the ultimate multidisciplinary design discipline, where graphic design, architecture, industrial design, interior design, landscape architecture, city planning, and urban design all converge. And common to all of these design disciplines, including EGD, is the design process, also known as *design thinking*.

Design thinking has been adopted by various nondesign organizations as a novel problem-solving approach in their arsenal of management techniques; while the name is different and the approach may involve fewer, differently named steps, the process is essentially the same. If considering this chapter to be about design thinking helps you better understand the design process, that's fine by us.

All design activity is a problem-solving process. All design activity is also creative, but unlike fine art, it takes place under real-world constraints.

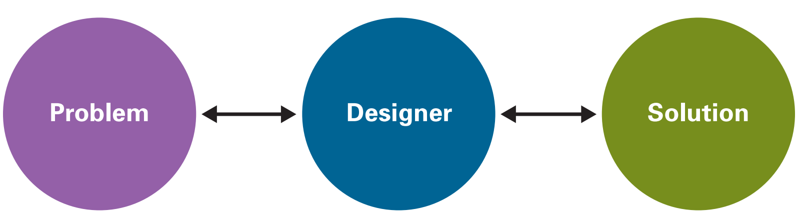
Designers focus their creative talents on solving problems for their clients, not on self-expression. We, as designers, have a unique gift to give: life to our clients' ideas, which we make tangible and real. It's a heady responsibility, one we must undertake with diligence and good stewardship. We must consider all things possible to the extent possible. Moreover, we must extend our best effort to employ our creative talents, skills, and knowledge in making the world a better place.

Designers, including EG designers, typically do not directly produce the objects of their design/creative activity. Unlike painters who put their creative compositions on canvas with their own hands, designers rely on other parties to produce the objects they design. There's the architect, who designs a building but relies on a contractor to build it; the industrial designer, who designs a consumer product but relies on a manufacturing facility to produce it; or the traditional graphic designer, who designs a book but relies on a printing facility to print and bind it. The EG designer relies on a sign fabricator to build and install a signage program.

A key role of the designer emerges in the preceding examples, that of an *intermediary,* between the client and the producer, and between the design problem and the embodiment or realization of the design solution. (See Figure 2.1.) In this role, the basic process any design professional uses becomes evident. It is to:

1. Assess the client's problem.
2. Apply creative skills.
3. Synthesize a solution.
4. Communicate the solution to the producer.
5. Oversee production of the solution.
6. Evaluate effectiveness of the finished product.

The universal design process is evolutionary, with the design solution unfolding in a series of steps, from general to more specific. And while the steps or phases of the design process typically progress from one to the next in a somewhat systematic, linear order, they may at times overlap, repeat, or feed back into each other. Ultimately, however, the end goal is to progress from the first phase to the last. And every effective



2.1

2.1 The designer serves as mediator between the design problem and the design solution.

A Word about Technology and the Design Process

Technology impacts the design process in ever-changing ways. The purpose of this chapter is to delineate the design process in a clear series of basic steps, without the distraction of details on current and future technologies that designers can use for managing the design process.

Certain technologies are mentioned in this chapter, but keep in mind that they will constantly change and evolve. The most important thing to take away from this chapter is an understanding of the design process, along with the knowledge that designers must constantly stay abreast of and master the latest technological tools to aid them in the process.

designer on the planet employs essentially this type of systematic process to arrive at design solutions, whether he or she is consciously aware of it or not.

The Client Is Part of the Process

When a client engages any designer, including EG designers, a partnership is formed, with both clients and designers performing various roles. The designer's role is to make a diligent, earnest effort to solve the client's problem. The client's role is to provide adequate information, feedback, and guidance in a timely manner—and to pay the designer's invoices on time.

Most successful projects are the result of an active working relationship grounded in mutual trust between client and designer.

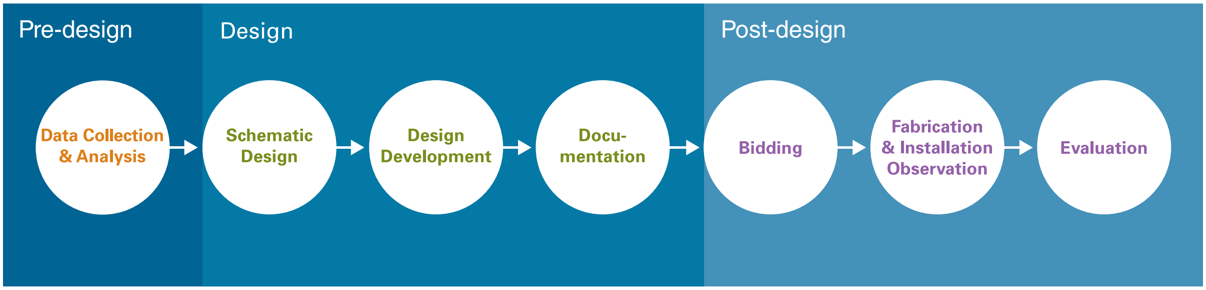
Message to designers: The client is part of the process, so don't ignore the client's needs and constraints.

Message to clients: You are a part of the process, so don't think the designer can magically solve the problem without your active involvement.

Effective design solutions require client input and engagement. Passivity on the client's part doesn't work. If both clients and designers remember that they have a partnership—and all that this relationship entails—a successful outcome is likely to result.

The Design Process Applied to EGD

The basic design process can be effectively tailored to EGD scenarios, maximizing the efficiency of EGD activity. Because so many EGD projects are coupled with architectural design projects, the design phases of the EGD process model outlined in this chapter are analogous to those used in the architectural profession. This process model is also



2.2

2.2 The phases of the design process include predesign, design, and postdesign activity.

a useful framework for outlining design services to be performed on a project in fee proposals to prospective clients. Additionally, it's useful for educating clients about the evolutionary process from which design solutions emerge and become implemented. The design process model, which includes predesign, design, and postdesign phases, is shown in Figure 2.2.

Each EGD phase, described in sequence in this chapter, has several tasks associated with it. Keep in mind that though these phases are presented as distinct and in linear order, they often overlap and feed back into each other, as noted previously. Also be aware that while the client's involvement is mentioned primarily at project milestones, the designer typically maintains ongoing contact with the client throughout all the phases.

Coordinating Timing of the EGD Process

If a signage project is independent of any larger design and construction project, the design process timetable can be set fairly easily. If, however, a signage project is part of a new construction, project timing of the EGD process with that of the overall project becomes critical. Often, EG designers are brought into a project too late, but they can also be brought in too early, such as before floor plans are frozen or locked—that is, while the plans are still in a state of flux and sign locations cannot be pinned down. Ideally, the signage design process should lag behind the architectural design process by one or two phases.

While on the subject of time, note that signage projects are usually of much longer duration than typical graphic design projects for print or electronic media. It is not uncommon for a signage project to take months or years to complete—although the EG designer may not be working continuously on the project during that time frame—so EGD is definitely not for those who seek instant gratification in their work.

Throughout this chapter the design process is illustrated with photos that trace the development of the One Raffles Quay (ORQ) signage program at our office, from the data collection and analysis phase through to the fabrication/installation observation phase. The end product of the design process for the ORQ project—the built signage program—is depicted in the Gallery section at the end of this book, as are sign programs which are the built products of the design process for our office and many other EGD consulting firms.

Our office designed the ORQ signage program for a very large, approximately 2-million-square-foot office complex in Singapore which has several mixed-use components, including below-grade connections to the metro rail system, above-grade parking facilities and pedestrian bridge network, and retail shops on the lower level. We designed the ORQs sign program with a harmony strategy, as described in Chapter 1, to create a strong, unique brand image inspired by the lantern-like forms and transparency of ORQ's two office towers. The ORQ signage program has been internationally recognized for design excellence in many awards programs and publications.

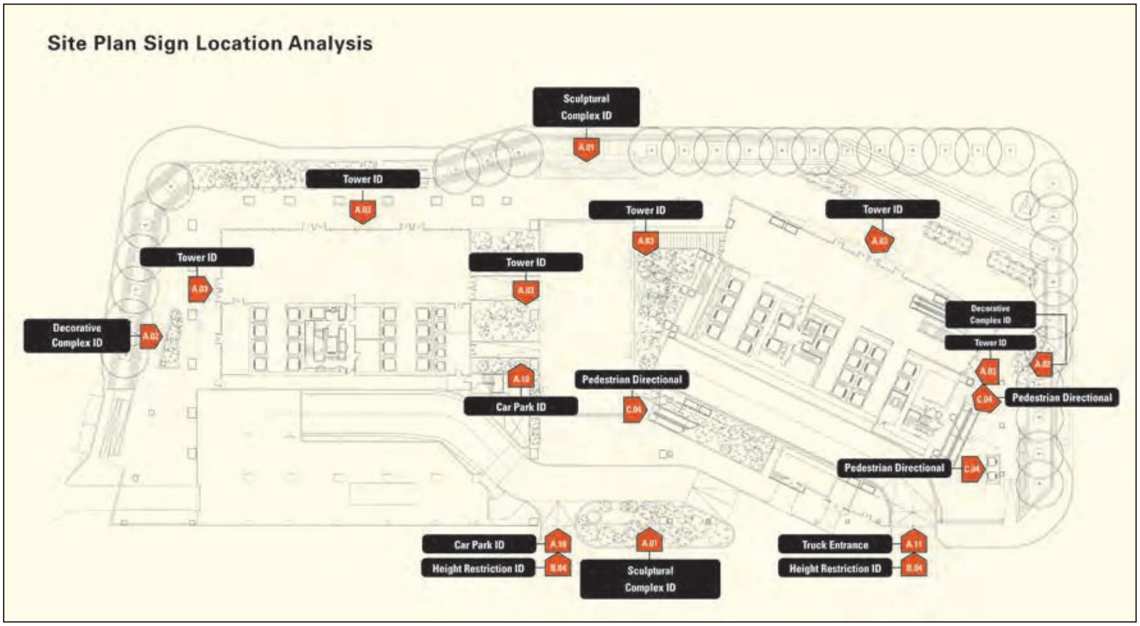
Phase 1: Data Collection and Analysis (Predesign)

2.3 Data collection and analysis phase: An architectural rendering provides initial information about the building's size, shape, materials, and lighting.

Also known by terms such as preschematic, research, discovery, and others, this is a very important predesign planning phase that's often neglected in the designer's eagerness to get the creative juices going. But remember that design doesn't happen in a vacuum! You have a client who has engaged your services to solve a signage problem, and that client and that problem come with a whole range of parameters and constraints that you need to know about before you put pencil to paper or mouse to mousepad and begin to synthesize an effective design solution.

Put simply, phase 1 is the information-gathering and analysis phase, the discovery or learning phase. During this period, EG designers collect as much information as they can on the fledgling project and then make sense of it. Examples of types of information studied and analyzed during this phase are shown in Figures 2.3 through 2.5. An appropriate description of the designer's role in phase 1 is that of a sponge, absorbing and assimilating as much about the project as possible, then filtering that information into a plan of action.

At first, phase 1 is focused on divergence, when the designer reaches out and plucks as much information about the project as possible with little regard to its ultimate usefulness. At this stage, it's important to be open-minded and nonjudgmental about the data being gathered. As more is learned about the project, phase 1 activity becomes more convergent. Now the designer analyzes and distills the information to draw conclusions and set goals for the subsequent design-oriented phases.



2.4

Subjects for up-front research can vary widely from project to project, but some basics for signage programs include, in no particular order:

- Time and budget constraints
- Image and branding goals
- Formal and thematic context(s) of the site(s)
- User profiles
- Physical characteristics of the site itself
- Circulation pathways and decision points
- Applicable codes affecting signage

2.4 Data collection and analysis phase: A site plan allows the designer to understand circulation paths, entry points, and identification opportunities.

2.5 Data collection and analysis phase: Studying the owner's marketing approach helps determine the site's identification strategy.

2.5

- Decision making and client contact protocols
- Whether the client hates the color blue

No doubt both you and your client will be impatient to get to the really fun, pretty-picture phases of design, but it's important to keep in mind that the careful planning of phase 1 sets the stage for more focused, viable solutions in subsequent design phases. Remember to find out what you're jumping into before you jump in! Remember, too, that while the big research push occurs at the beginning of a project, data collection and analysis often continues throughout a project.

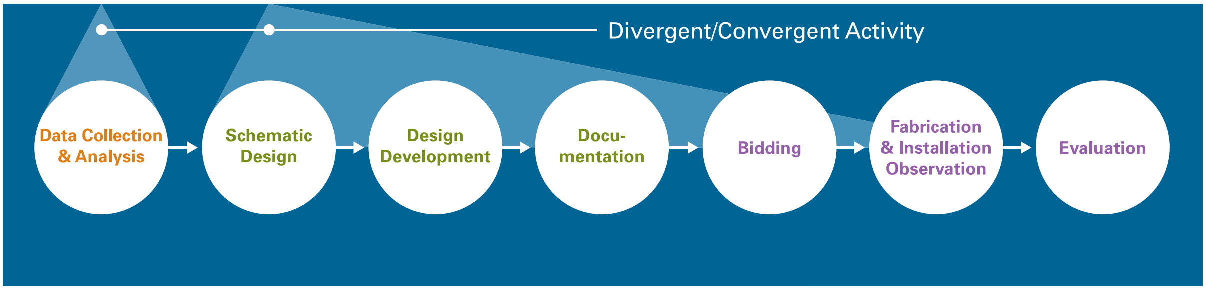
Phase 1 Goals and Results

The primary goal of the data collection and analysis phase is to gain a comprehensive understanding of the project at hand and to verify that your understanding meshes with that of the client. Phase 1 results in conclusions drawn from the data collection and analysis activity, as well as a plan for moving the project forward. Various diagrams and lists may be generated, as well as sketches, photo/video surveys, and other records. These may be informal working tools just for the design team's use, or they may be formalized for presentation to the client in a written report or visual presentation. In either case, the phase 1 results should be reviewed and discussed with the client.

Phase 2: Schematic Design

Once the predesign project research and planning phase is completed, the EG designer should have a good grasp of what the project entails, and a focused design effort can begin. The schematic design phase is the initial design phase and is undoubtedly the most creative, exciting phase, for it's when the informational and visual foundations of the signage program are laid. Initially, schematic design activity is divergent and exploratory, with the goal of generating as many ideas, concepts, and approaches to the design problem as possible, and then becomes convergent as these various schemes are evaluated and selected. Overall, subsequent project phases continue to be convergent as the selected design solution is refined and finalized. This divergent-convergent aspect of the design process is illustrated in Figure 2.6.

The visual aspects of a sign program are deeply influenced by its informational aspects, so it's important to start phase 2 with exploration of the program's information content system. Briefly, this includes determining the locations and communication functions of key signs in the program, as well as generating approaches to sign message nomenclature and hierarchy. In this process, the designer begins to formulate the building blocks—such as communication functions, message vocabularies, mounting conditions,



2.6

2.6 The design process involves divergent and convergent activity. Divergent activity focuses on gathering as much information and generating as many ideas as possible. Convergent activity focuses on selection, refinement, and conclusion.

and viewing distances—that are expressed in the visual aspects of the sign program. This activity will provide the designer with an inventory of key signs that represent the range of signs the program will encompass. This key sign inventory then becomes the focus of the visual concepts generated in schematic design. (Chapter 4, "The Information Content System," has a more detailed discussion on developing the sign information content system, an activity that's often referred to as *programming*.)

While it's essential to address the sign program's informational aspect early on in the schematic design phase, most designers focus their creative energies during this phase on the sign program's visual aspects: the graphics and hardware. (See Figures 2.7 through 2.10.) The creative juices and wild concepts should flow freely during the early stages of this phase—no holds barred. This is the divergent, ideation portion of phase 2, where the goal is to generate as many rough visual concepts as possible, where every little inkling of an idea is explored and no idea is negated/judged until later. The key word here is *rough*; schematic design should not delve too deeply into detail.

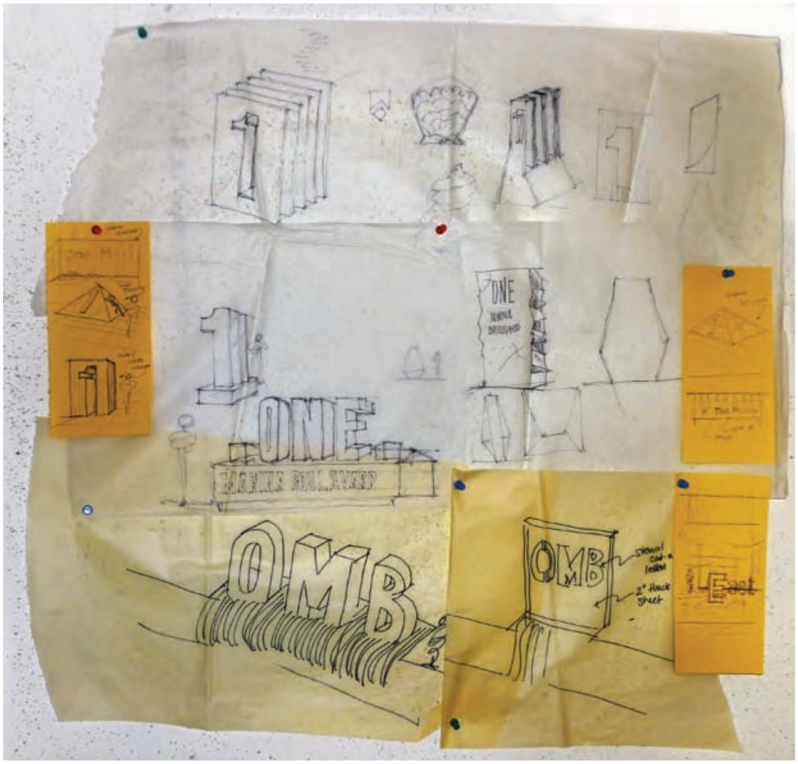
A tip for improving concept generation at the beginning of phase 2 is to never fall in love with your first—or any—idea. If you do, you run the risk of investing too much of your time, effort, and ego into a so-so concept when other, absolutely brilliant ones could be out there just waiting for your discovery. And when you invest too much of yourself into one concept, and detail it to death too early, you become reluctant to give it up, thereby blinding yourself to potentially exceptional concepts.

Another tip: It may take a while for ideas to emerge. The creative mind often needs what is sometimes referred to as an incubation period to formulate concepts and ideas subconsciously. When this is enabled, often a great idea will just pop out—sometimes at seemingly odd moments, such as in the shower or at the grocery store, in what's known as the "eureka" or "ah-ha" phenomenon. So be aware that creative ideas can take some time to emerge, although a deadline has a wonderful way of focusing the mind.

More brains generate more ideas, so it's often productive to gather as many designers as possible within the EGD firm to participate in the

2.7 Schematic design phase: Early sketches show a wide selection of ideas for monumental site identification signs.

2.8 Schematic design phase: Sign form study 1 shows a concept of overlapping planes derived from the building's design.



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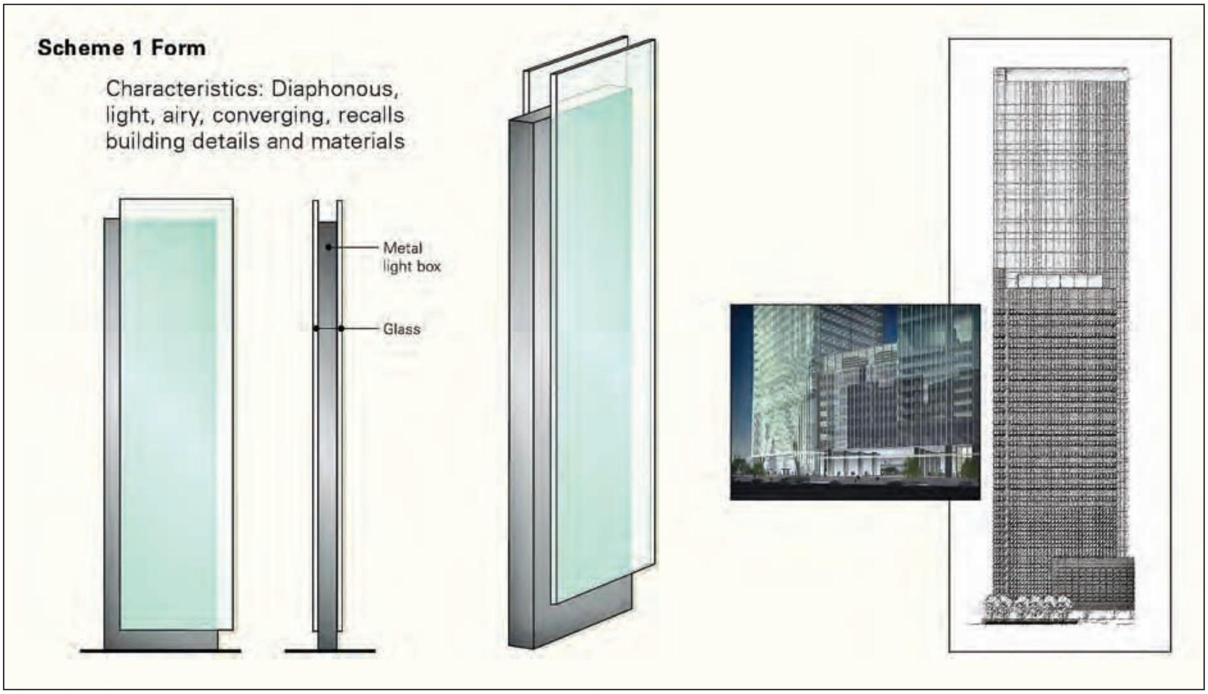

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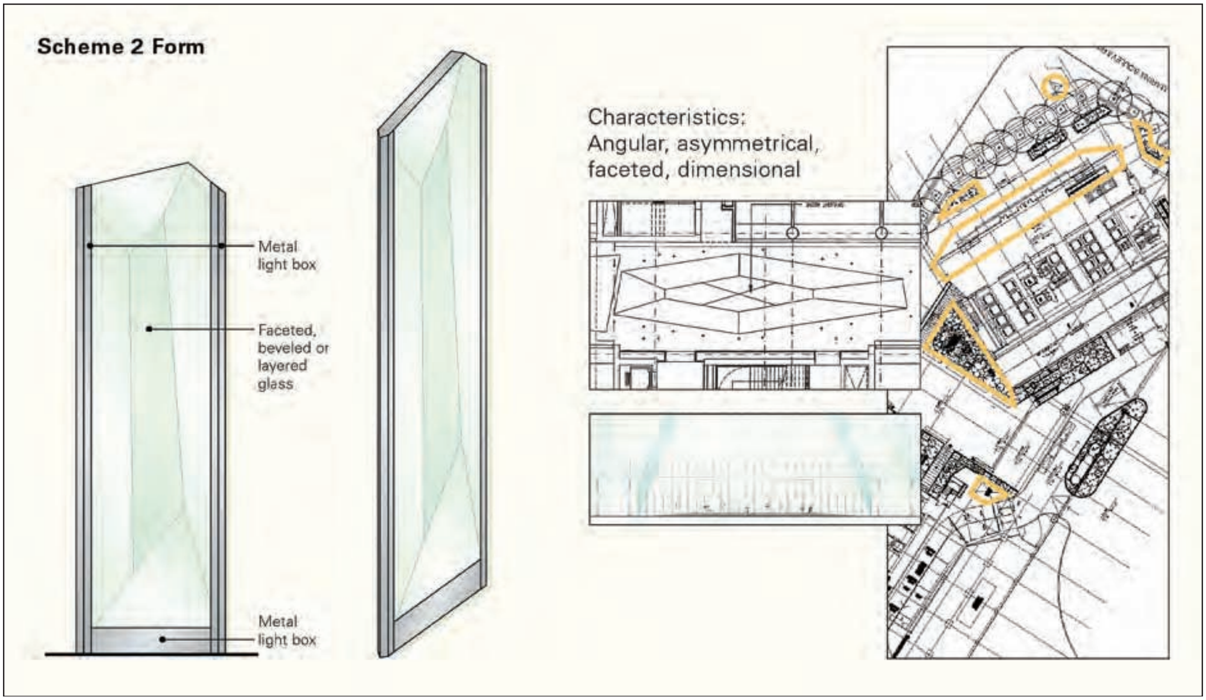
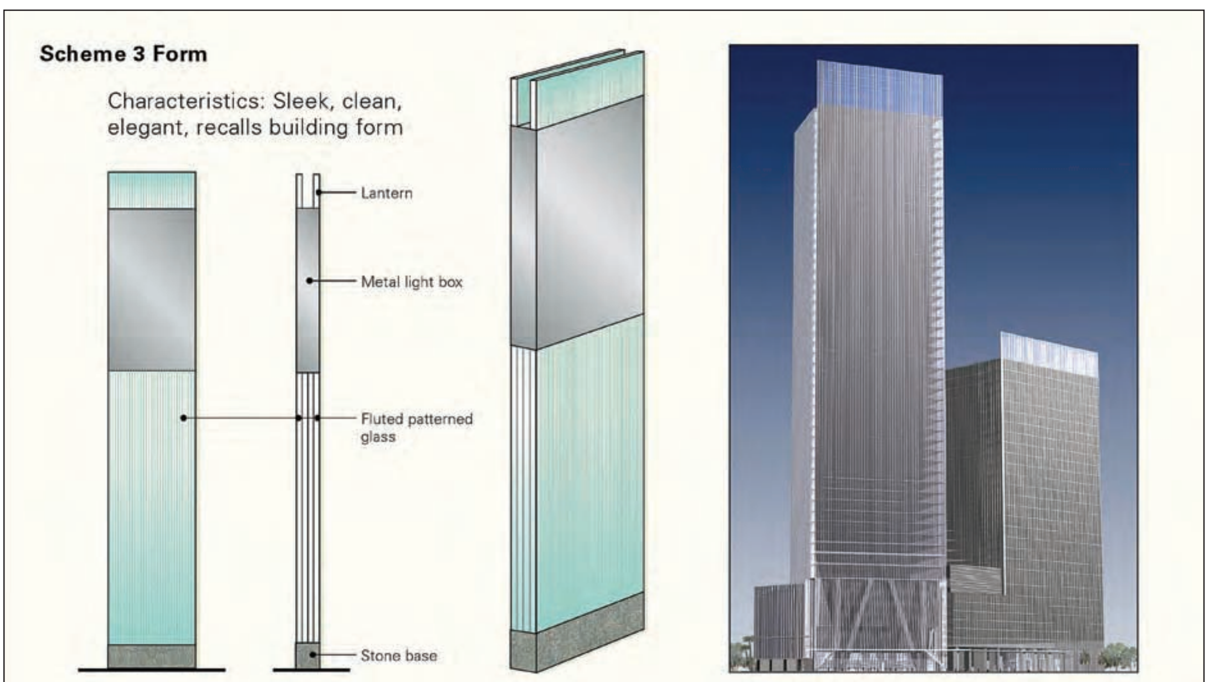


2.9 Schematic design phase: Sign form study 2 shows a concept of prismatic panels derived from the site's skylights.

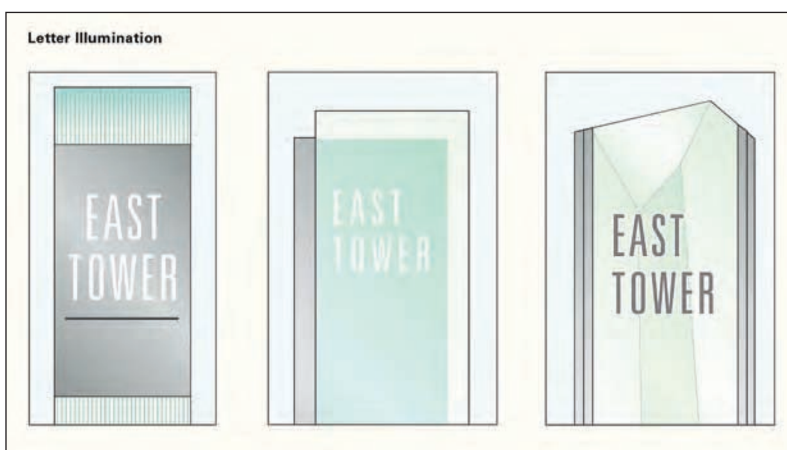


2.10 Schematic design phase: Sign form study 3 shows a concept of a lighted lantern derived from the building's lighting scheme.

ideation stages of phase 2, even if some of those designers may not be assigned for the duration of the project. Collaborative brainstorming and word association techniques can stimulate the flow of design concepts, as can pencil-and-paper sketching, versus computer rendering, as the computer interface is not as simple and direct as hand-sketching. Some EGD offices, in fact, don't permit computer use in ideation, in part because computer use tends to foster endless minutely detailed variations on a possibly mundane idea rather than exploration of many, truly novel ideas.

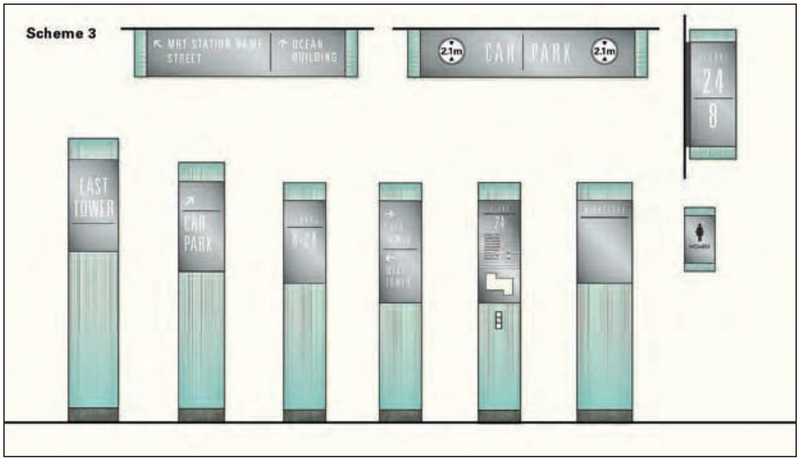
Pinup sessions, too, are very useful for comparing and cross-fertilizing ideas and concepts. The concept sketches generated by the EGD team are pinned up on the wall and discussed among the team, with each designer articulating the thinking behind his or her various ideas. These pinup sessions can be both convergent and divergent. Some concepts will be rejected, but even rejected concepts can stimulate entirely new directions, so plan on at least two pinup sessions to get out the ideas. And check your ego at the door.

As phase 2 progresses, it becomes convergent, as concepts for the sign program's visual aspects are weighed and selected to form clear design directions to finesse for presentation to the client. As with ideation, concept selection should be a team effort, with each concept thoroughly debated, defended, and discussed in relation to how well it points to a solution to the client's problem. The key phrase here is "pointing to a solution." Remember that the design process is evolutionary, that schematic design is an early phase of that process, and that the various problems and subproblems of the sign program will be solved as the process unfolds in subsequent design phases. (See Figures 2.11 and 2.12.) Think of phase 2 as skimming the surface of the solution and you won't run the risk of becoming too invested too early in what may be a wrong solution. This is not the phase for working out the details.



2.11

2.11 Schematic design phase: Various concepts for sign illumination.



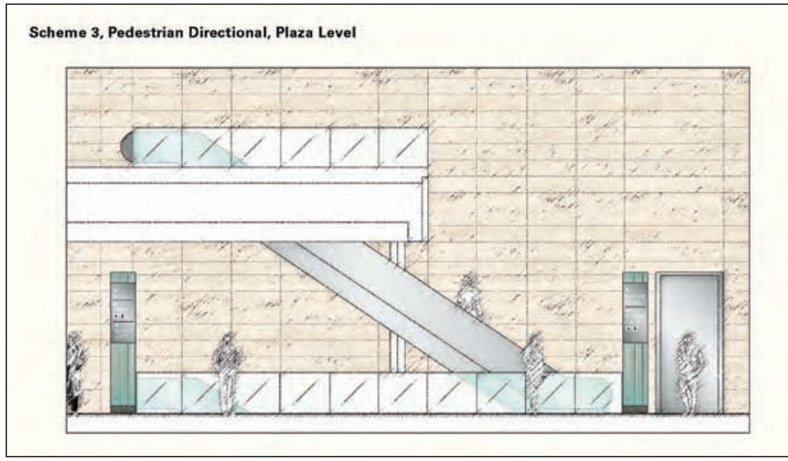
2.12

The culmination of phase 2 is a presentation to the client of the EG designer's schematic design activity. (See Figures 2.13 through 2.15.) This is typically the first time the client is presented with the visual fruits of the designer's creative labors, so it's a major project milestone that either sets the tone for the rest of the project or sends the designer back to the drawing board to seek other design directions. If the designer has conducted thorough research, however, the need for revisiting other design solutions is minimized. Another strategy is to fly some preliminary concepts by the client on an informal basis to test the waters—to gain input that you're on the right track before investing in an elaborate schematic design presentation.

2.12 Schematic design phase: The selected design concept expanded to pylon, overhead, projecting, and plaque sign types.

2.13 Schematic design phase: Presentation sketch showing pylon signs within the building's lobby.

2.13

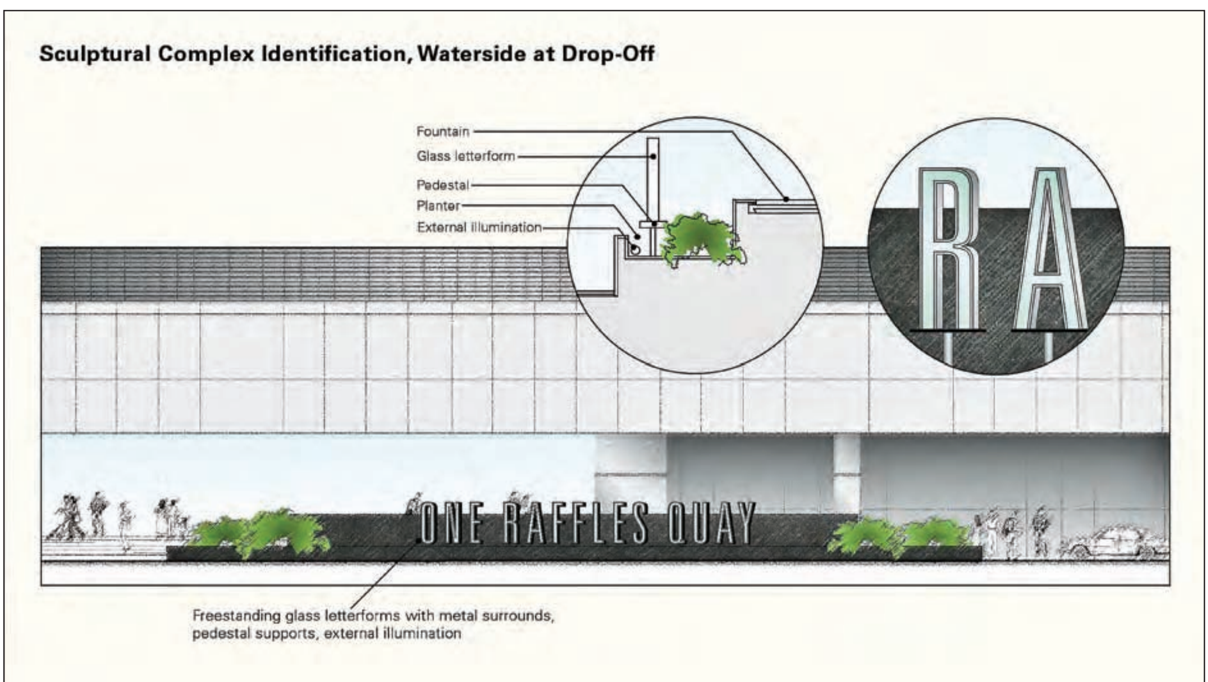


2.14

2.14 Schematic design phase: Presentation sketch showing directional pylon signs at escalators.

2.15 Schematic design phase: Presentation sketch of monumental cast glass site identification sign letterforms.

Many EG designers present up to three schematic design directions, explain the merits of each, and then gently guide the client toward the selection of one concept. Some designers present just one design concept and advocate forcefully for its adoption, which minimizes the risk of the client creating a "camel," that is, an awkward combination of two fundamentally different concepts. The drawbacks to the single-idea approach are that the client may: (1) reject the concept outright, and/or (2) feel that the designer is being too dictatorial by not presenting enough



options. Indeed, the designer should have discovered in phase 1 whether the client wants multiple options.

The key to presentation of multiple concepts, however, is to not overwhelm the client with too many options, or with any option the designer doesn't believe to be viable. In other words, don't show the client a direction you don't believe in because that may very well be the concept the client selects, and you'll be doomed to struggling with it for the duration of the project.

Phase 2 Goals and Results

The primary goal of the schematic design phase is to generate and present informational approaches and visual concepts for client review, selection, and approval in order to proceed to subsequent design phases. Another goal is to obtain client input and feedback that may affect the basic informational or design directions of the sign program.

Phase 2 results in presentation materials that convey the schematic design concepts and approaches to the client. Depending on the size and nature of the project and client, these presentation materials typically consist of an A/V presentation in the form of a PDF or PowerPoint/Keynote file, which may be supplemented by material boards, study models, or other visuals such as animated fly-throughs. The client may also wish to have a printed booklet or an electronic file of the A/V presentation.

A basic content checklist for the phase 2 presentation includes the items listed below. Of course, the EG designer can supplement or omit these basic content items as appropriate to a given project.

- Overview of project context, including survey(s) of existing conditions, if available
- Key sign locations in plan view
- Approaches to sign message nomenclature and hierarchy
- Evocative or metaphorical references, typically images
- Typeface and symbol options
- Material and color palette options
- Basic elevations of key signs, including scale references such as people, cars, and trees, and so on
- Perspective montages of signs in their environmental context, using renderings or photos of the actual site as underlying images
- Animated fly-throughs of key sign location areas to illustrate the signs within space/time sequence
- Basic study models of sign forms and shapes

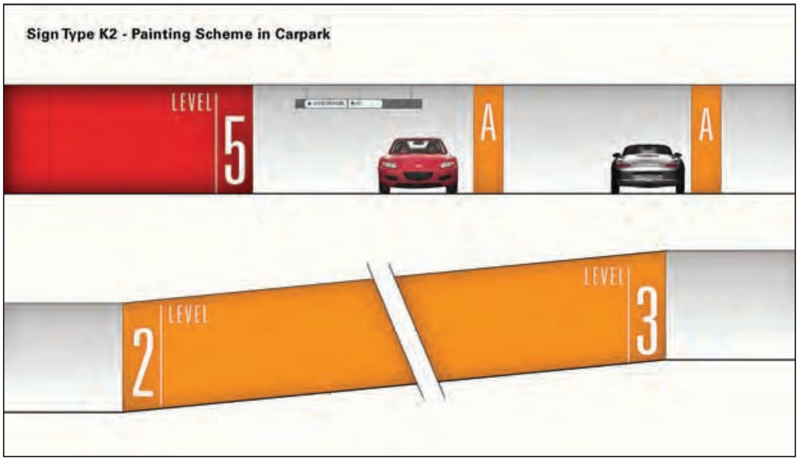
Persuasion is certainly part of the design process, as is the ability to articulate and present your concepts effectively, sometimes in formalized situations before large audiences. Whatever the context, successful presentations are visually compelling and verbally engaging, and clearly speak to the client's design problem.

In an ideal world, the schematic design presentation is a huge success and the client makes an immediate—or at least prompt—decision to select and approve one of the presented directions. So on to the next design phase, but not until you have clear client input and approval to proceed, especially because some clients take more time than others to reach decisions. And keep in mind that, occasionally, the designer must point to the project time schedule and gently prod the client to make a decision.

Phase 3: Design Development

Approval has now been granted to proceed further onto the design process, and the design development (DD) phase begins. Whereas the initial stages of schematic design (SD) are divergent, seeking many ideas, DD continues the convergence of the later SD stages, to focus more deeply on the selected schematic design direction. Phase 2 just skims the surface of the design solution; it is during DD that the solution is fleshed out, filled in, modified, and refined. (See Figures 2.16 and 2.17.) The methods for documenting and tracking various project elements are also solidified in phase 3.

As in phase 2, it's important to tackle the sign information content system in the early stages of design development. During phase 3, a complete inventory of all the signs in the program must be developed, meaning that each and every sign must be located, messaged, typed, and assigned a



2.16

2.16 Design development phase: With the sign family's basic vocabulary established, other aspects of the project, such as wall graphics for the car park, are explored.

2.17

2.17 Design development phase: Study of glass rib size and spacing advances the design refinement of the pylon signs.

unique identifying/tracking code. This sign inventory process is essential because the EG designer cannot meaningfully proceed with design of the visual aspects of the program until all the particulars of its parts are known. In other words, the designer must know the physical conditions, such as width or height constraints, as well as the specific message content of each sign before it can be designed. Human factors such as viewing angle and distance, as well as code-mandated factors such as typographic sizes, also affect how each sign is designed, as described in more detail in Chapters 4, 5, and 6.

Comprehensive sign programs are composed of hundreds, even thousands, of sign units, so it's inefficient from both design and manufacturing standpoints to design each and every one of them individually. Therefore, after sign locations and messages are established for the information content system, the designer can begin to look for commonalities among the various signs to group them into standardized *sign types.* The objective of *sign typing* is to reduce and simplify the sign program into the fewest number of groups that share common features standardized for each type, while still fulfilling the communication function of the sign program.

In a simple example of sign typing, assume the EG designer has located and messaged ceiling-hung, freestanding, and wall-mounted plaques within the project environment, and that they all have message content of varying length and importance. The first obvious common characteristic by which certain signs can be grouped together is mounting method; for example, Sign Type A is a ceiling-hung sign, Sign Type B is a freestanding sign, and so on. Then when message length and importance is considered, sign types can be further differentiated; for example, Sign Type A1 is a large ceiling-hung sign to hold message content of the largest quantity or highest importance, Sign Type A2 is a small ceiling-hung sign to hold message content of lesser quantity or importance. Many other factors can also affect the development of sign types, such as low ceiling clearances requiring the use of a smaller ceiling-hung sign type at certain locations, or narrow corridors that limit a sign type's width. Figure 2.18 shows a list of sign types and quantities for the ORQ project.

Sign Type and Quantities List • 50% Design Development

Type	Quantity	Description	Illuminated	Stone Prep Work Req'd
A - Exterior Specialty Items				
	1	A1 Inlaid Glass Letterforms	Y	Y
	1	A2 Freestanding Glass Letterforms	Y	Y
	4	A3 Inlaid Letterforms in Door Cladding	Y	N
	1	A4 Cantilevered Sign	Y	N
	TBD	A5 Lettersets	Y	Y
	2	A6 Pin Mounted Letterforms	N	N
B - Totems				
	7	B1 Large Exterior	Y	Y
	7	B2 Small Exterior	Y	Y
	2	B3 Small Interior	Y	Y
	8	B4 Lobby Directory Kiosk with Touchscreen	Y	Y
C - Exterior Bollards				
	8		N	Y
E - Interior Lift Bank Identification, Upper Floors				
	67		Y	Y
F – Overhead Signs				
	4	F1 A2 Link	Y	N
	3	F2 Exterior	Y	N
	6	F3 Travellator	Y	N
	2	F4 A2 Mezzanine	Y	N
	36	F5 Car Park	N	N
G - Plaque Signs - Front of House				
	13	G1 Large	N	N
	518	G2 Medium	N	N
H - Plaque Signs – Back of House				
	108	H1 Large	N	N
	514	H2 Medium	N	N
	18	H3 Small	N	N
J - Miscellaneous Metal Items				
	8	J1 Metal Lettersets inside Stone Niche	Y	Y
	10	J2 Elevator Transome Panels	Y	N
	1	J3 Exterior Regulatory Sign	N	N
K – Miscellaneous Applied Graphics				
	1102	K1 Applied Graphics on Hatch Door	N	N
	90	K2 Painted Graphics	N	N
	7	K3 Applied Lettersets on Glass Doors	N	N

2.18

2.18 Design development phase: Sign types and quantities list for One Raffles Quay.

When signs are typed accordingly, the designer gains efficiency and visual unity by designing the sign type, which can cover a large quantity of sign messages and units, rather than designing each individual sign as a unique, stand-alone object. And sign typing improves resource conservation and manufacturing effectiveness because, for example, several units of the same size and shape can be cut, formed, and assembled more efficiently than if the same quantity of units were all of different sizes and shapes. If you think of sign typing as designing for limited mass production, the usefulness of typing becomes clear. And, from a design point of view, visual order is enhanced, with fewer sizes, proportions, and shapes of signs in the project environment.

The best way to track and manage sign types is by keeping a list that defines the characteristics and size of each type. Pinning down sign types is, however, a balancing act, as sign types typically evolve and mutate as the DD phase progresses. For example, the need for new sign types may emerge, some sign types may be deleted, two sign types may merge into one, or the definition of a sign type may change.

Methods for defining sign types vary, but the two basic approaches are to type signs by:

- **Physical characteristics,** such as size, shape, material, mounting method, graphic application technique, and so on.
- **Communication function**, such as whether the sign communicates identification, direction, or another kind of information, as described in more detail in Chapter 4, "The Information Content System."

At C&VE (Calori & Vanden-Enyden), we prefer to type signs by physical characteristics, as they most directly translate into drawings, schedules, and bid forms. Our thinking behind this is that the primary fabrication cost factor of a sign is its physical characteristics, not the kind of information it displays. For example, a 12-inch square, wall-mounted aluminum plaque with two-color silkscreened graphics costs the same to fabricate and install regardless of whether it displays identification or directional information. And a 12-inch square, wall-mounted bronze plaque with two-color silkscreened graphics costs more to fabricate than the aluminum plaque with all the same characteristics. In this example, the material—aluminum versus bronze—is the distinguishing factor between these two signs, so we define them as different sign types.

Other EGD practitioners type by communication function, rather than physical characteristics. And sometimes signs are typed using a combination of physical characteristics and communication function. There is no hard-and-fast rule for sign typing, but as recommended by EGD pioneers John Follis and Dave Hammer in their seminal book *Architectural Signing and Graphics* (Whitney Library of Design, 1979), "All signs in a given sign type should have the same size, shape, and method of attachment to the building." We agree with this recommendation.

Regardless of the sign-typing technique you choose, each sign type is assigned a code—typically alpha, numeric, or a combination of the two. This code is a shorthand way to refer to everything that comprises a given sign type. For example, the aforementioned Sign Type A is a code that succinctly refers to a large exterior internally illuminated ground-mounted pylon. As such, the sign type code is an essential element of the sign message schedule, which is used to track and inventory each and every sign in a program.

During phase 2, key signs may be numbered, but it is during phase 3 that the sign numbering system for tracking all the signs in the overall project is typically established, as that's when all the signs in a program need to be located on plans and entered into a message schedule. The sign numbering system, sometimes called the location numbering system, identifies and distinguishes each sign unit on the location plans and the message schedule.

The sign numbering system is itself a coding system that conveys distinguishing information about each sign unit. To effectively track all the signs in a program, each sign should be assigned a unique sign location number—meaning it's not duplicated elsewhere in the program. Other information about the sign unit, such as its sign type, which floor the sign is on, or whether it's an interior or exterior sign, can also be coded into its sign number.

There are several approaches to sign numbering, some of which can be quite complex. A numbering system that's suitable for one project may not be for another, so it's wise to weigh various sign numbering approaches carefully before putting a given system to use, because it's tedious and time-consuming to completely revamp the sign numbering system once sign numbers have been entered on location plans and the message schedule. (See Figures 2.19 and 2.20.)

The sign location plans indicate on plan drawings each sign in a program, along with its identifying sign or location number. This sign number is entered into the sign message schedule, which contains all the essential information about each sign unit, such as its:

- Sign type, if it's not a component of the sign number
- Message, including arrows and symbols
- Plan drawing number
- Construction drawing reference, if applicable
- Mounting drawing reference, if applicable
- Graphic layout reference, if applicable

Sign No.	Qty.	Plan	Mount	Const.	Layout	Line	Message	Remarks
F2-05.01		SL 05					(Side A) CAR PARK (Clearance Information provided by A-51) (Side B) (Up Arrow) EXIT	Includes clearance bumper bar
G2-05.01		SL 05					01100 DCS 6.6 KV Motor Starter Room	**DCS Sign in Public Area**
G2-05.02		SL 05					0195 DCS Access Driveway	**DCS Sign in Public Area**
G2-05.03		SL 05					0195 DCS Access Driveway	**DCS Sign in Public Area**
H3-05.01		SL 05					01100 DCS 6.6 KV Motor Starter Room	**DCS Area Sign** Same room number as G3-05.01
H3-05.02		SL 05					0199 DCS Low Voltage Motor Starter Room	**DCS Area Sign**
A2-06.01		SL 06					ONE RAFFLES QUAY	
A3-06.01		SL 06					NORTH TOWER ONE RAFFLES QUAY	
A3-06.02		SL 06					(Side A) NORTH TOWER ONE RAFFLES QUAY (Side B) (Up Arrow) SOUTH TOWER	
A6-06.01		SL 06					ONE RAFFLES QUAY	Finalyson Green
A6-06.02		SL 06					ONE RAFFLES QUAY	Finalyson Green
B1-06.02		SL 06					NORTH TOWER ONE RAFFLES QUAY	
B1-06.03		SL 06					NORTH TOWER ONE RAFFLES QUAY	

One Raffles Quay - Project #1201
Sign Message Schedule + 50% Design Development

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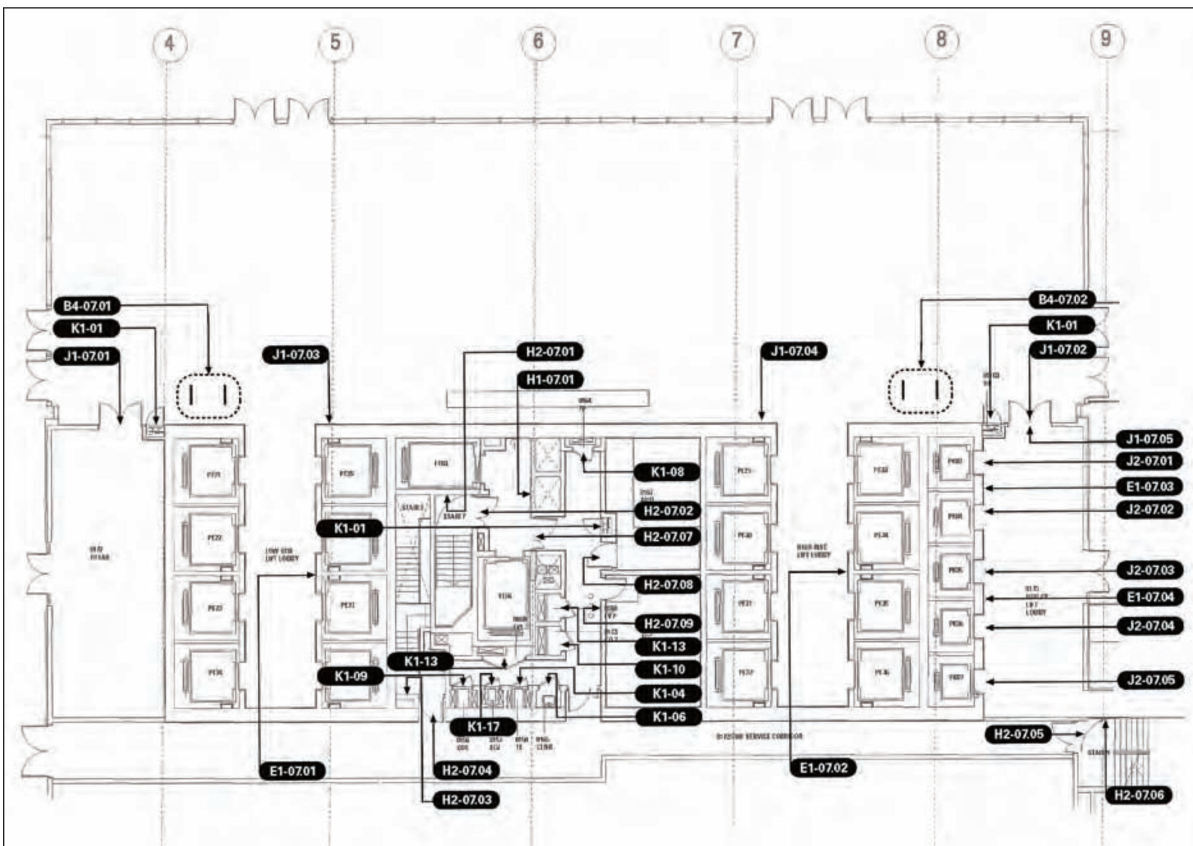
2.19



2.20

2.19 Design development phase: Sign message schedule lists sign numbers, plan locations, sign messages, and remarks.

2.20 Design development phase: Location plans locate each sign in the sign program.

Most message schedules also contain a Remarks column for tracking such items as changes, additions, deletions, signs for which client input is required, and so on.

Message schedules are formatted as tables, typically on letter-size, landscape (horizontal) pages. EGD practitioners can use a range of applications to generate message schedules, from word processing applications for relatively simple, small sign programs to spreadsheet and database applications, which provide more powerful, sophisticated tools for data entry, sorting, searching, and editing functions. All of these functions are definitely required during the development of a message schedule for large, complex signage programs, and in such cases a database application is the most powerful tool.

A word about computer platforms: Most EG design offices operate on the Macintosh platform while most clients, including architects, are on the PC platform. This situation creates some file exchange issues, particularly with message schedule files, the EG designer's drawing files, and architectural CAD files.

In the case of message schedules created in a database, most clients don't have database programs in their desktop applications, but they do typically have spreadsheet and Acrobat Reader applications, therefore the database message schedule may need to be exported to either spreadsheet or PDF format, which is easily accomplished. A spreadsheet format allows the client to edit the message schedule, if that's desirable; PDFs should be considered uneditable unless the client has the full Adobe Acrobat Pro application.

Regarding the exchange and display of other kinds of files developed by the designer or the client for a project, the PDF format facilitates this process, particularly for the EG designer's Adobe Illustrator (AI) drawings and the client's architectural CAD files.

And yet another word about computer technology and cross-platform matters: In lieu of CAD, more architectural offices are using Building Information Management (BIM) programs to accomplish their work. It's not the purpose of this book to explain PC-based BIM and how EGD may or may not relate to it. Suffice to say that EGD offices are devising their own ways of adapting to the cross-platform issues and opportunities BIM provides.

Sign location plans are prepared by placing a marker indicating each sign's location, along with its identifying number, on base plan drawings of the project. Most clients possess or can provide architectural plan drawing files, so the designer should always request those files—typically as PDFs—for use as the sign location base plans rather than going through the time-consuming effort of creating them anew.

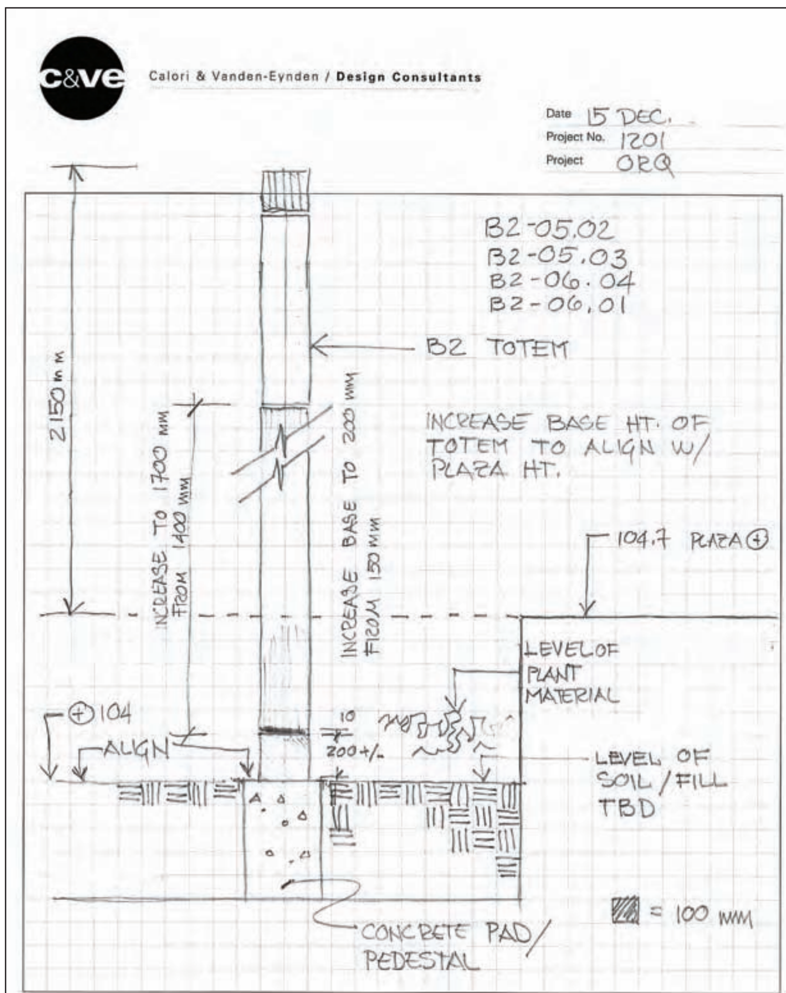
2.21

2.21 Design development phase: In situ rendering shows refinement of pylon sign height and width.

2.22 Design development phase: A scale model demonstrates the proposed lighting effect.

2.23 Design development phase: Sketches help coordinate sign details with design and construction teams.

2.22



2.23

The sign locations and numbers need to be clearly visible on the sign location plans, but this is easier said than done because plan drawings are typically cluttered with written information (such as notes, dimensions, symbols, etc.), which is necessary for construction of the project but tends to obscure sign locations. Nevertheless, there are several ways to increase the prominence of sign locations and numbers.

- Always request clean base plans with the written information removed, if possible. While this is a relatively easy process if the architectural drawings were created in CAD, some clients may not want to take the time. If the plans are from the pre-CAD era, just be happy that the drawings exist at all and take them however you can get them, making sure to check that they reflect the currently configured plan.
- Whether the plans are clean or not, they should be "grayed back" so that they're still readily visible, but fade into the background relative to the sign locations and numbers, which are not grayed back.
- Enclose the sign numbers in a distinctive shape that stands out visually from the plan background and any architectural symbols or shapes on it.

Another consideration is color coding on final plan drawings. While many organizations are reducing their reliance on paper prints, and while full-color printing has become relatively widespread and affordable, some parties that use the signage drawings may still be using paper prints reproduced in black-and-white. The techniques outlined here don't rely on color to distinguish sign locations and numbers, and therefore result in drawings that are readable when reproduced in either black-and-white or color.

When it comes to size, because plans are typically generated at small scales, the sign locations often need to be indicated at a scale larger than that of the base plan in order to be visibly prominent. This alarms some clients, however, because they think that there's too many signs or that the signs are going to be really large or that they're too close together, so some explanation of the scale discrepancy may be necessary. There are projects where indicating the signs in scale on the plans is useful and necessary. In these cases, the base plans must be of adequate scale so the signs can be accurately indicated and seen in the same scale, which may result in several plan sheets with match lines for a given area.

Another advance caveat: The sign locations and numbers can crowd each other on some plans, so give some thought to arranging them in an orderly fashion. Another recommendation is to pull out the sign numbers beyond the plan footprint, to help keep the plan itself uncluttered and readable—but this, too, requires careful arrangement.

As the information content system is developed and tracked in the DD phase, the design of the visual elements—the sign graphics and hardware—also progresses, as shown in Figures 2.21 through 2.25.

2.24

2.25

2.24 Design development phase: Symbols and icons, in addition to typefaces, are selected, refined, and finalized.

2.25 Design development phase: Color and material samples are gathered and evaluated.

During DD, the EG designer begins to address the details of the graphic system and the hardware system, to solve the subproblems that lie in those details. The EG designer can use scale and full-size models and mock-ups, drawings—including 3D computer renderings—and even design prototypes to study and refine those all-important details that contribute so much to the quality of the final sign objects. As the famed modernist architect Mies van der Rohe said, "God is in the details."

Phase 3 Goals and Results

The primary goal of the design development phase is to solidify and refine the conceptual direction selected at the end of phase 2, and to obtain client input and approval before proceeding into final documentation of the signage project.

Phase 3 results in several items that convey the evolution of the informational and visual aspects of the design concept to the client. At the very least, these items include:

- Sign location plans in progress
- Message schedule in progress
- Drawings showing development of sign graphics
- Drawings showing development of sign hardware

Other items that may or may not be reviewed with the client include:

- Study and/or presentation models
- 3D computer renderings
- Full-size mock-ups

Depending on the project's requirements, the EG designer may make a formal presentation during or at the end of phase 3, or may just submit a progress set of the location plans, message schedule, and design drawings for the client's review. In either case, client input on the development of the sign program's details is essential throughout the DD phase, and the EG designer should seek the client's review and approval of the sign program's development before proceeding into the documentation phase.

Phase 4: Documentation

The documentation phase, which is the final design-centered phase of the design process, begins upon the client's approval of the work accomplished in phase 3. Phase 4 continues the convergent activity of phase 3, honing in on detailed solutions and refinements to the subproblems of the sign program.

The goal of the documentation phase is to convey the design intent of the sign program to sign fabricators for pricing and production. In other words, the EG designer works out all the details and ties up all the loose ends of the sign program's design before it gets priced and built. The documents that work together to convey this design intent include:

- Sign location plans
- Message schedule
- Design drawings for the sign graphics and hardware
- Specifications

Note that work on most of these documents was started in the design development (DD) phase, and that the documentation phase is aimed at filling in and finalizing the information contained in these documents to provide fabricators with a complete picture of the sign program's design. (See Figure 2.26.)

Before the documentation phase begins, the EG designer and client should agree on the format for the signage design documents, if that discussion has not already taken place. This includes the final sheet sizes of all documents in the package, whether the signage package is a standalone or part of the document package for an overall construction project—which often happens when signage is part of new construction. It also includes the titleblock, whether the EGD firm's own or that of

2.26

2.26 Documentation phase: Design refinements often continue into the documentation phase, as shown in these full-size mock-ups of pylons and an elevator bank identification sign, to study and finalize such items as size, readability, and lighting.

another party, such as the project architect. Titleblocks appear on all drawings and contain general project and specific drawing information, such as drawing number, drawing title, date, scale, and so on. (Remember: If the project is overseas, paper sizes and proportions are different from those in the United States.)

As in phases 2 and 3, it's important to focus on the sign program's information content system in the early stages of the documentation phase. It's time to nail down every last sign location and message because, inevitably, a few will still be left open from the DD phase. Only when the sign locations and messages are finalized can the details of the sign graphics and hardware be finalized, as resolution of these visual aspects of the program is contingent on the quantity, kind, and viewing conditions of the information displayed on the signs.

Finalizing Sign Types

The documentation phase is also when sign types are finalized to address the few that may have still been in a state of flux during phase 3. Keep in mind that, at the very least, the sign type is keyed into the message schedule, and is perhaps part of the sign number keyed on both the message schedule and the location plans. In either case, sign type revisions are tedious because they must be tracked and updated in the schedule and perhaps the plans as well. That said, if sign typing was carefully considered during phase 3, the need to revise sign types during phase 4 should be minimal; but there's always the possibility that the definition of a given sign type needs to be changed or that a type needs to be added or deleted for the final project documents.

The sign message schedule is the master inventory list for the entire program, which is why it is updated and finalized during phase 4 with all changes, additions, and deletions to sign messages and sign types/numbers. Sign or location number, and perhaps type, changes must also be updated on the final sign location plans. Additionally, drawing reference numbers are entered into the message schedule as final drawings are generated for the sign graphics and hardware.

This work is very tedious because each sign needs to have its own unique number and that number needs to be the same on both the sign location plans and the message schedule. The reason each sign needs its own number is because, with the exception of some repeating messages like women's restroom wall plaques, each sign has its own location-specific message, such as a room number plaque. Directional sign messages are even more location-specific since destinations change along circulation paths. Thus, sign program message schedules are more complex than architectural door schedules because most signs in a program communicate a unique, location-specific message. Software developers have at various times grappled with easing and automating this aspect of signage documentation, and some EG designers are successfully using such applications for this task.

Just as the message schedule and location plans document the sign program's information content, the design drawings document the visual aspects of the sign program. Often called *working drawings* or *design intent drawings*, these drawings convey the details intrinsic to the design of the sign graphics and hardware.

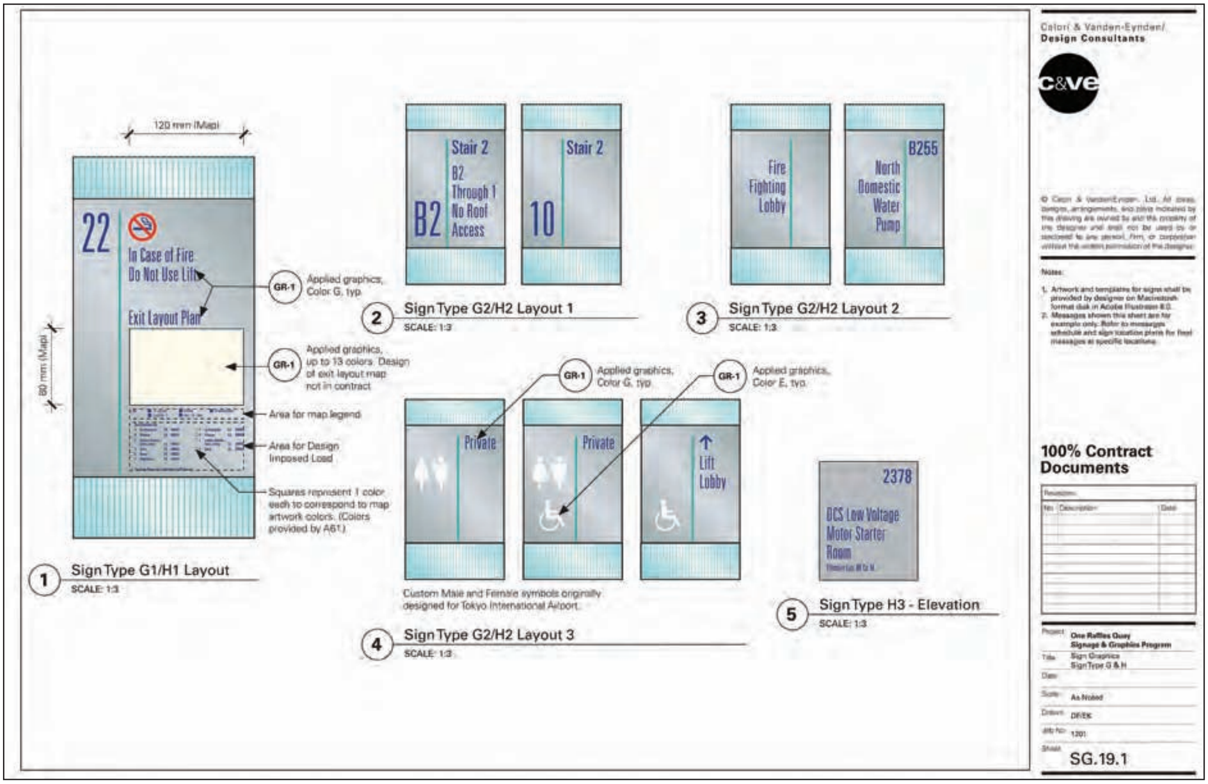
Deciding on Level of Detail in Drawings

The eternal question on design drawings is how much detail needs to be conveyed in order to obtain clear apples-to-apples pricing from fabricators; thus, this is where the distinction between design intent and working drawings comes into play. It's generally understood among EGD practitioners that design intent drawings contain just the amount of detail that's required to convey the intent or outward appearance of the sign program's design; in contrast, working drawings contain a higher level of detail, typically regarding how the signs could be built.

It's important to note that most EGD practitioners are typically trained in graphic design. Since they don't have training in engineering or architecture, they are not qualified nor licensed to perform either of these services. Signs, particularly those that are large, electrified, or similarly complex, and their connections to adjacent surfaces need to be engineered. This is typically the responsibility of the sign fabricator, but some clients want signs to be engineered as part of the design documentation. In these cases, the EGD firm will need to engage the services of a licensed professional engineer.

Along the continuum of design intent to working drawings detail, it's impossible to decree the appropriate amount of detail for any given project, design firm, client, or perhaps most importantly, budget. Accordingly, this section focuses on the core or essential information that needs to be conveyed in the drawings for a sign program. (See Figure 2.27.)

As noted earlier about sign location plans, the design drawings shouldn't necessarily be prepared assuming that they'll be reproduced in full color. In other words, it's wise not to rely on the use of color to communicate important information. For example, if a sign background color is blue, it should be noted as such in writing on the drawing; if this is not so noted and the drawing is reproduced in black-and-white, there is no way to know that the sign background is blue. These annotations, which indicate colors, materials, finishes, and so on are referred to as *callouts*.



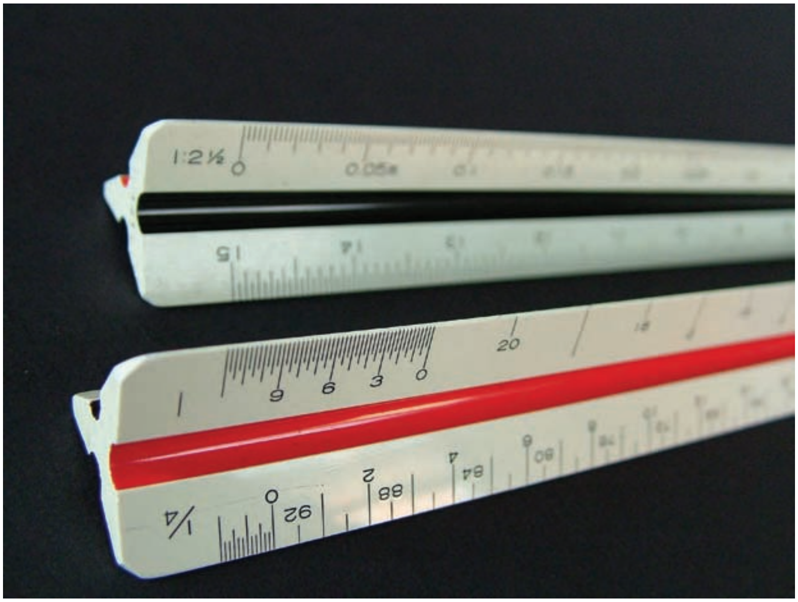
2.27

2.27 Documentation phase: Working drawings for the One Raffles Quay signage program contain details on the graphic system such as layouts and colors.

Dimensioning and Scale

Size is another essential piece of information that needs to be conveyed about each unit in a sign program, so all design drawings must be dimensioned. The extent of dimensioning depends on the complexity of a given sign type, but at the very least overall dimensions (height, width, and depth) should be indicated, as well as the dimensions of any components of the sign type. For example, the overall dimensions of a post-and-panel sign unit are indicated, along with dimensions for the post component and for the panel component. Dimensions indicating where signs are positioned relative to their surroundings are also important. For example, a typical wall plaque mounting elevation indicates dimensions for the plaque's mounting height and distance from door openings.

In addition to being dimensioned, all design drawings must be prepared at scales that can be measured with a scale ruler, typically an architectural scale ruler. (See Figure 2.28.) The smaller signs in a program can be drawn at full or half size, but larger signs have to be drawn at a smaller scale to fit on the drawing sheet. Again, all drawings must be at a *measurable* scale—that is, not reduced an arbitrary percentage to fit on the sheet. The scale of each drawing should be indicated in writing, and anything that is



2.28

2.28 Documentation phase: Scale rulers: An Imperial architectural scale is shown in the foreground, a metric scale in the background.

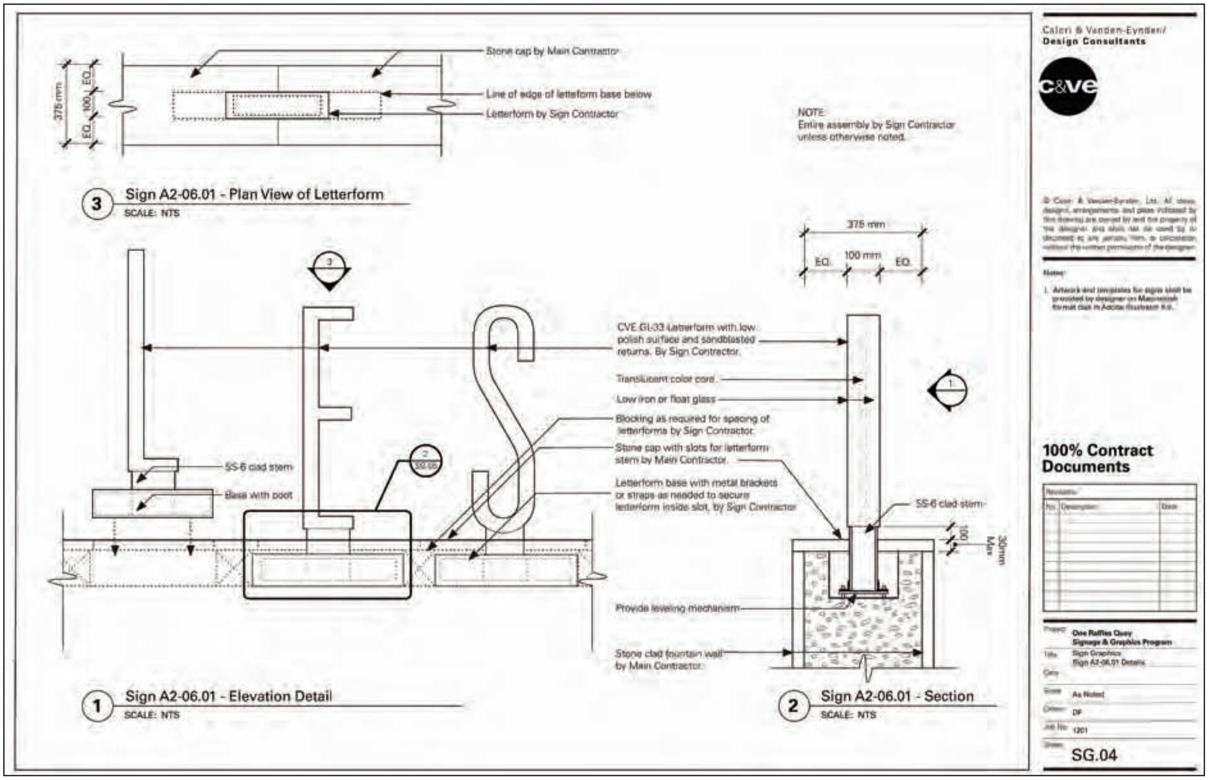
not drawn to a measurable scale should be clearly indicated as N.T.S., for "not to scale." CADtools, an Adobe Illustrator plug-in, equips AI users to draw and dimension in measurable scales.

The importance of measurably scaled, dimensioned design drawings cannot be overstated, particularly to graphic designers, who are not typically trained to work at scales less than actual size. Use of dimensions and measurable scales is the only clear, accurate way to convey the sizes of the various sign units within a program. And it's important to point out that the metric system *must* be used for dimensioning and scaling on any project outside the United States. You'll find the metric system, once mastered, to be much easier to use than the U.S. system.

Conveying Design Information

In addition to providing dimensional information, the design drawings contain a package of information about the sign program's visual aspects. (See Figure 2.29.) A checklist guide for the drawings package content includes:

- Listing of the graphics vocabulary, including the full fonts of all typefaces, along with all symbols and arrows used
- Summary of all colors, materials, and finishes used in the program
- Front, side, and top views of each sign type, with callouts
- Representations of the different graphic layouts for each sign type, with callouts



2.29

2.29 Documentation phase: Working drawing sheet with elevation, plan, and section details documents hardware system components of the monumental freestanding glass site identification letters.

- Mounting elevations, fixing signs in relation to architectural or site features
- Sign location plans, typically bound in with the design drawings package

Depending on the sign program's design, more or less detailed information may be required than indicated on this checklist. For example, if a sign is a simple, flat, square wall plaque, top and side views may not be required, since the thickness of the plaque can be conveyed by a callout rather than dimensioned on a side or top view. Similarly, if that plaque is simply glued to the wall, that can be called out as a note rather than shown in a side or top view. However, in the case of a sign that's more complex in form, say, with tapering or multileveled planes, all sides may need to be shown—front, back, top, right side, and left side, possibly even along with some sections through it. The drawing number of a sign type's primary elevation—typically the front elevation, since it's usually the most distinctive—is entered into the message schedule for each sign number. (See Chapter 6, "The Hardware System," for an explanation of these drawing views.)

The key to the drawings package is to include all the design information about the signs that will affect how they're priced, how they're built, and how they're installed. The goal is to cover all the bases for all the unique conditions in the program; the trick is to do this without being unduly repetitive. For example, several elevations may be required to show the different mounting conditions for a given sign type at different locations, but a typical mounting elevation can be used for a condition that's the same at many locations, such as wall plaques mounted next to doors. At this point, the drawing number for the mounting elevation corresponding to each sign number is entered into the message schedule.

In the graphics drawings, the EG designer controls the appearance of the sign graphics for a wide range of message content. The graphics drawings should show each unique layout configuration for each sign type, since a given sign type may display several different kinds of informational content, with each requiring a different layout. Keep in mind that a given layout configuration can be used for any number of similar messages, so it's inefficient to provide a layout for each and every sign message in a program, unless the sign program is very small. At this point, the drawing number for the graphic layout that corresponds to a given sign number's message content is entered into the message schedule.

Distinguishing Between Drawings and Artwork

It's important to make the distinction here between drawings and artwork for sign graphics. The graphic layout drawings visually depict the graphic arrangement of various kinds of messages, but they are not the actual artwork for the final sign graphics. It's more efficient for the sign fabricator, rather than the designer, to produce the final digital artwork for each individual sign unit in a program, so digital art production is typically the fabricator's responsibility; but it's the EG designer who controls the visual appearance of the artwork by providing graphic layout drawings.

Since design firms use computers to produce their design documents, the content and nature of documents for the sign graphics have changed. In the precomputer era, it was typical to highly dimension the graphics drawings, because they served as layout grids that the sign fabricator used to produce and assemble the final artwork for each sign's graphics. But now that design firms produce their layout drawings as computer files, it's become common for the designer to provide those files as templates for the fabricator to use in producing the final art.

And that brings up another important distinction: between template files and artwork files. Think of a template as a digital grid, which has typical graphic elements in their specified size(s) and arrangement, into which new messages are input to create individual artwork files for each unique sign message. Template files have active, editable fonts so the fabricator can input the various messages specified for a given layout template to create the final digital artwork file for each sign. Again, sometimes the EG designer will produce individual artwork files for a very small sign program or for a relatively small collection of signs within a larger program.

Once the messages have been input into the artwork files, the fonts are typically converted to paths or outlines, which renders the fonts uneditable (i.e., deactivated) in the final artwork files, to avoid font conflicts with computerized cutting equipment in the fabricator's shop. At this point, the fonts become mere geometric vector files in the shapes of letterforms. But messages can't be edited in files with deactivated fonts, so it's important for the EG designer to maintain the source files with editable, active fonts in case artwork for additional or revised messages needs to be produced. (Chapter 5, "The Graphic System," has more on graphic layouts.)

Compiling Technical Specifications

Specifications serve as an adjunct to the design drawings, communicating verbally what the drawings can't communicate visually. As such, the specifications, or specs, can be thought of as the instructions to the sign fabricator. As with the design drawings, the appropriate level of detail and formality of the specifications varies with each project.

An entire book could be written about specifications—indeed, there are professional spec writers, who occasionally become involved with signage projects—so the purpose of this section is to provide only a general overview of specifications relating to signage.

As mentioned, signage fabrication is part of the construction industry, and the signage specs become part of the fabrication contract, which is typically let by construction industry professionals such as general contractors (GCs) or construction managers (CMs). The actual fabrication contract is a legal document that consists of many more general contractual items than the signage specs, including terms and conditions (often referred to as *boilerplate* or *up-front conditions*), bonding requirements, and others; thus, the specs that are concerned solely with the product to be constructed—that is, signage—are termed the *technical portion* of the specs.

The extent and formality of signage technical specs is dependent on the size and circumstances of each project. On smaller projects, the specs can effectively be incorporated into the design drawings. On larger projects, particularly those for large government or institutional clients, the EG designer may be required to provide highly detailed, formalized specs conforming to the MasterFormat® established by the Construction Specifications Institute (CSI). CSI format specs are in the form of a letter-sized document independent from the drawings. (More information about CSI format can be found at www.csinet.org.)

Most signage specifications fall somewhere between drawing notes and CSI's MasterFormat® in detail and formality. Often the signage specs are wordy enough that they're easier to produce as a letter-sized word processing document than put on the drawings. (See Figure 2.30.) And even if the client doesn't demand strict CSI language, the EG designers should not be surprised if they are told to label the signage technical specs as "Section 10 14 00," which is the section of the CSI MasterFormat® devoted to "Signage." Note that the 2012 MasterFormat® has further subcategories, such as "10 14 16, Plaques" under the Signage section. Nor should the EG designer be surprised to see the signage

Section 10400 – Project Name and Description

2.8 ILLUMINATION

A. It is the responsibility of the Sign Fabricator to provide bright and even illumination appropriate for the condition.

B. **Code:** Conform to State Electrical Code, National Electrical Code, and U.L. listings for all materials. All electrical components and wiring methods for internally-illuminated sign units (by others) shall be properly insulated and UL Approved. Coordinate with architecture.

C. All internally-illuminated sign units shall be adequately vented to dissipate heat generated by electrical components.

2.9 FABRICATION / GENERAL SIGN CONSTRUCTION

A. Fabricator shall fabricate signs and graphics following dimensions and details shown in the Contract Documents, accepted Shop Drawings, Graphic Layouts, and other Submittals, and as otherwise approved or specified.

B. **Intent of Specifications:** It is intended that all finished work be of the highest quality to pass eye-level examination and scrutiny by the Architect.

1. Construct all work to eliminate burrs, dents, cutting edges, and sharp corners.
2. Finish welds on exposed surfaces shall be of the correct type to eliminate distortions of flat surfaces, and to be imperceptible in the finished work. At exposed connections, all flux, oxides, slag, and discoloration shall be removed so that these areas match the finish of adjacent areas. Any damage by welding shall be repaired by grinding, polishing or buffing.
3. Except as indicated or directed otherwise, finish all surfaces smooth.
4. Surfaces that are intended to be flat shall be without dents, bulges, oil canning, gaps, or other physical deformities.
5. Surfaces that are intended to be curved shall be smoothly free flowing to required shapes and shall be without dents, bulges, oil canning, gaps, or other physical deformities.
6. Except where approved otherwise by Architect, conceal all fasteners.
7. Make polycarbonate LED access lenses tight-fitting, curved and flush with adjacent surfaces with no exposed fasteners or hinges.
8. Exercise care to assure that polished, plated, or finished surfaces are unblemished in the finished work.

Project Name 10400 - Page 11 Date

2.30

2.30 Documentation phase: Technical specifications for a typical signage project.

specs bound into a huge, comprehensive specification document for an overall construction project.

Two other important tips about the detail and formality of the technical specs:

- Unless all the specs are treated as drawing notes, there should be as little redundancy as possible between any drawing notes and the letter-sized spec document. There will always be some redundancy between the two, but it's time-consuming to indicate a spec twice, or to need to change a spec in two places rather than one.
- In the interest of clarity and brevity, spec language should be as definitive and concise as possible. Specs are definitely not a creative writing exercise! Typically, sentences are formulated in a somewhat brusque, instructional form, such as, "Use stainless steel fasteners for all sign attachments," and use the biblical-sounding verb *shall,* as in "All signs shall be attached with stainless steel fasteners." Words such as *must, should*, and even *will* are considered too indeterminate in intent for spec language.

Regardless of the level of detail or formality required, on one level or another, the technical specs for signage should cover at least the following:

- Quality assurance
- Required submittals
- Quality/workmanship standards
- Materials and products
- Fabrication and graphic application techniques
- Installation and cleanup

Quality assurance specifies the qualifications fabricators must provide to assure they're capable of performing the work required by the design. This is very important on projects that go out to publicly advertised bidding, as such projects often draw bids from unqualified fabricators. Qualifications requested may include length of time in business, photos and descriptions of similar projects in scope and cost, list of designer references, square footage of fabrication shop, list of shop equipment and personnel, percentage of work to be subcontracted, and the like. Some EGD firms require that, along with their bid, bidders submit a sample representing the quality and complexity required by the project at hand.

Required submittals indicate which drawings, samples, and other items fabricators are to submit for design review as they produce the project. Submittals required for signage typically include shop drawings, artwork for all sign graphics, material/color/finish samples, product literature, and production prototypes.

Quality/workmanship standards describe general standards for the quality of work to be performed by the fabricator, such as tolerances, accurate fitting of parts, use of nondefective materials and components, production and finish standards, and more.

Materials and products specs indicate specific materials and products the fabricator is to use to produce the project, such as metals (e.g., stainless steel, aluminum, etc., plus specific alloy if necessary for the appearance or integrity of the design), plastics, paints, stock sign components, electronic displays, and so on. If a specific material or product essential to the design of the project is only available from one manufacturer, the material/product name should be specified, along with the manufacturer's name and contact information. Such *proprietary specs* are sometimes frowned upon by clients, necessitating addition of the term "or approved equal" in the proprietary spec.

Fabrication and graphic application techniques specify the techniques the fabricator is to use in producing the sign hardware and graphics, such as how parts are to be attached to each other, seamless or seamed assemblies, types of finishes and coatings, how graphics are applied, and others.

Installation and cleanup indicates how the fabricator is to install the signs and clean up after installation, such as coordinating sign installation locations with other trades or parties, installing signs level and plumb, restoring any adjacent areas damaged by sign installation, removal of fingerprints and dirt from installed signs, and the like.

Phase 4 Goals and Results

The primary goal of the documentation phase is to tie up all the loose ends of the sign program's design, and clearly communicate the program's design intent to sign fabricators, who will be bidding on and then producing the sign program. It's the last design-intensive phase of the design process before the design is handed off to the producer. As such, it's the last chance to finalize all outstanding detail, approval, and coordination issues, to avoid unpleasant—and, often, costly—surprises during the postdesign bidding and fabrication phases.

Phase 4 results in several documents that convey the final design intent to the client and other parties involved in procuring fabrication of the program:

- Final sign location plans
- Final message schedule
- Final sign graphics drawings
- Final sign hardware drawings
- Technical specifications

The EG designer wouldn't have progressed to phase 4 without client approval of big-picture presentations of the program's design in phases 2 and 3; therefore formal design presentations are rare during the documentation phase. Designer-client interaction during phase 4 is usually more in the form of coordination meetings and document review to resolve all the details of the program, culminating in the client's approval to release the design documents for the bidding phase. Coordination between the designer and the client's contracting representative should also occur during phase 4 to prepare for the bidding phase.

Phase 5: Bidding (Postdesign)

Finally, the project has been appropriately documented and the design work is done, for all intents and purposes. Bidding is the first of three postdesign phases in the overall design process, and it's the phase in which official, binding prices are competitively obtained for the sign fabrication contract, and a bidder is selected for the contract. As with previous phases, the formality of the bidding phase depends on the project at hand. On projects outside of the U.S. the bidding phase is sometimes referred to as the *tendering phase.*

Remember, EG designers very rarely procure sign fabrication services because they don't have the hefty financial or legal resources needed to enter into a construction industry contract. Rather, the sign fabrication contract is let by an outside entity who represents the client, such as a GC, CM, or a government or corporate procurement department; therefore, the EG designer's role during the bidding phase can be described as advisory.

After the designer releases the document package to the client's contract representative, it's that representative's responsibility to compile and assemble the overall bid document package, issue the documents for bidding, administer the bid process, evaluate the bids, and award the fabrication contract. Unfortunately, contract reps sometimes leave the EG designer out of the bidding loop. This is a mistake for two reasons. First, the project design firm can provide valuable technical assistance on signage-specific issues during the bidding phase; second, many contract reps don't have experience with signage packages.

Bid phase items on which the design firm can advise the contract rep include:

- Bidder qualification
- Bid form development
- Invitation to bid
- Responses to information requests, including prebid meeting

Developing Better Bid Documents

Mark Andreasson

The quality and pertinence of the information included in your bid documents is the key to a good and fair result. From the fabricators' perspective, there is some essential information that will help them to determine whether they should pursue the project in the first place.

The Basics

Assembled bid documents should include information on the following basic items:

- What date is the bid due?
- Is a prebid meeting required? If so, has it been scheduled?
- What is the anticipated project schedule? When would work be awarded and what is the project completion date?
- Is it a public or private bid?
- Are there any special contract requirements such as tax exemption, bonding requirements, union labor, off-hours work, Minority and Women's Business Enterprise (MBE/WBE) requirements, or owner-controlled insurance programs (OCIP)?

The Bid Form

A standardized bid form provides better control of the pricing information that comes back and aids setup of a precise comparative analysis between bidders. At a minimum, the form should include these items:

- A list of the quantities, by sign type.
- Space for itemized sign type cost and installation cost, on a unit-times-quantity basis.
- Individual line items for taxes, bonds, permits, or any other special considerations, including alternates.
- Space to list any general expenses that would be part of the project costs, regardless of how the quantities may fluctuate—for example: management costs, shop drawings, shipping, travel expenses, and equipment.

The Documents

Specifications

The written specifications should include a clear description of the scope of work. This may include identifying the party responsible for excavation and foundation work, bringing electrical service to the site, electrical tie-in, removal of existing signs, layout of artwork or maps, permit procurement, and so on. Specifications will also encompass vendors and material and process information pertaining to metal alloys, coatings, surface finishes, illumination, adhesives, and the like. Bear in mind that the less control you, as a designer, will have over the final decision about which fabricator will be awarded the work, the more thorough you should be while preparing specifications and drawings.

Sign Location Plans

Sign location plans may not be an essential element at the time of bid; nevertheless, they will help the fabricator understand the site, and thus should be included—if they are accurate. In combination with the message schedule and the bid form, this gives the fabricator the opportunity to cross-check quantities between the three documents.

Message Schedule

The message schedule is an essential tool for the fabricator to reference while preparing pricing. Some of the information contained will tell the fabricator whether a sign has one or more sides with graphics, or how many lines of text it has.

Developing Better Bid Documents continued

Signs that contain individual dimensional letters are usually priced by the letter, so an estimator will need to count each letter in the various messages. The message schedule should also contain a location number that will, in turn, reference the location plan. There are software programs available that will link all this information so that an update in any one document will be captured in all of the relevant documents.

The Drawings

The drawings comprise the primary tool used to communicate the form and spatial relationships among the sign program elements. The more information that can be conveyed through the drawings, the better. The fabricator will be examining the drawings primarily to identify information that has a cost impact—such as color breaks, material thicknesses, relationships between parts, dimensions, face and edge finishes, fasteners, graphic applications, for example, silk-screen, vinyl, digital printing—so every effort should be made to include this level of detail.

Context information communicated in the drawings is also very helpful—how each sign element is intended to interface with the architecture or landscape. Exploded views and perspective drawings are incredibly useful to an estimator, making it possible to quickly understand a design. Moreover, these will help you as a designer, to identify spatial or dimensional problems that may not be obvious in a typical front/top/side view.

As a designer, the most valuable skill you can develop is a thorough understanding of the materials, technologies, and processes involved with the sign fabrication arts. This is the medium in which you work, and the better you understand the materials and the way things go together, the more design options you will have at your disposal. In this way, you become more valuable to both your employer and to your clients.

Mark Andreasson is President of Design Communications Ltd., Boston, Massachusetts.

- Bid review
- Contract award recommendation

Bidder Qualification

Signs are some of the most highly scrutinized objects in the built environment, making bidder qualification a very important step in the design process. Simply put, an inexperienced or poorly equipped fabricator can destroy a sign program's design value and create enormous headaches for the entire project team. Also, many owner reps, while perhaps experienced in general procurement management or in heavy construction trades, lack the means to assess the capabilities of sign fabricators to successfully execute the type of signage project at hand. While the owner's rep has the experience to assess the financial condition of potential signage bidders, the EG designer has the experience to assess their technical production capabilities.

When possible, to achieve a high level of quality control, it's best to have bidders' qualifications reviewed *before* bids are solicited; the project then goes out for bids from a preselected group of quality-screened bidders. Many publicly funded projects, however, require open bidding without regard to prequalification. In such public-funding scenarios, the qualification requirements of the technical signage specs become essential for eliminating unqualified fabricators that have submitted bids.

The designer's role in the qualification process may be as simple as providing a list of sign fabricators with whom the designer has previously worked as potential bidders for the project, usually a minimum of three. Or bidder qualification may entail much more work on the designer's part, such as reviewing qualification literature and information provided by potential bidders, visiting their shop facilities, conducting interviews with them, and contacting their references to assess past performance on similar projects. In either case, the designer should have no affiliations with, nor imply performance guarantees for, any recommended or reviewed fabricator.

Bid Form Development

Bid forms provide a standardized means for all bidders to submit their bids, easing the task of bid comparison and analysis. The EG designer can advise the contract rep on how to devise the bid form for the project, or can provide the bid form to the contract rep. At C&VE, we favor unit pricing for bid forms, since unit prices provide much more information for bid comparison than a single lump sum for the entire fabrication contract.

At their most basic, unit price bid forms are itemized by the unit price for each sign type times the quantity of each sign type, yielding a total price for each sign type and a grand-total, bottom-line price. Of course, there are many variations. Client reps may want any of the following:

- The fabrication and installation costs quoted together on a unit basis for each sign type
- Fabrication and installation costs quoted separately on a unit basis
- Fabrication quoted only on a unit basis, with installation quoted as a lump sum
- Costs quoted with sales tax included in unit prices
- Costs quoted with sales tax as a lump sum

It may be helpful to include quantities for each sign type on the bid form, but with the caveat that each bidder is responsible for verifying all quantities.

Invitation to Bid

The invitation to bid provides specific information to bidders on preparing and submitting their bids. This information can include when and where a prebid conference is held and whether attendance is mandatory, when and where to submit bids, contact information for the contract representative, brief scope of work, bid guarantee period, work completion dates, and any other information that may be pertinent to bidding the project.

Responses to Information Requests

Responses to information requests are just that. Bidders sometimes have questions or need clarifications about the design documents—although generally not too many if the EG designer produced a thorough document package. These questions can come up in a prebid conference, where the EG designer is present to respond, or in the form of official requests for information (RFIs). Bidders are typically required to send an RFI to the owner's representative, who in turn routes the RFI to the EG designer, often via the project architect, if one is involved. The designer then responds via the same channels, usually within a requested time period.

A word about protocol during the bidding phase: To ensure a fair bidding process, all bidders should have equal access to the same information. Accordingly, unless otherwise arranged, the designer should avoid responding directly to any given bidder's questions and route all communication with bidders through the contract rep.

Bid Review

Bid review involves the analysis of the bids submitted by fabricators. The client's rep will usually organize the numerical bid results in some form, such as a table, and the designer should review this information for discrepancies or red flags among the field of bids, such as an unusually high or low unit price for a given sign type, or a wide spread between the lowest and highest bids. The designer should advise the contract rep of such anomalies and have the rep request clarification.

Contract Award Recommendation

The contract award recommendation is typically a joint decision involving the contract rep, the client, and the designer. Depending on the project, factors other than price may play a role in the contract award decision. These factors can include the bidders' conformance with the formal contractual requirements, qualifications, understanding and responsiveness to the project at hand, financial status, as well as others.

Phase 5 Goals and Results

The main goal of the bidding phase is for the client's contract rep to award a contract to a fabricator qualified to produce the sign program at a competitive price. This process involves the contract rep's solicitation, administration, and review of bids, with the EG designer performing an advisory role to the rep and client.

Depending on the project, phase 5 can result in the designer providing or advising on certain documents for the bidding process, such as the bid form, invitation to bid, and responses to information requests.

During phase 5, the designer should also be involved in reviewing the bids received by the contract rep and in contract award decision making. Additionally, the designer should attend the prebid conference and be involved in reviewing the qualifications and capabilities of the bidders.

Even though the designer's role is advisory during phase 5, all parties—including the designer—should feel confident that the selected bidder is capable of fabricating the sign program to the highest-quality standards at the lowest possible price. This sense of confidence is the most important result of phase 5.

Phase 6: Fabrication/Installation Observation

In this second postdesign phase of the design process, the client's contract rep has contracted with a qualified sign fabricator to produce the sign program, and the EG designer's creative solution to the signage problem is physically embodied. This is the exciting moment of truth for the designer, when all the planning, vision, and hard work literally take form.

In the fabrication/installation observation phase (subsequently referred to here as "observation"), the designer reviews the fabricator's work and progress for technical conformance with the design intent, while the contract rep administers the overall mechanics of the contract such as payment schedules, time schedules, coordination of signage with other trades, routing of project communications, and so forth.

In the architectural profession, this phase of the design process is often termed *construction administration* (CA) or, simply, *construction phase services.* Note that the use of the word *administration* is somewhat misleading, because the overall administration of the contract, including payment of subcontractors such as sign fabricators, is primarily the responsibility of the client's contract rep, not the architect. The EG designer's role during this phase is similar to the architect's during the construction phase: observing and reviewing the fabricator's work, and advising the contract rep on its quality and progress in relation to the design intent. Thus, the designer's role is of an advisory rather than an administrative nature (which is why this book uses the term *observation* rather than *construction administration*). That said, the EG designer's role during this phase should, however, be much more active than that of a passive, disinterested observer.

Activities in which the EG designer should be involved during the observation phase include:

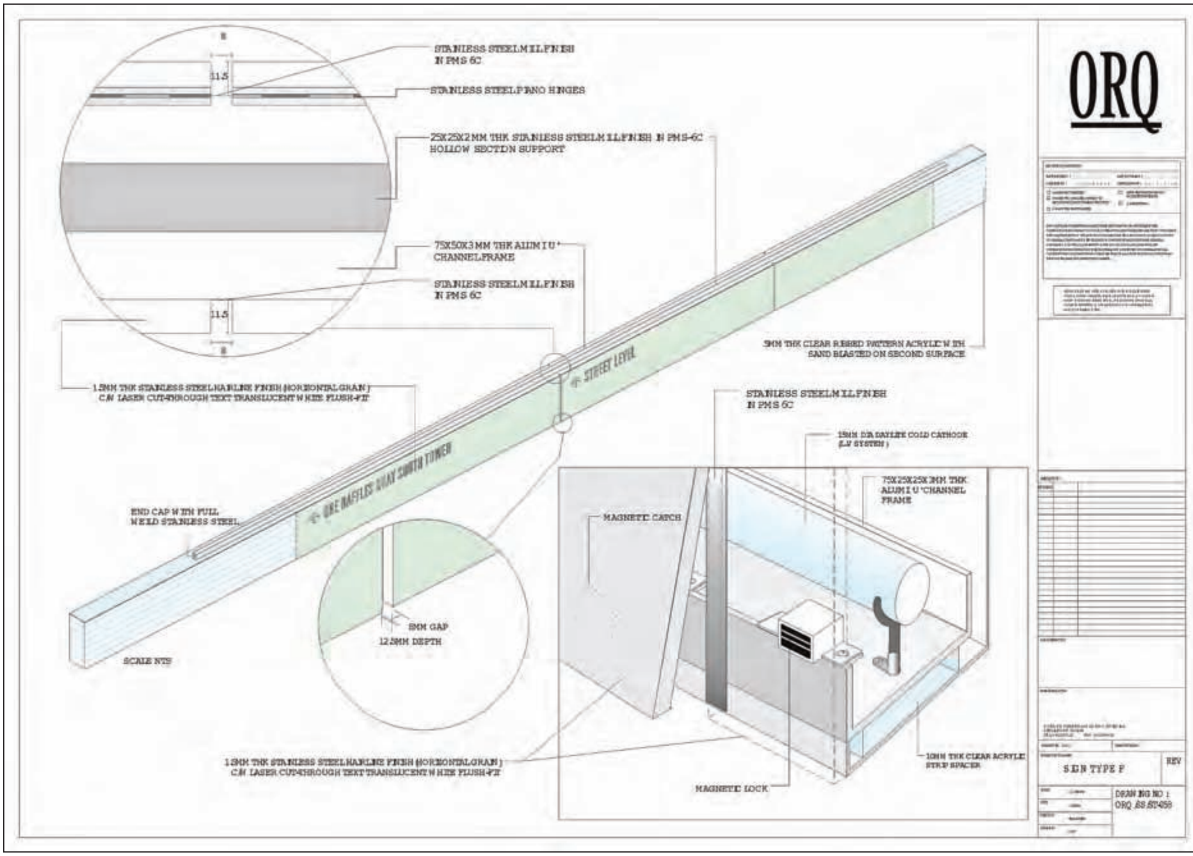
- Coordination meetings
- Submittal review
- Shop visits
- Site visits
- Postinstallation punch list inspection

Although some clients, in an attempt to reduce design fees, request little or no designer involvement during the observation phase, it's important to note that the designer's involvement is a key quality control measure during sign fabrication. EG designers are far more experienced with the details that comprise a signage program, and they have the greatest expertise of anyone on the project team to review and assess the fabricator's fidelity in executing the design intent. Certainly, the designer's involvement may be limited in some of the activities listed, to reduce design fees, but at the very least the EG designer should review all of the fabricator's submittals, which include shop drawings and samples, during phase 6.

Coordination Meetings

Coordination meetings are important tools during the observation phase, starting with a fabrication kickoff meeting at the beginning of the phase, which the client's contract rep, the fabricator, and the designer attend, along with any other interested project team members, such as the client or project architect. The kickoff meeting helps set the stage for an efficient observation phase, covering such items as the expectations and responsibilities of all parties, identification of any potential problem areas, identification of coordination points and processes, definition of project communications protocol, and so on.

After the kickoff meeting, periodic coordination meetings are necessary as sign fabrication progresses, and the designer's involvement with them can vary with the project at hand. In addition to face-to-face meetings, other



2.31

tools can be used for project coordination, such as web conferencing, teleconferencing, e-mail, an FTP site, or dedicated project collaboration websites.

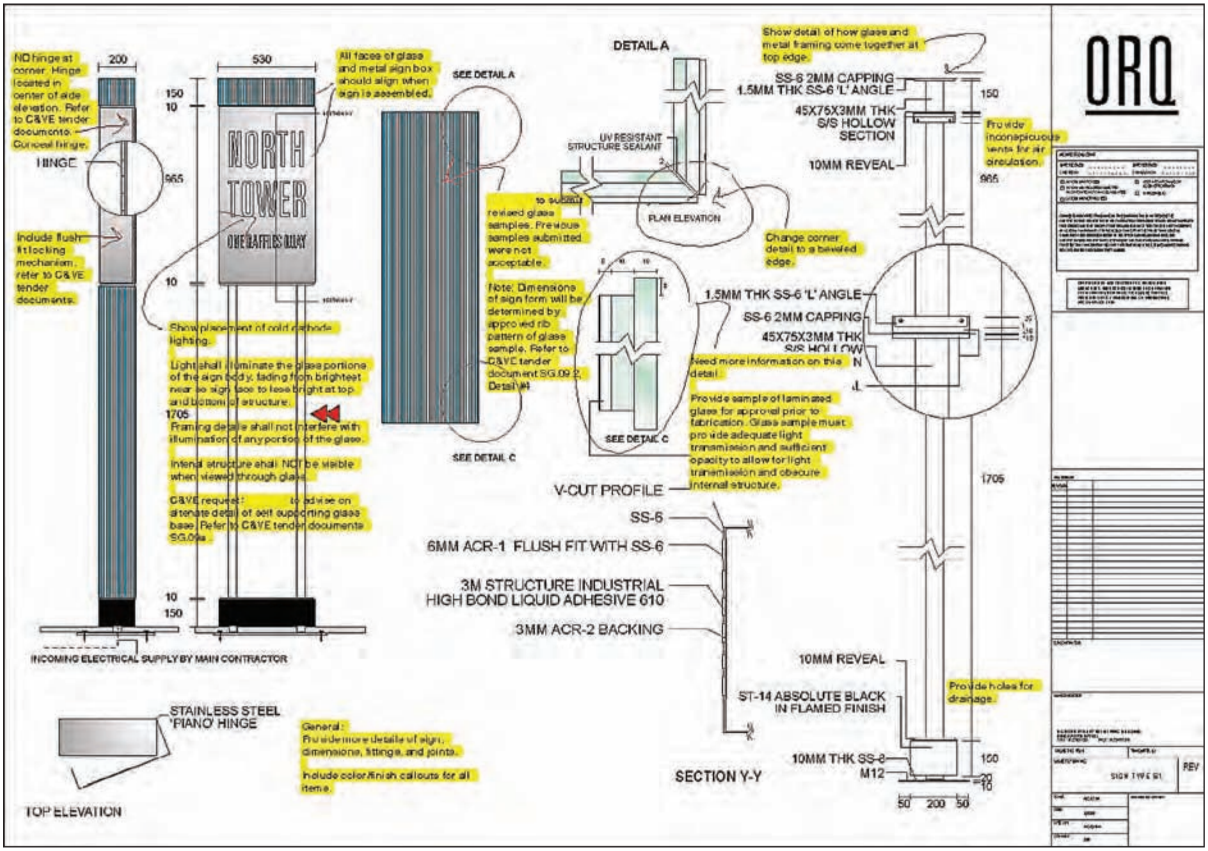
2.31 Observation phase: Shop drawings indicate how the sign fabricator intends to build the signs.

Submittal Review

Submittal review is the key role for the EG designer during phase 6. As noted in the discussion of phase 4, submittals are items the fabricator prepares to indicate how the sign program will be fabricated, and these items are submitted for the designer's review and approval. Submittals required for signage typically include shop drawings, artwork for all sign graphics, material/color/finish samples, product literature, and production prototypes. (See Figures 2.31 and 2.32.)

Each kind of submittal provides a different piece of information about the sign program's fabrication.

- **Shop drawings** indicate how the fabricator will construct and install the signs.



2.32

2.32 Observation phase: Shop drawing marked up with designer's review comments.

- **Artwork** shows the size and layout of graphics for each unique message/sign type combination within the sign program.
- **Material/color/finish samples** show the actual materials, colors, and finishes the fabricator will be using on the signs.
- **Product literature** provides information and specifications on signage components, such as lighting fixtures or digital display units, which the fabricator purchases from outside manufacturers.
- **Production prototypes** are, effectively, samples of the actual, completely fabricated and assembled signs, with one prototype typically provided for each sign type. Obviously, production prototypes are usually submitted after all the other submittals have been approved, giving the fabricator the green light for actually producing the signs on a trial basis. Approved production prototypes then become the quality standard for the remaining production run, and may also be part of the total sign product the fabricator delivers and installs.

2.33

2.34

Submittal review is a checkpoint process that facilitates coordination and helps catch mistakes, inaccuracies, and defects, and resolves misunderstandings before the sign program is built. It's in the best interest of every fabricator to provide meaningful, complete submittals for design approval, because approved submittals indicate that the fabricator is on the right track in interpreting the design intent of the sign program, thereby minimizing the chances of design rejection after the entire program is fabricated.

Most kinds of submittals are sent to the EG designer's office for review via a routing protocol set up for the project. The one exception may be production prototypes, as the prototypes for some sign types may be far too large to transport to the designer's office. Prototypes for smaller-sized sign types, however, can be reviewed in the designer's office. Fabricators are increasingly using digital photos and videos taken in their shop to show fabrication details and progress, but since photos don't show everything, they should be considered adjuncts to—not substitutes for—physical prototypes. (See Figures 2.33 through 2.37.)

The formality of the submittal review process varies from project to project, as does the protocol for routing the submittals. The key is to keep all interested parties in the loop so they're aware of all comments and approvals on all submittals. For this reason, it's best for the fabricator

2.33 Observation phase: A selection of full-size production prototypes created for review and approval.

2.34 Observation phase: Production prototype of exterior pylon sign showing hinged weather-tight cabinet for lighting component access.

2.35

2.36

2.35 Observation phase: Production prototypes demonstrate pylon sign lighting effects.

2.36 Observation phase: Production prototype of a suspended sign shows details of jointing and inset graphics. Note the vertical reveal, which points out, rather than conceals, the joint between the sign panels.

2.37 Observation phase: Production prototype of a suspendered sign shows hinged panel for access to internal lighting components. After the production prototypes are accepted, the full fabrication run commences.

2.37

to issue all submittals to the contract rep, who in turn routes them to the proper parties for review. The routing order is reversed after the submittals are reviewed. Although such protocols can be cumbersome, they are vital, as they help prevent mistakes and misunderstandings by ensuring that all project communication is transparent and that all key players are aware of the status of the submittals. It is definitely bad form for the designer to discuss submittals directly with the fabricator without inclusion of the client's contract rep and/or architect—although in certain cases the contract rep and/or architect will authorize such direct contact.

Even when the design document package for a program is very thorough, many of the infinite details of the sign program are worked out during the observation phase. As such, sign fabrication is a give-and-take process that requires mutual respect between the designer and fabricator, assuming the fabricator is properly qualified. The two must work together to ensure that the design intent is executed as faithfully as possible, and that requires reasonableness—and, sometimes, compromise—on both sides regarding submittals.

The fabricator shouldn't try to "pull any fast ones"—for example, trying to convince the designer that substandard workmanship is within acceptable industry standards. The fabricator should also prepare meaningful shop drawings, which provide an accurate picture as to how the signs will actually be produced with that fabricator's equipment, shop practices, and personnel, rather than an unconsidered rehash of the design drawings. This is now more important than ever, since technology has made it easier for some fabricators to try to pass off design drawing rehashes as shop drawings. Conversely, the designer shouldn't be unreasonably fussy—for example, objecting to fabrication details that don't compromise the appearance or functionality of the design intent.

That said, the designer should review submittals very carefully, for once a submittal is approved it is considered an acceptable standard for fulfillment of the fabrication contract. In most cases, submittals are stamped or tagged with a review stamp that has check boxes for indicating the submittal's approval status. Typically, these boxes are labeled in a range from Approved (outright approval) to Approved as Noted (conditional approval) to Revise and Resubmit to Rejected. Note that some EGD and architectural offices avoid the use of the word *Approved* on their stamps because it may imply the designer's guarantee of the fabricator's performance; in such cases, a less definitive word, such as *Reviewed* or *Accepted*, may be used. Depending on project protocol, the review stamp may belong to the EGD office or to another firm on the project team, such as the architect, or the review stamps of both may be used. In addition to the status check boxes, the review stamp typically contains a disclaimer of the reviewer's responsibility, along with spaces for the reviewer's signature and review date.

The review stamp status is accompanied by any applicable review comments written on the submittal. On paper submittals, such as shop drawings and graphics artwork, the drawings are typically marked up with review comments in red pencil—hence the terms *markups* and *red lines* for reviewed drawings. On some projects, other project team members, such as the architect, will mark up the drawings with comments additional to those of the EG designer. It is becoming more common for EG designers and architects to "mark up" electronic versions of the drawings rather than paper prints, by using Adobe Acrobat Pro or a project collaboration application. Figure 2.32 shows a marked up shop drawing.

It's rare for all the various submittals on a signage program, particularly shop drawings and graphics artwork, to be accepted, outright or conditionally, on the first round. It's often a process of revise and resubmit based on the design review comments, or, less commonly, outright rejection, when a submittal is so off-base that it doesn't even warrant the EG designer's time and consideration. The key is that the fabricator is required to resubmit, in a timely manner, each submittal item until it is accepted. As such, the resubmittal process can become a war of the wills, which requires judiciousness—and, sometimes, compromise—on behalf of both designer and fabricator.

Shop Visits

Shop visits are performed during the course of fabrication to observe the quality and progress of sign production in the fabricator's shop. The need for and number of shop visits varies with each sign program. Smaller, relatively simple programs, with just a few sign types that are physically small in size, may not require shop visits since production prototypes can be sent to the designer for review. Larger, more complex programs, with many sign types that are too large in size to transport to the designer, may require several shop visits. The use of digital photos and videos to indicate shop details and progress can help reduce the number of shop visits. (See Figures 2.38 and 2.39.)

When shop visits are warranted, they are conducted by the EG designer, often accompanied by the contract rep and/or the client. The purpose of the first shop visit is typically to review production prototypes, although on some larger projects the first shop visit may be devoted to project coordination and review of other kinds of submittals. The need for additional shop visits varies with each project, but if only one shop visit is covered in the design budget, it's most effectively allocated to production prototype review, during which the designer can discuss any design or fabrication issues directly with the shop-floor personnel involved in building the prototypes.

2.38 Observation phase: Steel molds were constructed for production of the monumental cast glass letters

2.39 Observation phase: One of the monumental site identification letters being cast.

2.38

2.39

The observations and conclusions of shop visits are documented in a memo or the meeting minutes, often with digital photos incorporated, which can be recorded by the EG designer, the contract rep, or the fabricator. In projects where the records of shop visit(s) are produced by others, the designer should review them for accuracy and completeness before they are distributed to the project team.

Site Visits

Site visits are typically concerned with coordinating sign installation, such as verifying sign locations and mounting heights, and coordination of sign installation details with the adjacent site conditions. As with shop visits, the need for and number of site visits varies with the sign program's size and complexity. Site visit participants can include the EG designer, contract rep, client, and other members of the project team, such as the architect. Digital photos of specific sign location conditions can be sent to the project team to coordinate installation with fewer team members needed at the site. The observations and conclusions of site visits are documented similarly to shop visits.

Postinstallation Punch List Inspections

Postinstallation punch list inspections are also site visits, but now the EG designer and/or contract rep walks the project site to inspect the signs after they've been installed, and enters any defects onto what is

2.40

2.40 Observation phase: A finished pylon sign installed onsite still wears some of its blue protective sheathing.

2.41

2.41 Observation phase: Uncrating and inspecting the monumental cast glass letters.

termed a *punch list*—which is why this inspection process is also called *punching out.* On projects outside of the U.S. a punch list is sometimes referred to as a *defects list.* On some projects, the fabricator may accompany the punch lister(s) for at least part of the inspection. (See Figures 2.40 through 2.42.) Note that the term *defects*, as used here, includes not only fabrication defects but a whole host of other problems such as missing signs, signs damaged in shipping, signs mounted crooked or in wrong locations, sign installation damage to adjacent construction, and others.

The message schedule, which already exists as a complete itemized inventory of every sign in the program, can be readily adapted for punch list comments, including the insertion of digital photos of problematic signs. The contract rep forwards the completed punch list, often accompanied by a memo summarizing general comments, to the fabricator to make any necessary corrections to the defective signs.

On a large signage program, the punch list inspection can be very time-consuming—and exhausting—so it's important to point out that the design budget may not accommodate the EG designer performing an exhaustive inspection of each and every sign. In some cases, the design budget may not accommodate *any* onsite inspection by the EG designer.

There are, fortunately, some ways to adhere to the design budget in such instances. For one, the designer could inspect all of the signs that receive

2.42

2.42 Observation phase: A construction worker inspects the partially completed installation of the monumental cast glass letters.

the most public scrutiny and just spot-check the less noticeable signs. Or the designer and the contract rep or client can spend a day together spot-checking each sign type, with the designer pointing out what to look for and then handing off the inspection of all the remaining signs to the contract rep or client.

Digital photos that show the completed signs as installed are helpful and can actually be proof of work done for payment. Site visits may not be possible on projects with limited design budgets, so photos may be the only way to ascertain how well the fabrication and installation was done.

As with submittal review, the punch list inspection requires reasonableness and, sometimes, compromise. The punch lister needs to know where to draw the line between acceptable and unacceptable products, so the punch list can become an instrument of negotiation. There's also the thorny issue of signs that have been damaged by other trades after the signs were installed but before they were punched out. For this reason, the sign program should be punched out as soon as possible after installation.

After the fabricator has taken action to remedy any defects, the corrected signs should be punched out in a follow-up inspection. This inspection is best performed by the designer, but can also be handled by the contract rep or client, if necessary, aided by digital photos sent to the designer. After all the work is completed to everyone's satisfaction, the contract rep arranges the final payment to the fabricator, and the new sign program is up and running! It's time for congratulations, handshakes, and professional photography to document the final product of the signage design process.

Phase 6 Goals and Results

The main goal of the observation phase is to observe and review the fabrication and installation of the sign program. It is the contract rep who handles the general administration of the fabrication contract, with the EG designer taking on the dual roles of advisor and facilitator on the technical issues relating to the fabricator's fulfillment of the design intent.

Phase 6 should result in the EG designer participating in activities that provide review checkpoints for the sign fabricator's quality, progress, and fulfillment of the design intent. These activities include coordination meetings, submittal review, shop visits, site visits, and post installation punch list inspections.

At the very least, the designer should be thoroughly engaged in submittal review and approval, providing review comments and acceptance status marked up on the submittals. The designer's involvement is also key to more effective coordination meetings, shop and site visits, and punch list inspections. Depending on the project, the designer may also be involved in providing coordination memos and meeting notes.

Phase 7: Postinstallation Evaluation

The signage program solution that took so long to evolve, to become reality, has been built and installed and is, everyone hopes, a huge success. It might seem, then, that the design process has been concluded in the observation phase and that it's time to move on to another project. Not so fast. Whether formally or informally, paid for by the client or not, every design solution should be evaluated.

In phase 7, the EG designer evaluates the effectiveness and functionality of the operational signage program. The major goal of evaluation is to learn which aspects of the signage program are successful and which aspects, if any, could use improvement. The results of the evaluation phase of a given sign program can be applied to both the program at hand and to other programs the EG designer develops in the future.

It should go without saying that, in fact, evaluation takes place throughout the design process, as various solutions and processes are explored, considered, presented, and either selected or rejected. But only after installation can the sign program as a whole be evaluated in its real-world environment.

Most often, evaluation takes place informally and without the direct involvement of, or compensation to, the designer. So how can the designer obtain evaluation input? The two most basic ways are through client feedback and direct observation. After living with the operational sign program—and people's responses to it—for a while, the client gains insights into the program's strengths and (ideally, few) weaknesses. Accordingly, it's useful to contact the client a few months after the sign program is installed to request the client's assessment of the program's effectiveness. At this point, the client may commission the designer to develop any additional signage or make any modifications to the in-place signage that may be needed to fine-tune the program.

The designer can also visit the project site and directly observe how people interact with the sign program and how the program fits with its environment. This approach may also include interviews with site staffers who interact with the site's users. The depth and formality of the direct observation approach tend to depend on the geographical distance between the project site and the design office and on whether or not the designer is being compensated by the client for assessing the project.

Phase 7 Goals and Results

The primary goal of the evaluation phase is for the EG designer to learn how effectively the sign program solution functions in its operational environment. Phase 7 results in insights and findings that can be applied to the sign program being evaluated, as well as to other sign programs developed by the designer.

As noted, the designer may or may not be compensated for performing an evaluation of the sign program, and this tends to determine the depth and formality of the assessment. In either case, client feedback and direct observation are helpful evaluation tools. If the designer is being compensated for phase 7, a report may be produced that summarizes the conclusions and recommendations of the evaluation process. In any event, after the sign program has been operational for a period, the client may engage the designer to fine-tune the program with additional and modified signs.

Chapter Wrap-Up

That's it for the design process. It's quite a journey, even when delineated in somewhat simplified form, as in this chapter. And no two projects are ever quite the same, so it has myriad variations and nuances.

Design is an evolutionary, creative, problem-solving process, so plan thoroughly, don't jump the gun, keep the ideas flowing, and follow through on everything. From the initial project research to conceptualization to development and documentation of the design to advising on bidding and fabrication to evaluating the final sign program, the design process involves a lot of work. It makes concepts become reality and, ideally, results in a successful sign program—and, perhaps, lasting friendships with other members of the project team.

3

Overview of the Signage Pyramid Method

Making the complex simple by using a systematic approach.

As explained in Chapter 2, "The Design Process," the design of a comprehensive signage and wayfinding program is a very complex undertaking, more complex than most people—including those in the broad-spectrum design community—might imagine. So how can EG designers approach a signage problem and begin to chase down a successful solution? By using the Signage Pyramid, a methodology we outline in this chapter and delineate further in the next three chapters. It is an effective, systematic, proven approach to mediating the problems and subproblems associated with the design of a comprehensive static signage program.

Chris Calori initially developed the Signage Pyramid approach in her graduate school studies and thesis, and we have since noodled with and fine-tuned it through years of practice at our design office. Although many people think we're crazy to share this proprietary tool with our fellow designers (and competitors!), with the first edition of this book, the time had come to contribute it to the growing body of knowledge about EG design.

As pointed out in Chapter 1, when Chris developed this approach, the terms *signage* and *environmental graphic design* were just coming into use, and the field was just progressing from its infancy to toddlerhood. The Society of Environmental Graphic Designers, now the Society for Experiential Graphic Design (SEGD), had been formed a few years prior to Chris' graduate studies, and very little information was available on how to approach EGD problems. The notable exception to this knowledge gap was the groundbreaking book *Architectural Signing and Graphics*, written by esteemed pioneers of the field, John Follis and Dave Hammer, in 1979.

Genesis of a Design Approach

In our professional careers, after receiving our undergraduate degrees, we gravitated from two-dimensional print to three-dimensional signage design because we found the 3D aspect of signage to pose more interesting design challenges than print work. Chris' first foray into the signage world was as a member of a design team that was developing the signage for a large, new international airport being built overseas. The team consisted of graphic designers and architects working within the corporation that was designing and building the airport.

In the early phases of that project, the signage team focused primarily on the design of the sign graphics, based on a limited list of messages, and the sign objects that would display those graphics. During the design development phase, the team began to develop the actual sign messages and locations that would be needed for people to find their way through this very complex airport environment. In the process, the number of messages that had to be displayed on the signs grew from one to many, and this required a fundamental alteration in the design of the signs from the one conceived during the schematic design phase. Chris somehow believed that this amount of backtracking shouldn't be necessary, and so decided to take her budding professional EG design experience to graduate school to analyze what's involved in EG design and to figure out a way to approach it more seamlessly. Thus, the Signage Pyramid approach was born.

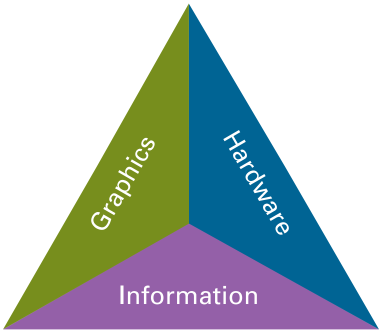
The Signage Pyramid's Component Systems

During Chris' graduate ruminations, she deduced that the primary purpose of a sign program is to communicate information about a given environment to users of that environment, and that that information is conveyed via graphics displayed on physical sign objects or hardware. From that, she came to realize that the design of a signage program is composed of the design of three constituent yet interrelated systems, as shown in Figure 3.1:

- The Information Content System
- The Graphic System
- The Hardware System

Comprehensive sign programs consist of many types of signs, from large exterior freestanding pylons to small interior wall-mounted plaques. A key design problem is how to create a unified family resemblance, both informationally and visually, among all the various types of signs in a comprehensive program. The Signage Pyramid does just that: It provides a balanced, three-prong solution to this problem.

Basically, the Signage Pyramid approach is a classic divide-and-conquer strategy for solving a complex problem. By breaking down a complicated,



3.1 The three components of the Signage Pyramid model.

3.2 The information content system consists of sign messages, sign locations, and their interrelationships.

nebulous, seemingly insurmountable signage problem into its component parts, each of those parts can be more readily solved. The Signage Pyramid method views all signage programs as composed of the three distinct but interactive systems, itemized above, that must be balanced in the design process. Each of these systems is outlined briefly here.

The Information Content System

The communication of information is the functional essence of any signage program; therefore, the information content system consists of:

- What information is displayed on the signs
- How the sign messages are worded
- Where the sign information is located
- How the messages and locations of the various signs in the program relate to each other in a consistent, cohesive network of information

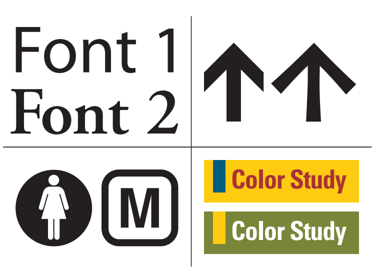
Figure 3.2 represents the information content system component of the Signage Pyramid.

The Graphic System

The graphic system is the two-dimensional vehicle that visually encodes and displays the information content system. The graphic system consists of:

- What two-dimensional graphic elements—typography, symbols, arrows, and color—are used to encode the sign information
- How the graphic elements are arranged into layouts, to organize the information content, emphasize messages, and create a visual identity
- How the graphics are applied to signs

Figure 3.3 represents the graphic system component of the Signage Pyramid.



3.3 The graphic system communicates the information content of a signage program using two-dimensional graphic elements and their arrangement into layouts.

The Hardware System

The hardware system is the collection of three-dimensional, physical sign objects that display the sign information as encoded by the sign graphics. The hardware system consists of:

- The three-dimensional shapes of the signs
- The sizes of the signs
- How the signs are mounted or connected to other environmental objects

- The materials, coatings, finishes, and lighting techniques used
- The stylistic relationship of the sign objects to one another and their surroundings

Figure 3.4 represents the hardware system component of the Signage Pyramid.

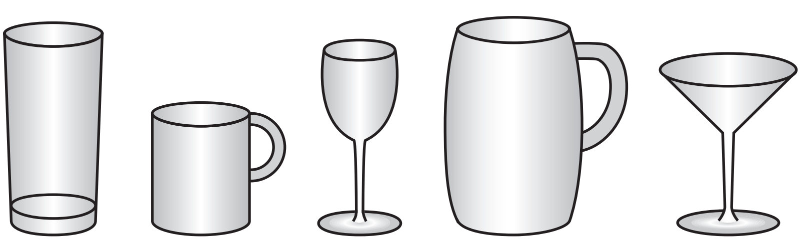
3.4 The Hardware System consists of the three-dimensional physical objects—their shapes, structures, arrangements, and materials—that display the sign graphics and information.

System Roles

Each of these systems plays a distinctive role in the development of a sign program, yet they all interact with each other. The information content system is the underlying reason for a sign program to exist. Sign information is not tangible, per se; it's the raw communication material that makes a sign program work. In this respect, the information content system can be thought of as the software of a sign program—you can't see it or touch it but the sign program wouldn't be functional without it. In contrast, the graphic and hardware systems exist to make the program's information content visible and concrete in the built environment.

Given that the information content system is the bedrock of a sign program, the development of this system—often called *programming*—is a more planning-oriented than design-oriented activity. As such, the information content system should be mapped out and planned before design of the graphic and hardware systems begins in earnest. Why? Because any design activity will be somewhat meaningless and, therefore, wasted if the extent of the information content system, for which the graphic and hardware systems are being designed, is unknown.

Take, for example, the design of a drinking vessel as a very simple analogy: The type of liquid content—whether water, coffee, beer, wine, or a cocktail—and the quantity of liquid it can contain will, obviously, have a profound influence on the design of the vessel. (See Figure 3.5.) Should it be thick- or thin-walled, stemmed or not, large or small, glass or ceramic or plastic, equipped with a handle, and so on? Without knowing the intended contents, the designer would very likely spend a lot of time designing a vessel that's completely inappropriate to its required function.



3.5

3.5 Just as the kind and quantity of liquid content affects the design of a drinking vessel, the kind and quantity of information content affects the design of a signage program.

The same applies to designing a sign program's graphic and hardware systems before the EG designer has developed the information content system.

Accordingly, the information content system is the foundation, the planning that needs to be substantially in place before design of the graphic and hardware systems commences. Thereafter, design of the graphic and hardware systems takes place concurrently, in a back-and-forth manner. Additionally, the information content system may be further refined or tweaked as design of the graphic and hardware systems progresses.

System Interactivity

So much for the differences between the three systems of the Signage Pyramid; now, how do they interact? The information content system is the bedrock, the raw informational material that is communicated by the graphic system, which in turn is displayed on the hardware system. Let's examine a few examples of this interaction. For starters, sign locations and messages, part of the information content system, have a profound effect on the size of the graphics for a given sign, as determined by factors such as reading distances for the graphics and the length and quantity of messages. The size of the sign graphics, in turn, affects the size of the sign hardware that displays the graphics.

The sign location aspect of the information content system can also directly affect the hardware system, in that the location of a given sign can determine how large the sign object can be and how the sign is mounted; sign size and mounting are primary formal factors in the hardware system. The graphic and hardware systems interact in terms of visual appearance factors, such as style and color. There are many other ways in which the three systems of the Signage Pyramid interact with each other, as will be seen in Chapters 4 through 6.

The Signage Pyramid method that this book delineates for designing static signage programs can also point to an approach to digital information systems. In this approach, the digital realm's information content system would be the information being communicated, the graphic system would visualize the information in 2D graphics and/or video, and the hardware system would deliver and display the information on 3D electronic screens.

The Signage Pyramid and Resource Allocation

There's no doubt that all design activity, including EG design, involves a certain amount of backtracking—one step backward for each two or three steps forward—as the designer progresses from initial concept to final product. But the Signage Pyramid approach can help reduce the amount of backtracking encountered when solving complex signage problems, and this translates into more efficient use of the EG design team's time and, therefore, design budget.

At the outset of any EG design project, there's a big temptation, on behalf of both the designer and the client, to rush into creating design concepts—that is, the pretty pictures for sign graphics and hardware. But too often this just results in finding out later that the concepts won't work at various sign locations or for the quantity and nature of information various signs need to contain. Don't fall prey to this temptation! Keep in mind, the sign information content system is intangible, meaning it doesn't lend itself to sexy visualizations; nor is the planning of this system as creative as design of the graphic and hardware systems. But, by gritting your teeth and tackling the information content system first, you'll find the subsequent design of the graphic and hardware systems to be far more focused, hence effective.

Think of trying to design a book or a website without having the information—or at least a good idea of the information—these items are to contain. Without the content, designing that book or website would be a waste of time, because the design of these items is so intrinsically linked to the quantity and nature of the information they contain. The same holds true for designing a signage program: It's a waste of both time and money to design the program's graphic and hardware systems without the informational content.

Not only can the Signage Pyramid approach help allocate design resources and budgets, it can also help in the allocation of fabrication budgets. The way the information content system affects fabrication budgets is essentially a numbers game: The more sign units required to communicate the sign information, and the bigger the signs must be to hold all the required information, the more expensive the job will be to fabricate. The point? Take care not to oversign an environment.

The graphic and hardware systems affect fabrication budgets differently. Generally speaking, sign quantities and sizes aside, more of the cost of fabricating a sign is tied up in the three-dimensional hardware system than the two-dimensional graphic system. This is due to the cost of the hardware system's raw materials, such as aluminum and steel; the cost of working those materials into the final sign objects; and the cost of installing the sign objects at the project site. In a freestanding overhead freeway sign, for example, most

3.6

3.7

3.6 and 3.7 Examples of graphics-driven signs, in which decorative graphic patterns and treatments enliven flat, rectilinear sign hardware panels.

of the cost goes into building and installing the three-dimensional hardware structure that supports the sign panel that displays the message graphics—even though, often, these sign panels contain only a few words! In general, the simpler the detailing of the hardware system forms, the less expensive are the sign objects to fabricate. For example, a flat sign panel is cheaper to produce than a curved one. Rich detailing of the graphic system, however, has less impact on fabrication costs. (See Figures 3.6 through 3.8.)

These facts can help the EG designer allocate fabrication budget resources. If the fabrication budget for a given project is limited, the EG designer may consider designing the sign program to be driven by the graphic rather than the hardware system. In such a case, the sign graphics are the primary design feature, as applied to simple, flat sign panels, or directly to walls.

3.8

3.8 Flat graphics, whether as appliqué, wall covering, or paint, applied directly to wall surfaces create visual impact at less expense than three-dimensional graphics or detailed sign hardware.

3.9 and 3.10 This program featured a single monument sign as a centerpiece, whereas other, more commonplace signs have a related but simpler palette of materials and details.

Another strategy for allocating limited fabrication budgets is to concentrate the more expensive hardware system details on a few, highly visible showcase or centerpiece signs, and design the rest of the signs in the program with simpler hardware system details. (See Figures 3.9 through 3.12.) The key in such cases is to maintain a formal resemblance among all the sign objects in the program's hardware system—from the splashy showcase signs to the less obvious room number plaques, for example.

3.9

3.10

3.11

3.12

3.11 and 3.12 Limited fabrication budgets can be stretched by concentrating higher-end materials and details into a showcase or signature sign element that becomes the focal point for the other signs in a program.

Chapter Wrap-Up

This chapter has provided an overview of the Signage Pyramid method for approaching the design of a signage program. This model divides and conquers the complexities of a signage problem by splitting it into three different yet integrated systems that are more readily managed and solved. These three component systems are the information content, graphic, and hardware systems.

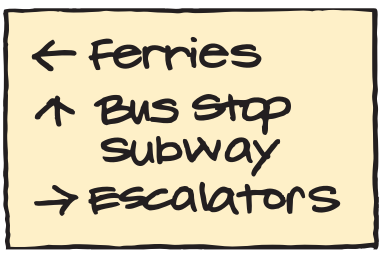
This chapter has also stressed the importance of *planning* a sign program's information content system before *designing* its graphic and hardware systems, and has explained some of the ways in which these systems interact.

Finally, this chapter has described how the Signage Pyramid method can aid in the allocation of both design and fabrication budget resources. The next three chapters are devoted to a detailed explanation of each of the component systems of this model, with the aim of providing the EG designer with the tools to effectively solve even the most complex signage problems.

4 The Information Content System

Signs are meaningless without information.
What good is a blank sign?

Signs exist for one purpose and one purpose only: to communicate information to people about their environment. (See Figure 4.1.) Unlike other objects intentionally placed in the built environment such as light fixtures, walls, flooring, landscaping, and so on, signs literally speak to people, in that they convey meaningful information that people, in turn, act upon. In this respect, a sign is one of the few truly interactive elements of the built environment. And because people have to engage in the act of reading the information on signs, signs also are among the most scrutinized objects in the built environment. Other environmental objects, by their very form and existence, may connote an inherent message (e.g., a fence or high wall connotes "stay out"), but they do not do so in a literal, denotative manner as do signs. (See Figure 4.2.)



4.1 The information content system.

Put simply, a sign program's information content system consists of what the signs say—the information they communicate—and where

4.2

4.2 Spikes added to standing pipes wordlessly connote "Don't sit here."

that information is located in the environment. The information content system of a signage program can be compared to the operating system of a computer. Like all those unseen 0s and 1s in a computer program, the information content system makes the sign program function; indeed, it is the essence of signage, but it's intangible, in that it doesn't take physical form. Put another way, a sign program's information content system is the program's communication infrastructure, the network of content that links all the signs in a program together informationally.

As explained in Chapters 2 and 3, it's essential to plan and develop the information content system—an activity often called *programming*—early on in a project. Programming is critical because before meaningful design activity for the graphic and hardware systems can take place, the EG designer has to have a good idea of the amount of information each sign will display, the physical conditions of each sign's location, and the viewing conditions for each sign.

Unlike other graphic design projects, it's typically the responsibility of the EG designer to take the lead in formulating the informational content of a signage program, with the input and approval of the client. In contrast, in collateral, Web, advertising, and other graphic design projects, the informational content—at least text content—is typically provided by others, such as professional copywriters.

Why do EG designers generate the informational content for sign programs? Because they possess the skills to analyze a site's plan, its circulation paths, and the informational needs of its users, all necessary to map out where signs are needed and the kinds of information content the signs should convey. More conventional content providers, such as copywriters, do not possess these skills.

It's important to reiterate that information content system development consists primarily of locating signs and generating their messages. Typically, the EG designer plays a lead role in locating signs, with the EG designer and the client playing a mutual role in the formulation of the sign messages. In some projects, the sign message content may be almost entirely developed by the client, with the guidance of the EG designer; in other projects, the sign message content may be almost entirely developed by the EG designer, with the client's advice and approval.

Kinds of Sign Information Content

The information content system serves many functions in a signage program and provides many kinds of informational content. For example, in wayfinding signage, the information content system is the "breadcrumb trail" that helps people find their way through an

4.3 A permanent "breadcrumb trail" in the brick paving of Boston's Freedom Trail.

4.4 Identification signs confirm that "you have arrived" at a destination, such as this sculptural building address number for an office park in Westchester County, New York.

environment. (See Figure 4.3.) The various types of informational content communicated by signage are categorized in this section, along with an indication of who may generate the message content and locations for each type of information. In a comprehensive signage program, all or many of these kinds of information will be displayed on the program's various sign types. But before we delve into these categories, keep in mind that every signage program and every EG designer is different, so some EG designers may use different terms than the ones used here to

4.3

4.4

refer to the various kinds of sign information content. Additionally, some of these informational content categories may overlap.

- **Identification** signs are located at a destination to identify that destination or place in an environment. Identification signs confirm that "you have arrived" at a destination, and they may or may not have directional signs leading to them. Identification sign message content—that is destination names or room numbering systems—may be generated by the EG designer and/or the client. Identification sign locations are typically mapped out by the EG designer. Message content and locations for identification signs related to life safety and accessibility are often mandated by code authorities. (See Figures 4.4 and 4.5.)
- **Directional** signs are located remotely from destinations to direct people to the various destinations within a given environment.

4.5

4.5 Identification and directional information combined on a single sign panel at a Virtua Health Systems hospital.

4.6 Directional signage guides drivers to civic facilities and major highways in the City of Summit, New Jersey.

Directional signs are also often referred to as *wayfinding* signs because they help people find their way to destinations. Directional signs almost always display arrows to point out specific paths—such as, left, right, straight ahead—to destinations. Directional sign message content—that is, destination names—may be generated by the EG designer and/or the client. Directional sign locations are typically mapped out by the EG designer. Locations and message content of directional signs related to life safety and accessibility are often mandated by code authorities. (See Figures 4.6 and 4.7.)

4.7

4.7 Primary and secondary directional signs at Lambert-St. Louis International Airport's long-term parking facility.

- **Warning** signs alert people of hazards or safety procedures within an environment. Two common examples are Danger: High Voltage; and In Case of Fire, Use Stairs Unless Otherwise Instructed. Warning sign message content and locations may be developed by the EG designer and/or the client, and often are mandated by code authorities. (See Figures 4.8 and 4.9.)
- **Regulatory and prohibitory** signs are intended to regulate people's behavior or prohibit certain activities within an environment. Two common examples in this category are Authorized Personnel Only and No Smoking. Regulatory and prohibitory sign message content and locations may be developed by the EG designer and/or the client, as well as mandated by code authorities. (See Figures 4.10 and 4.11.)

4.8 Statutory information including an egress diagram, smoking prohibition, and accessible area information is combined on a floor directory sign at Ocean Financial Centre in Singapore.

4.9 Warning sign for the One Raffles Quay office tower complex in Singapore.

4.8

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4.10 Regulatory/prohibitory sign for the National Mall in Washington, DC.

4.10

- **Operational** signs inform people about an environment's use and operations, thus may often be quite detailed, requiring some time to study and absorb. One example is directory signs, also called directories, which list the location of tenants within an environment, often accompanied by a locator map. Other examples include signs listing days and hours of operation, such as for a retail store; and the All Visitors Must Be Announced signs, which are ubiquitous in Manhattan apartment buildings. Message content and locations for operational

4.11

4.11 Regulatory/prohibitory sign on the beach at Sentosa Island resort in Singapore.

signs may be generated by the EG designer and/or the client. (See Figures 4.12 through 4.14.)

- **Honorific** signs confer honor on people associated with an environment. A prime example is donor signage, which displays the names of financial benefactors of a site or facility. Another example is a building cornerstone, which typically displays the date of erection, along with the names of the building's developers, architects, and

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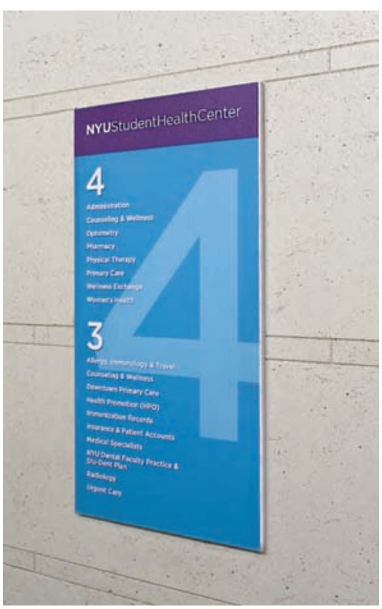
4.13

4.12 Operational signage explains use of municipal parking lots in the City of Summit, New Jersey.

4.13 Operational sign announces security procedures at Philadelphia's Cira Centre office tower.

4.14 Operational signs, such as this directory at a university health center, often display detailed information that requires close study.



4.14

other notables. Honorific signage is most common at institutional and civic sites and facilities. The message content for honorific signage is typically provided by the client, but sign locations may be mapped out by the EG designer or the client. (See Figures 4.15 and 4.16.)

- **Interpretive** signage helps people interpret the meaning of an environment, or places within it, by providing information on its history, geography, inhabitants, artifacts, and more. Examples include plaques that commemorate the event(s) that took place at a historical site, such as a battlefield, and signs that provide information about the animals at a zoo or aquarium. Research—often quite scholarly and detailed—is usually required to develop the information content for interpretive signage, and the research, content development, and locations of interpretive signs may be undertaken by the EG designer, the client, and/or experts in the subject matter of the interpretive program. (See Figures 4.17 and 4.18.)

Hierarchy of Content

Not all informational content is equal in a signage program. Some sign messages and locations are more important than others; therefore, the designer must impose a hierarchical ranking on an environment's sign messages and locations, based on relative importance. In this process, signs are ranked in regard to whether the information they display is primary, secondary, tertiary, or even less important. The general principle is that the more important the information, the higher the rank. This, in turn, translates into the size of the graphics conveying the information and, correspondingly, the size of the sign itself. Logically then, signs

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4.15 Honorific signage includes donor recognition signage such as this "woven" pattern of individual wall panels.

4.16 Donor recognition wall honoring the benefactors of a Virtua Health Systems facility denotes various donor categories and enlivens a long hallway.

4.17 Interpretive signage provides information on ocean fish at the Temaiken Bioparke in Argentina.

4.18 Interpretive panels on the opposite side of map signs for Washington, DC's citywide signage program inform visitors and residents about neighborhood points of interest.

communicating primary information are larger than those communicating secondary information, and so on. Additionally, the ranking of the information determines how visually prominent the sign that displays it should be. Generally speaking, the higher up a sign is displayed, within limits, the more visually prominent it is. (Chapter 6, "The Hardware System," has more on sign mounting heights.)

4.17

4.18

There are two basic, related reasons why a sign information hierarchy is necessary:

- To enhance communication effectiveness
- To conserve space on sign faces

Regarding the first, communication effectiveness, consider an airport terminal, which has many destinations, some of which are more important to a greater number of people than others. For example, more people will be seeking out check-in, gate, and baggage claim areas (primary destinations) than the nursery (secondary or tertiary destination). To give all of these destinations equal importance on a primary directional sign—or, indeed, even to include all of them on such a sign—leads to information overload and communication breakdown. Particularly with directional signs, which often list multiple destinations, there is a limit to how much information people can absorb while moving through an environment, especially if they are in vehicles.

A similar circumstance occurs with signs displaying content other than directional information. Continuing with the airport example, it would be confusing if the airport's hours of operation were signed with the same prominence as the check-in area or other major destinations. Similar confusion and overload would arise if the nursery and janitor's closet were identified as prominently as the gate numbers.

Related to communication effectiveness, sign information hierarchies help conserve sign space. As the old saying goes, "You can't pour 10 pounds of flour into a 5-pound sack." The amount of space a sign has for the display of information is often constrained by various physical site factors, such as low ceiling heights, which limit the height of overhead signs to allow adequate vertical clearance for people or vehicles to pass underneath. A sign that's limited in size is also limited in informational capacity; therefore, it should not contain messages other than those that are the most important. Even where there are fewer physical site constraints on sign face size, loading too much information on a sign is dysfunctional.

Developing the Sign Information Content System

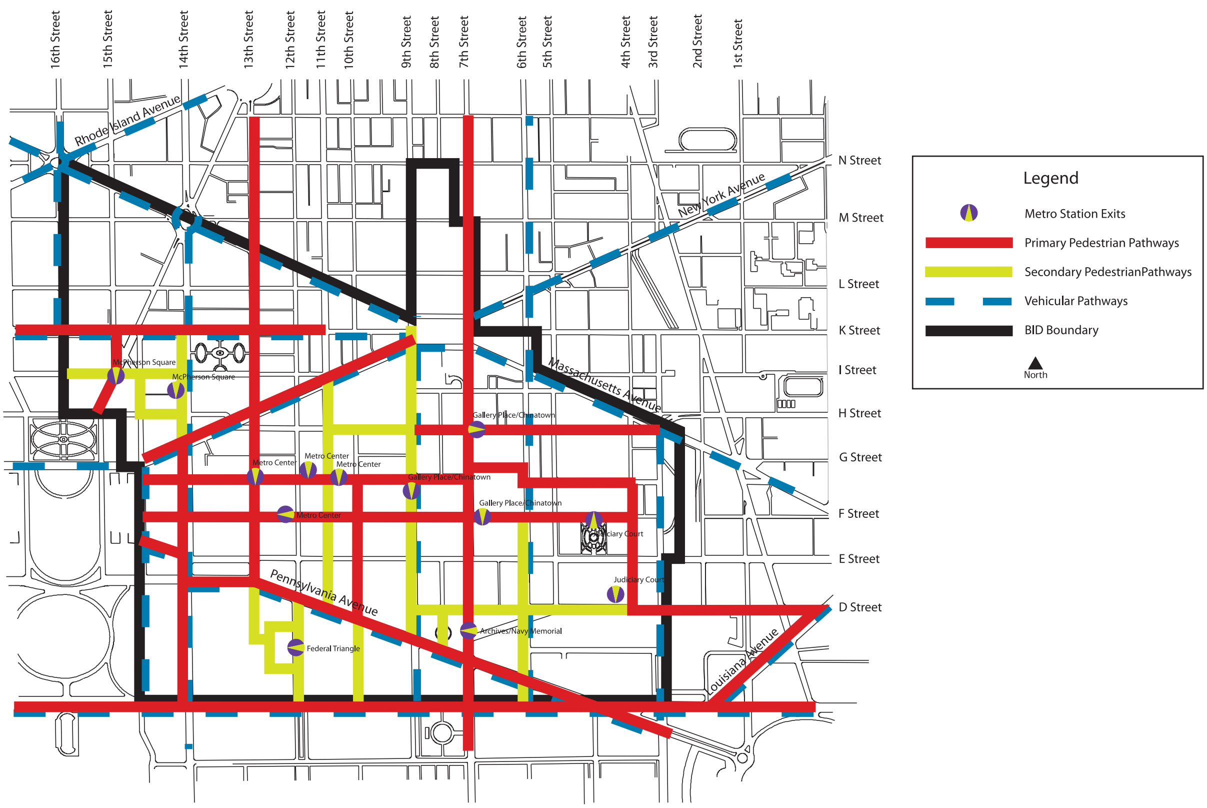
As noted at the beginning of this chapter, developing a sign information content system is often called *programming* and this process is best introduced with a question: What information do sign users need and where do they need it? Essentially, this process entails mapping out sign locations and establishing the message nomenclature that will be displayed on the signs at each location.

Sign Locations

Sign locations are determined by analyzing circulation routes and decision points within the project environment. This process, too, can be addressed by posing questions: "Where are the pathways that people move along and where along those pathways must people decide whether to make a turn or proceed straight ahead?" The EG designer answers these questions by reviewing the project's plan drawings, which depict a site or building from above, and marking out where the circulation routes and decision points are.

If the project at hand is new and not yet built, plan drawings are the primary tools for analyzing circulation and decision points. If, on the other hand, the project site exists, the EG designer has an additional tool: He or she can visit the site to survey circulation and decision points in situ. Obviously, it takes more skill to envision circulation and decision points for a site that doesn't yet exist and is defined solely by drawings than for a site that can be directly experienced. Whether or not the project site exists, however, plan drawings are the medium for sign location analysis. (See Figure 4.19.)

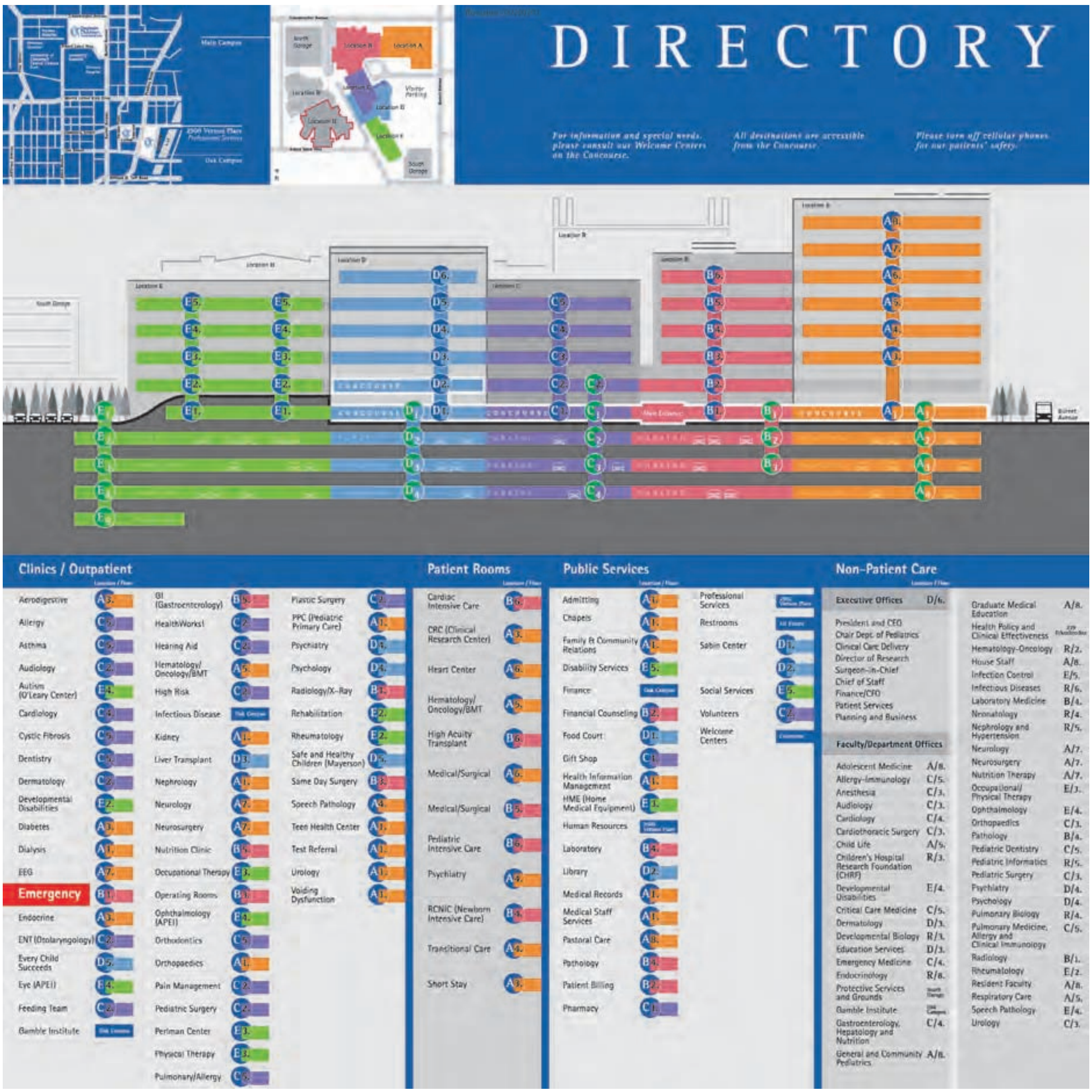
4.19 Circulation analysis of primary and secondary pedestrian pathways, as well as vehicular pathways, in Washington, DC.



4.19

4.20 Directory for the Cincinnati Children's Hospital indicates vertical and horizontal circulation routes in an interconnected, multibuilding complex.

Although plan review focuses on lateral circulation, it's necessary to keep in mind that for many project environments vertical circulation routes are just as important as the lateral ones. A great many sites, such as rail stations, airports, hospitals, retail malls, and parking garages have multiple floor levels and the vertical circulation pathways between these levels present key decision points for navigating the site. (See Figures 4.20 through 4.22.) Section drawings, which are vertical slices through a building that reveal the stacking of its levels, can aid vertical circulation analysis.



4.20

BIM models, which are digital and 3D, can provide useful visuals of a project site that doesn't exist, including static perspective views, sections at any point, and animated fly-throughs. These BIM visualizations are great tools that can help EG designers better assess both lateral and vertical circulation routes for projects that are not yet built.

After studying decision points and user circulation, the EG designer begins to map out the signs on plan drawings, making a mark to indicate each sign on the plan. This initial go-round of the sign location plans may include just primary signs, for simplicity and clarity, and they may be color-coded by communication function—for example, red for directional signs, blue for identification signs, and so on. (See Figure 4.23.) Remember, though, as pointed out in Chapter 2, color-coding can be useful for the initial sign location plans, but the final sign location plans should not rely on color-coding to communicate important information about each sign, as the final location plans may be printed in black-and-white only.

Keep in mind that like the design process itself, developing sign location plans is also an evolutionary process, so expect to go through several iterations of the sign location plans and corresponding messages before they are finalized.

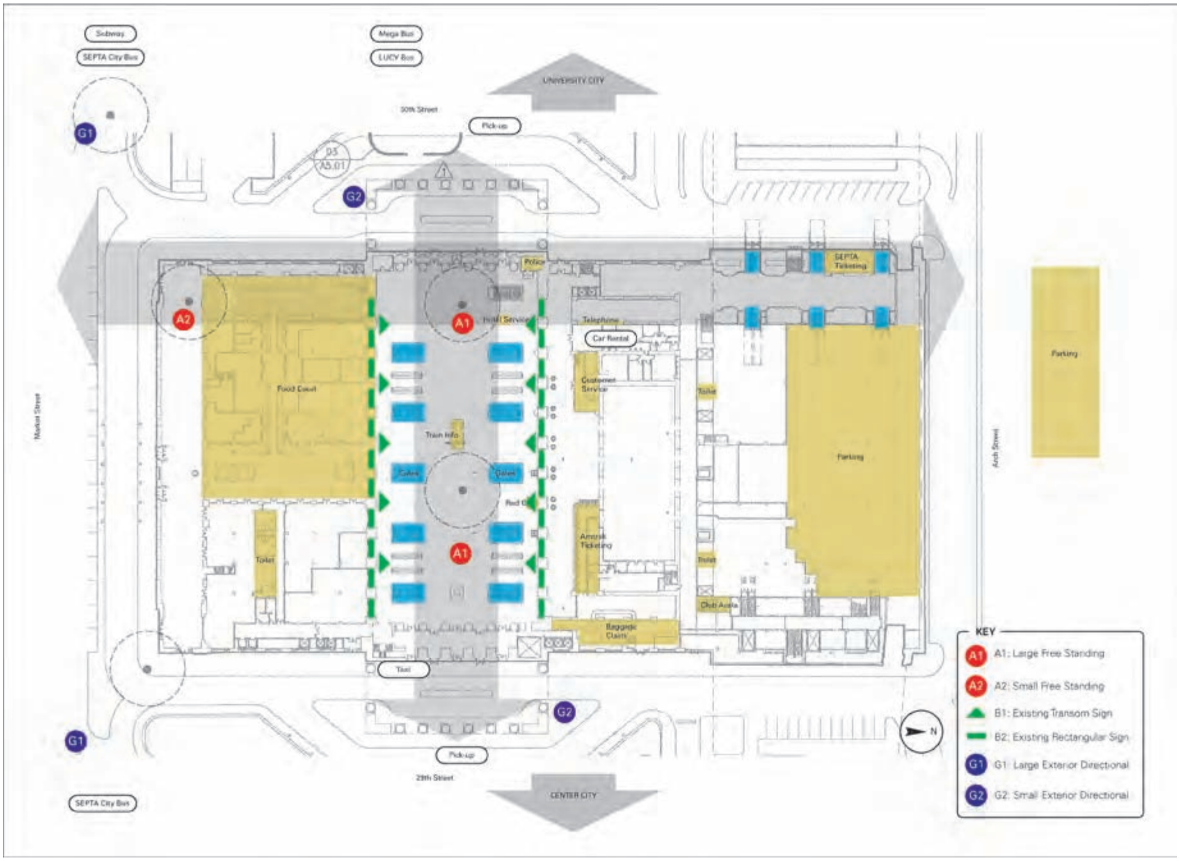
Tips for Determining Sign Locations

- Always locate signs perpendicular to the viewer's line of movement and sight, as people can't see signs located parallel to their line of movement/sight without turning their heads. This can be dangerous, particularly in driving situations, when drivers need to keep their gaze focused on the road ahead.
- Always locate directional signs at decision points; and on long paths, reinforce the information on additional signs to assure people they're heading in the correct direction to their destination, as shown in Figure 4.24.
- In certain situations, particularly those involving vehicular signage where reaction time is a factor, use advance directional signs (e.g., Departing Flights Next Left) to give people enough time to maneuver to the decision point. Use these in tandem with confirmatory directional signs (e.g., Departing Flights with a left directional arrow) at the actual decision points, as shown in Figure 4.25.
- Place identification signs at the destinations to which people have been directed, to confirm their arrival at the destination they've been seeking, as shown in Figure 4.25.

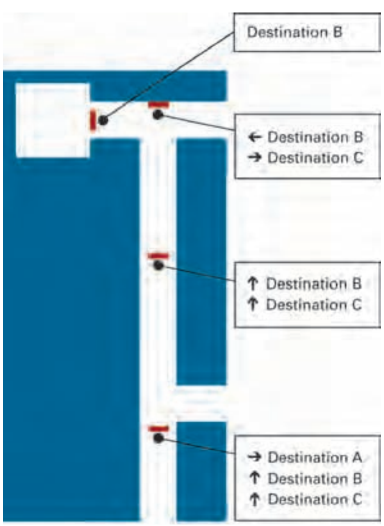
Thus the wayfinding breadcrumb trail has been laid: Directional signs point to the various destinations at each decision point along a circulation route, and each destination is identified to confirm that it has been reached.

4.21 Floor directory at a children's museum indicates the vertical stacking of destinations.

4.22 Unique three-dimensional directory for a cruise ship provides orientation to lateral and vertical circulation, as well as to the ship's fore and aft.



4.23 Initial sign location plan for Philadelphia's 30th Street Station maps out primary sign elements defined by sign type, function, and mounting condition.

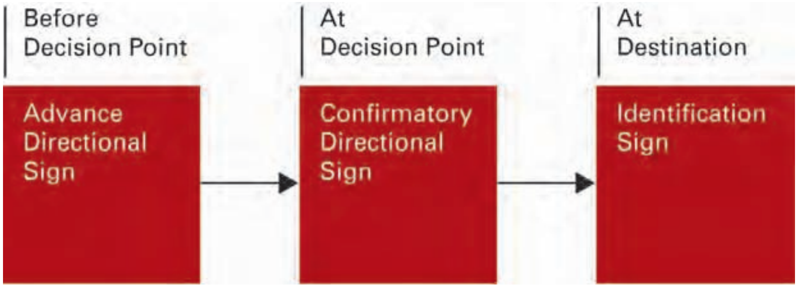


4.24 Directional signs should be located at decision points, and directional information should be reinforced with additional signs on long paths.

After the initial sign location plans have been developed, the EG designer should examine the site conditions at each location. These site condition factors include:

- Viewing distances
- Viewing angles
- Physical limitations on sign sizes and/or mounting heights, such as low ceiling clearances or narrow corridor widths
- Physical sight-line obstructions, which can be immobile, such as columns or trees, or movable, such as people or vehicles
- Lighting conditions
- Sign mounting opportunities
- Adjacent surfaces, finishes, and functions

As with circulation analysis, it's easier to determine conditions at each sign location when the project environment actually exists and can



4.25

4.25 Advance directional signs give people time to prepare for actions at decision points, decision points are signed with confirmatory directional signs, and identification signs verify arrival at the destination.

be surveyed in person, rather than having to rely solely on drawings and other visualizations. But on projects whose sites are not yet built, drawings provide the primary reference for site conditions, so all available architectural and/or engineering drawings need to be studied carefully. In addition to plan drawings, these architectural drawings include elevations and sections, with elevations showing vertical surfaces such as walls and doors, and sections showing vertical slices through the site. On projects that require ceiling-mounted signs, those drawings include reflected ceiling plans (RCPs), which should be consulted to ascertain ceiling conditions at each sign location. Renderings, models, fly-throughs, and other visualizations of the site are also helpful in assessing sign location conditions. Again, such visualizations are getting easier to obtain as BIM gains hold in the architectural arena.

Another important design consideration has to do with scale. That is, even if the final sign location plan documents aren't prepared at a measurable scale, early sign location studies should take place on plans of a measurable scale so that viewing distances can be accurately measured with a scale ruler. Why is viewing distance so important? First, among other signage provisions, guidelines such as the Americans with Disabilities Act's (ADA's) Standards for Accessible Design (SAD) specify character heights related to sign mounting heights and/or viewing distances. Second, the farther the distance from which a sign must be viewed, the larger the sign typography must be; and the larger the typography, the larger the sign size must be to accommodate it. Chapters 5 and 6 go into greater detail about sizing sign typography for viewing distances.

By identifying site parameters and constraints, the information gathered in studying sign locations begins to set the stage for designing the sign program's graphic and hardware systems, as well as for defining the program's sign types. It also aids in identifying and coordinating sign locations that require additional support systems to be brought in, such as electrical or structural.

As the EG designer learns more about the conditions at each sign location, the sign location plans will be refined and filled in with all

Wayfinding: Passive and Active

Wayne Hunt

In finding our way, we respond to two kinds of environmental information. First is the environment itself—sight lines to destinations, objects that help us maintain orientation, intuitive location of entrances, even lighting and sounds. These built-in features in the natural and man-made environment are the *passive tools of wayfinding.* The best places and spaces are rich with these integrated attributes that foster orientation, understanding, and self-guiding.

The second category of wayfinding information is the added active elements: signs, directories, color-coding, and other more literal tools that help guide us. These proactive elements are often needed to supplement and clarify the as-is, or passive, environment. It is within this second category of design, *active wayfinding design*, that most environmental graphic designers operate. We plan, design, and implement systems of physical and virtual tools that are added to or overlaid onto and into existing or planned places and spaces.

This combination of *passive* and *active* information allows us to navigate freeways, find our way in museums, stay oriented in malls, and even find the party in an apartment building—"After you get to our building, just follow the noise to our place." However, the best environments have a higher percentage of passive wayfinding qualities. These are the intuitive, self-guiding places that need relatively few directional signs: the museum with a traditional formal entrance; the European town with a large clock tower in the center; the theme park with restrooms right where we expect them (and when we need them), and so on.

Lost in the Woods

If you have ever been lost while hiking, you became dependent on the passive and native things in the natural world—the position of the sun, a distinctive rock formation you passed that morning, a distant mountain range. Regaining orientation is critical, often a matter of life or death. You are without active wayfinding elements until you stumble upon a trail sign.

Note that a paper trail map is an active tool, but its utility depends on users matching the features shown on the map with their real-life counterparts in the environment—a melding of passive and active wayfinding processes. But even with a good flashlight, a trail map is of little use after dark.

Where Is the Cave?

Ancient humans were wholly dependent on reading the natural or passive environment for wayfinding information. Heading out for a day of hunting, ancient man intuitively recorded his route and could quickly retrace the path back to safety in an emergency. Survival depended on this innate ability to wayfind by means of a wide variety of passive elements. Some wayfinding experts say that even cues as subtle as regionally unique, tiny wind-shaped patterns in desert sand could signal nearness to an important destination or the location of water.

Ever More Active Elements

Modern urban development has covered over many natural wayfinding cues, so much so that our daily world is largely a human-constructed place, but we still have a built-in, innate need to be oriented—to know where the cave is. To meet this powerful need, we are increasingly more dependent on the hard and literal tools of active wayfinding. To interpret and navigate through today's complex built spaces and places we need organized systems of signs: signs to direct, signs to identify, signs to inform, and signs to regulate behavior.

While this proliferation of signs solves immediate problems, often the real problem is the place itself, if it has been designed without important passive wayfinding qualities. A parking garage is set back from the street with no view to the entrance; the second floor in a hospital aligns with the third floor in the connected garage; the four corridors leading from an elevator in an office building look identical; the sections in a stadium have a counterintuitive numbering system. Unfortunately, the familiar remedy for all of these all-too-common situations is signs and more signs—that is, active elements added to make up for the missed opportunities of passive wayfinding.

Improving the Active; Influencing the Passive

As wayfinding designers, we continually try to improve the design of signage. But we also look for opportunities to participate in the early stages of projects and help advise on passive wayfinding elements to reduce the need for active interventions—signs. Such integrated elements and strategies include:

- Building entrances that look like entrances
- Providing clear sight lines to decision points wherever possible
- Incorporating the fewest turns in routes between destinations
- Centrally locating elevators
- Positioning elevator doors to be visible from a distance
- Differentiating paint and artwork schemes in similar corridors
- Adding views to exterior features
- Heightening lighting near entrances, both exterior and interior
- Using intuitive numbering systems for rooms, airport gates, and buildings
- Using descriptive building and department names
- Designing understandable paths through exterior areas

What about Mobile Wayfinding?

The development of GPS-driven wayfinding programs and devices has added another method for finding one's way. At the touch of a button, on-screen turn-by-turn visual and verbal directions can provide accurate point A to point B guidance. But because knowledge of the surrounding or passive environment is not needed with GPS, users understand very little about where they actually are, or even how they got there. So even as this high-tech wayfinding becomes more ubiquitous, human-based passive and active wayfinding will remain important to accessing the built environment.

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the signs necessary for the program. Concurrently with mapping out sign locations, the EG designer is also mapping out messages to be communicated at each location, which leads to a discussion of message nomenclature development.

Sign Messages

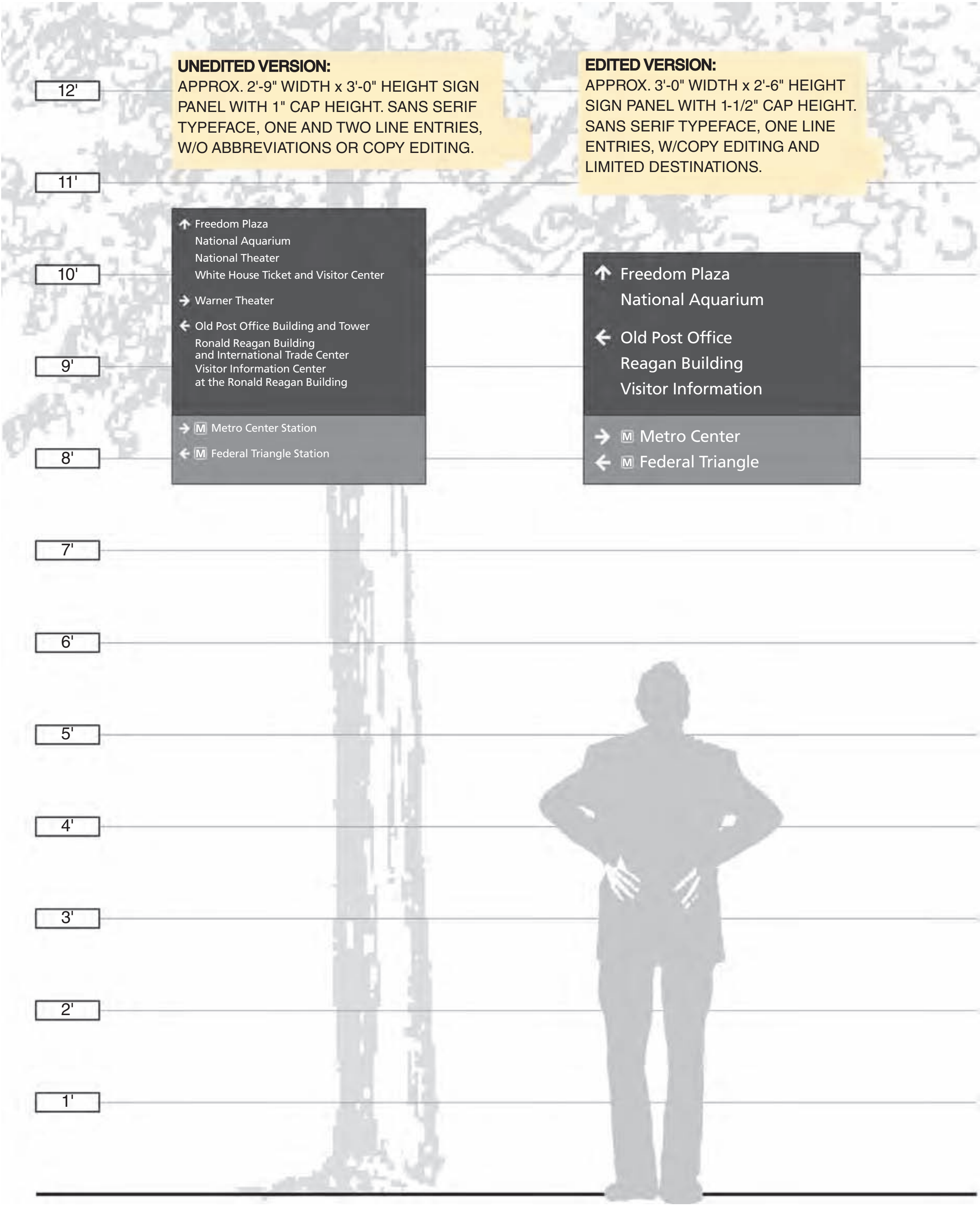
Each project site requires a message nomenclature vocabulary. This should be a consistent and concise collection of messages to be displayed on the site's signage. The operative words here are *consistent and concise*, for a nomenclature vocabulary that is both consistent and concise is essential for clear communication of the sign information system.

A consistent sign message vocabulary is key to maintaining the breadcrumb trail of information. Once a destination name has been determined, it should be used on *every* sign relating to it. As the saying goes, "Don't change horses in midstream"—developing the sign message nomenclature system is not an exercise in creative writing. Also, never use synonyms! Imagine the confusion of users if some signs in a program display the message Downtown and others display the message Center City. Both have the same basic meaning, but using the terms interchangeably within a sign program causes confusion. Hence, rigid adherence to consistency of message nomenclature is essential for clearly communicating the sign information system.

The sign message vocabulary must also be concise, for two previously stated reasons: to conserve sign space and to prevent information overload. Accordingly, a message should communicate the essential information needed by the sign user in as concise a manner as possible. For example, often, the official names of destinations are quite lengthy, such as Ford's Theater National Historical Site, and such messages take up a lot of real estate on a sign face. The more concise message Ford's Theater communicates the core information necessary for sign users far more clearly and effectively than the lengthy, official message. Accordingly, destination names must be reviewed and edited for conciseness and clarity, and consistently used once edited. Note, however, that it may be difficult to build consensus with clients on the use of the edited versions of destination names. (See Figure 4.26.)

Related to the conciseness of the message nomenclature vocabulary is the use of abbreviations, which is sometimes necessary to conserve sign space. The rule of thumb is that abbreviations should only be used in sign nomenclature when they are highly recognized by the general public. Examples of highly recognized abbreviations include:

- St., for street
- Hwy., for highway
- Fl., for floor
- Intl., for international
- Dept., for department



4.26 Lengthy, official destination names should be edited to more clearly and concisely communicate essential information. The number of destinations should also be limited.

Stay away from less recognized abbreviations, such as:

- Arpt., for airport
- Term., for terminal
- Stn., for station
- Dntn., for downtown

Again, once the decision has been made to use a given abbreviation, use it consistently throughout the sign program. One more point: Don't hyphenate sign messages; while hyphenating words may be acceptable in large blocks of newspaper or book text, it is unacceptable in signage.

Another critical element in achieving consistency of message vocabulary is message syntax, which refers to how the sign messages are structured. For example, there are two common ways to indicate a numerical series, such as levels of a building:

Levels 1 to 5

Levels 1–5

Both the word *to* and the dash are widely recognized, hence acceptable to use, but to prevent confusion, one method or the other must be chosen and employed consistently throughout a sign program.

As stated previously, the EG designer is typically the lead orchestrator of the information content system for a sign program. In some cases, this entails structuring and editing message content such as destination names provided by the client. In other cases, the EG designer generates an entirely new message nomenclature vocabulary to impose on the project site; that is, he or she develops a new destination naming system that relates directly to the informational needs of the project's sign users.

The most straightforward example of this name imposition is the development of a signage room numbering system for a building in which the room numbers on the architectural plans must be superceded by a different numbering system for signage purposes. The need for this arises when the room numbers assigned during the architectural design process (which properly fulfilled their architectural function) do not make sense from a communication standpoint to a person navigating the building. For example, rooms are commonly added or deleted during the architectural design process, resulting in room numbers on the plans that aren't in any logical sequence for a sign user; thus, the EG designer is called upon to develop a new, more logical room numbering system for sign program use.

The EG designer may also generate and impose even more comprehensive new signage nomenclature vocabularies for complex,

4.27

4.27 The major interior circulation corridor of Boston's Brigham & Women's Hospital complex, named the "Pike" after the Massachusetts Turnpike, directs people to various destinations at numbered "exits."

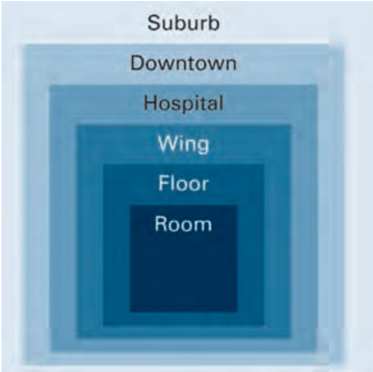
multibuilding sites, with the goal of organizing the site's nomenclature to simplify and clarify user orientation and navigation. These vocabularies are almost always hierarchical and are developed for unbuilt as well as existing sites. A classic example is a new signage nomenclature vocabulary for a hospital complex that has grown from its original building to several buildings, often with complex, interconnected lateral and vertical circulation routes. (See Figure 4.27.)

Navigation: Message Hierarchy and Proximity

People navigate from general to specific destinations, and the sign information system needs to be organized accordingly. Navigation is a process of zeroing in on a specific target destination in ever more discrete, nesting steps. In a simple example, consider the steps involved for a woman who lives outside of a city's downtown district who is visiting a friend in a downtown hospital. She must:

1. Find her way to the downtown district within the city.
2. Find the hospital within the downtown district.
3. Find the proper wing within the hospital.
4. Find the proper floor within the wing.
5. Find the proper room on the floor.

Obviously, when this woman first enters the freeway to head downtown, she isn't going to see her friend's hospital room number on the freeway directional signs. She is likely to see the word "Downtown," which is



4.28 People navigate from general to specific destinations.

the first, most general, layer of the informational hierarchy leading to her friend's hospital room sign. The point here is that it's completely inappropriate, let alone impossible, to display every single, specific destination within an environment on all directional signs within the environment. Therefore, sign information must be organized so that it builds from less detailed to more detailed the closer the sign user gets to his or her target destination. (See Figure 4.28.)

In another example, consider a traveler entering a city environment. Hundreds of thousands of destinations, ranging from major to insignificant, lie within the city, but they couldn't—and shouldn't—all be listed on directional signage. For a cohesive, comprehensible sign information system, the destinations need to be organized on two bases: *hierarchy* and *proximity.*

Hierarchy

Developing a sign information hierarchy starts with reviewing and analyzing all the various destinations within the project environment. The first step is to make a list of these destinations and then begin to rank them in order of importance for the sign user. Some rankings will be obvious, such as in an airport, where a janitor's closet would be a less important destination than the security checkpoint. In a city wayfinding example, the municipal sewage plant would be a less important destination than the city government offices or the train station.

In determining the ranking of destinations, the client's input is extremely valuable, and often essential, particularly for projects such as urban or campus signage programs. In these cases, the client often has hard and/or anecdotal data regarding which destinations are most sought out or visited by the most people, and this data can be used to determine which destinations appear on which signs. This data is often referred to as *trip generation* data.

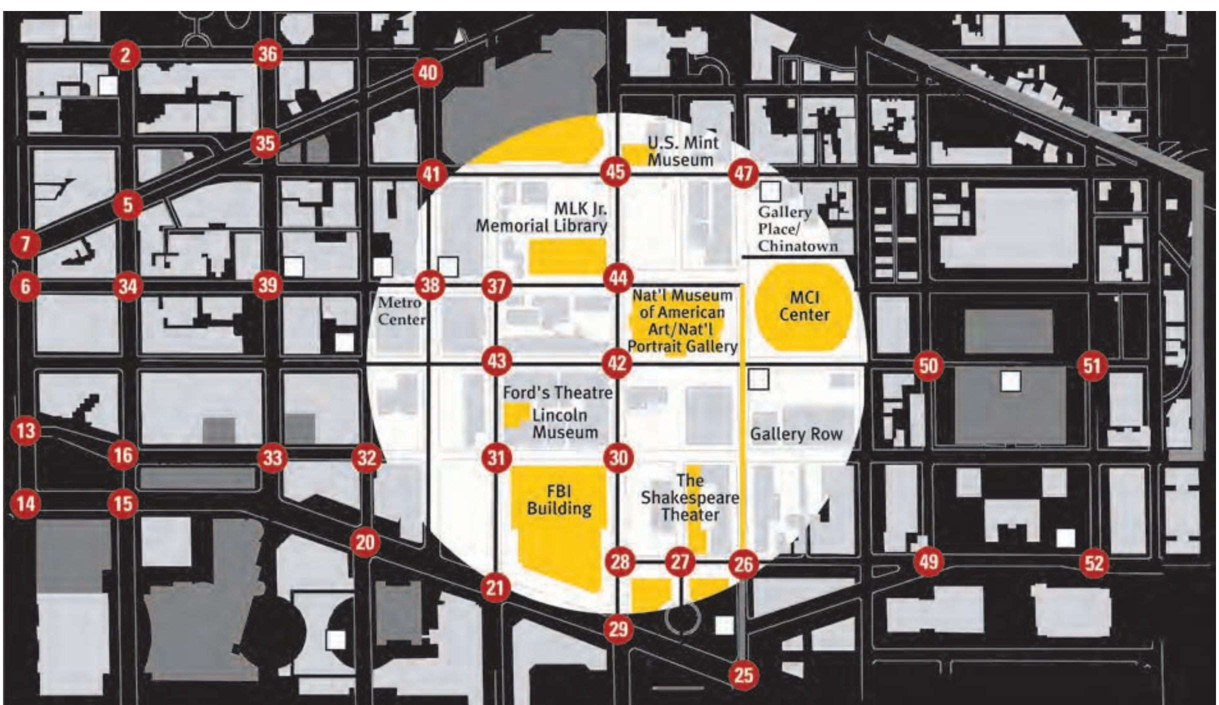
Keep in mind that some destinations are just not important enough to be displayed on directional signs. Nevertheless, people will seek out these less important destinations, so they can be included on map signs, paper map handouts, and mobile wayfinding applications, space permitting. A good example of this sort of sign information hierarchy is found at large regional shopping malls. The primary vehicular directional signs typically display only the major anchor store destinations, because listing all the smaller specialty shops would overload the signs with information too detailed to be absorbed effectively. Instead, the specialty store names are displayed on the interior mall directory maps, which contain detailed information that requires more time to study and absorb.

Proximity

Along with hierarchy, sign information can be organized and displayed according to its proximity to the destination. Again, signs have limited message capacity, so not all destinations can be displayed on all signs within an environment. However, destination names are dropped from signs once they have been reached, freeing up capacity for new destinations, so that as the information system courses through a site, messages are added and deleted from signs.

The general objective of proximity-based messaging is to add a destination to a sign when the sign's location is near to the destination. Just how near to the destination is a judgment call that varies with each project, and depends on the hierarchical ranking of a given destination. A very high-ranking destination such as Downtown may be displayed on a sign quite far away from the destination, along with less highly ranked destinations in closer proximity to the sign location. For all but the most highly ranked destinations, however, a standard should be established stating at what point a destination will be added to a sign. That standard may be different for each project. It might, for example, state that the destination name will be added to all signs located within a 500-foot radius of the destination, or within a .5-mile radius, depending on the size of the sign program's environment and the density of destinations within it. (See Figure 4.29.)

4.29 Highlighted area on this proximity diagram indicates destinations located within a fixed radius from the center sign location.



4.29

Navigation: Message Hierarchy and Proximity

Other Factors Affecting the Sign Information Content System

By now it should be obvious that developing the sign information content system is not a simple process, so it shouldn't be surprising to learn that there are still other factors that make it even more complex. These factors are primarily related to various government regulations and guidelines, as well as multiple language considerations.

Unlike most graphic design projects, the information, graphics, and hardware systems of a signage program are affected by federal, state, and municipal codes and regulations of various forms. It is beyond the scope of this book to delve into the details of these regulations, which are numerous and constantly being revised; rather, the objective here is to raise awareness of the fact that signage must be designed with government regulations in mind, in order to help both the EG designer and the client to avoid pitfalls.

To begin, it is important to note that regulations and guidelines, including those affecting signage, are typically written in cumbersome legal language that can be interpreted in several ways. It is therefore advisable for the EG designer and the client to thoroughly research and review the applicable sign regulations and then develop viable compliance strategies, with the input of legal counsel, code consultants, regulatory officials, and professional/trade organizations, as deemed necessary.

Signage and the Americans with Disabilities Act

The Americans with Disabilities Act (ADA) is a federal regulation enacted by Congress to secure civil rights for disabled Americans, and these rights include physical access to the built environment. To that end, the ADA includes numerous provisions that affect physical elements of buildings and transportation facilities, including signage. These provisions were originally contained within the Americans with Disabilities Act Accessibility Guidelines (ADAAG), which were published in 1991. The ADAAG was updated in July 2004 and renamed ADA Standards for Accessible Design (SAD), which was adopted in 2010. The 2010 SAD guidelines are currently in effect and are available from the U.S. Department of Justice website at www.ada.gov or from the U.S. Access Board website at www.access-board.gov. In addition to the federal regulations, it's important to be aware that a number of states and local jurisdictions also have accessibility regulations and guidelines that affect signage, sometimes differently or more stringently than the federal regulations.

While the SAD is a subset of the broader ADA legislation, this book uses the terms "SAD" and "ADA" somewhat interchangeably, partially because the term "ADA" has become so commonly associated with "signage." The intent of the SAD signage provisions is to promote equal access to the built environment for visually impaired persons, as well as to point out accessible routes for those with mobility impairment. It's important to note that the 2010 SAD signage provisions differ considerably from those of the 1991 ADAAG. The 2010 SAD signage provisions are more complex—notably making a distinction between tactile/raised and visual characters, with different standards for each—and require much study. Also note that this book is not intended to provide technical or legal advice on any aspect of the ADA/SAD, and that EG designers are advised to become thoroughly acquainted with the current guidelines.

The SAD signage provisions stipulate standards to be met in the display of sign information; they do not, however, mandate specific messages that must be displayed on signs, nor that signs even be required at all. However, whenever a sign is programmed it must conform to all applicable ADA standards. (See Figures 4.30 through 4.32.)

4.30

4.31

4.32

4.30 In the United States, the design of permanent room identification signs is affected by provisions of the ADA's Standards for Accessible Design.

4.31 The design of restroom identification signs, as with other permanent room identification signs, is affected by ADA/SAD provisions.

4.32 The cut-through symbol on this permanent room identification sign reinforces the message.

Regulations and Architectural Signage

Ken Ethridge, AIA

I'll bet that, no matter where you studied design, the subject of regulation was never brought up. Don't feel alone. It was barely mentioned when I studied architecture back when rocks were soft. Even then, the professors just said that we'd ". . . learn all that stuff later—in practice."

It's all very well to say, "I'll just design it and let the drones make it compliant." But now the problem is your client actually thinks you know "that stuff" and is betting fee money that you do. So, here's a very abbreviated version of what I wish someone had told me in school.

Architecture, and its handmaiden architectural signage, is governed by four major groups of regulation:

1. *Land Use (i.e., Zoning Regulations):* These address what can be built and how big it can be, depending on where it is. A municipal planning and zoning department normally enforces them, with reference to a local zoning code.
2. *Structural (i.e., Building Codes):* These address the question of how strong something needs to be to resist forces like wind and gravity. A municipal building code department normally enforces them, with reference to both state and local building codes.
3. *Escape and Egress (i.e., Fire Codes):* These address how people enter and exit a facility, every day and during an emergency. They are enforced by a municipal fire marshal, with reference to a state and local fire codes.
4. *Accessibility (e.g., Federal Standards for Accessible Design [SAD] and State and Local Accessibility Codes):* These address how a building should be built so that it's available to the entire population, no matter what their disability. Enforcement for this group is more complicated than all the previous ones put together. The federal government ultimately takes precedence, because the SAD supports a federal civil rights law (the Americans with Disabilities Act [ADA]) and is enforced by the Department of Justice. The SAD, however, has generally been adopted by state building codes. Additionally, so-called *higher standards* may have also been adopted by the states, further complicating the situation. Local building officials should enforce the federal SAD as the "law of the land." In practice, they enforce the actual letter of state and local codes.

In the case of architectural signage, Land Use and Structural regulations are most likely to affect exterior signs, because they're public and large. But, the latter two groups, Escape and Egress and Accessibility, will almost always affect interior signage.

As is the case for accessibility, local and state fire codes are based on so-called *Model Codes*, developed by independent bodies with members drawn from public agencies, ranks of experts, and other interested parties. Enforcement is most often concentrated in the hands of local Fire Marshals from the inspection division of a local fire department, who have a great deal of leeway in their interpretations. For example, the necessity and location of fire egress maps are often completely at the discretion of the individual inspector.

Accessibility is primarily an interior game because, with a few narrow exceptions, the SAD signage guidelines refer only to interior signs. Notice that I wrote *guidelines,* not *regulations.* That's because there can't be any fixed regulations supporting the ADA due to the nature of civil rights law. At base is the idea that an individual can bring civil suit against an alleged violator, saying, "The guideline was not enough for my case. The guideline should

Wayfinding: Passive and Active continued

be changed to include me (and people like me)." Therefore, unlike a black-and-white regulation, a guideline can be a moving target, more dependent on the spirit rather than the letter of the law.

This may seem a fine point, especially since *meeting* the *guidelines* and *complying* with the state building code's accessibility *regulations* is usually enough for mere mortals. However, this difference accounts for most of the confusion that results when we expect hard-and-fast *regulations* but meet up, especially with accessibility, with a vast array of gray-area guidelines. If that weren't enough, both *guidelines* and *regulations* change over time, arguably to represent the best of current knowledge.

Knowledge of regulations and guidelines—especially on accessible signage—is now assumed to be part of an environmental graphic designer's toolkit. Welcome to the postgraduate world.

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The ADA signage provisions also address aspects of a sign program's graphic and hardware system design, among them figure/ground contrast, symbol use, dimensional limits, and finish. These are discussed further in Chapters 5 and 6.

In addition to the 2010 SAD guidelines document itself, a useful resource to guide EG designers and their clients is the SEGD 2012 ADA White Paper Update, which is discussed in greater detail in Chapter 5, "The Graphic System."

Local Codes and Interior Signage

Local codes, be they on the state or municipal level, contain regulations that affect the information content system of certain signs in a building environment, typically those relating to life safety and often accessibility. These codes can mandate both the locations and messages to be displayed on signage.

The local building code is the most obvious and common source of interior signage regulations, but these may also be buried in local administrative and health codes. Building codes are usually adopted on a statewide basis and they can vary from state to state—although building code standardization efforts among the states are underway. Certain large municipalities, such as New York City, have their own building codes that supercede the state building code.

It can be difficult to identify the local codes that apply to signage, and then to find the regulations on signage within the applicable codes. For example, even though some building codes have a section dedicated to signage, don't be fooled into thinking that all the code's signage regulations are neatly contained in that section, because there's a good chance that other signage regulations are scattered throughout other sections of the code. For example, a requirement for an elevator emergency evacuation sign may be buried in the elevators section of the code. And don't trust the code's index to capture all of the regulations pertaining to signs or signage, because they often don't. The only reliable solution is to visually scan the entire code for the words *sign* or *signage* if the code is in print form, or use the search function (if available) if the code is in electronic form.

Many states and cities adopt standard building codes formulated by independent code councils, such as the International Building Code (IBC) developed by the International Code Council (ICC). Other localities adopt a standard building code, with amendments/addenda tailored to the locality. Still others have their own proprietary building codes. A word of warning: Building codes are updated on a regular or sporadic basis, so it's always necessary to ensure that you're consulting the edition of the code that affects your project. It's wise to verify the applicable code edition—which is not always the most current one—with the client or project architect.

Standard building codes, which are available in book and, increasingly, digital form, can be purchased from the independent councils that develop them. Some proprietary city building codes, such as the New York City code, are available for purchase through city government channels. Still other building codes are available without charge on the Internet.

As stated at the beginning of this section, local codes pertaining to interior signage typically mandate location and message content of life safety information for building emergencies. This includes information at elevator lobbies that directs people to use the fire stairs instead of elevators to exit the building during emergencies. Local codes also typically specify information that must be displayed on both the occupancy side and stair side of fire stairwells, to orient both evacuees and emergency personnel to them. The message wording for such signs may be mandated by the code, as well as the size(s), color(s), and/or style of the typography used to display the messages. The code may also mandate the location, mounting height, panel material, requirements for any symbols or diagrams, and other aspects of such signs. Additionally, because some information on these signs can identify permanent spaces, any identifying information must also meet ADA provisions.

Outside the scope of work of EG designers are standard illuminated building exit signs and illuminated signs identifying designated areas of refuge or areas of rescue assistance. The reason? These signs are usually required to be illuminated, often on dedicated circuits with backup power, so they are typically the responsibility of electrical engineering professionals.

In addition to life safety signs typically mandated in the building code, other local codes may affect locations, message content, size, and so on, of other kinds of interior signs. Examples of such local code–related signage abound, but two of the most common are no-smoking signs and maximum occupancy signs for public assembly spaces. The State of California, for example, mandates the message content, location, size, pictograms, and so on, of restroom identification signs, making its restroom signs the most distinctive in the nation.

With so many codes affecting interior signage, it's no wonder that code conflicts occasionally arise, typically between local and national requirements. In such circumstances, strategies must be developed to comply with both, and it can be helpful to consult with local building officials who will have the final word on whether the interior signage is adequate for a Certificate of Occupancy.

Local Codes and Exterior Signage

Exterior signs, too, come under the auspices of various local codes. Specifically, state and municipal building codes are typically concerned with the safety of exterior signs themselves, such as the structural integrity to withstand prescribed wind forces and the soundness of electrical systems and connections.

Other local codes, usually municipal sign or zoning ordinances, are concerned with aesthetics—that is, controlling the visual character of a community's signage. Such ordinances, which vary from locale to locale, have been enacted in response to the mostly unattractive hodgepodge of sign styles that have mushroomed along the commercial strips of so many American towns and cities.

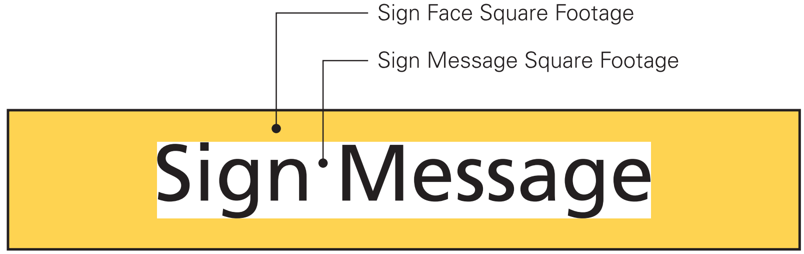
These ordinances typically apply to commercial signs, but also sometimes to directional signs, and can range from highly to loosely restrictive, depending on the locale or zoning district within the locale. Sign ordinance restrictions can include square footage, height, location, quantity, form, materials, illumination, and other elements. An example is a community whose commercial signs are all small, low-lying, externally illuminated, carved-wood panels with painted and gilded graphics, sitting on twin carved-wood posts.

It is not the intent of this book to focus on commercial signage or on the ordinances that may control them within any given community, so suffice it to say that sign ordinances are definitely well intentioned; but they can also be open to interpretation, hence causing contention. More to the point of this book is that sign ordinances can pose problems for the EG designer, especially when an ordinance places restrictions on directional signs. For example, an ordinance that places unrealistic size restrictions on directional signs can limit either the amount of informational content that can be displayed on the sign or the size of that information, to the point at which the sign fails to carry out its communication function.

Usually, before an exterior sign can be erected, sign ordinances require filing a permit application at the local jurisdiction, accompanied by an illustration of the sign, to demonstrate that the sign will comply with the ordinance. Some communities may additionally require that any proposed exterior signage be presented to a local governing body for approval, particularly if a *variance* is being sought for the sign or signs. A variance is, basically, an official permission for the sign to vary from the ordinance, and they can be difficult to obtain. On certain projects, the EG designer may be involved in providing renderings or plan and elevation drawings of the exterior signs for local approval, as well as in making presentations to local authorities.

The square-footage aspect of sign ordinances, in particular, is open to interpretation, raising the question of what the square footage applies to: Is it just the message area or the overall sign face? Does it include exposed support structures, such as vertical posts, that are unsuitable for carrying message content? These are important questions because the message area footprint takes up far less than 100 percent of a sign's square footage, and it is almost always surrounded by *dead space,* or *white space*, in the form of margins and any spaces between lines of typography, that contain no message content but are essential for good readabilty. The point is, one can make a valid argument that dead space—including exposed support structures—should not be included in the square-footage calculation; indeed, many local sign ordinances permit square-footage calculations on just the message area. (See Figure 4.33.)

It is useful for EG designers to work with the client's attorneys, engineers, and architects in locales with exterior sign ordinances. There are also various resources for additional information about exterior sign ordinances, including the United States Sign Council (www.ussc.org), and the International Sign Association (www.signs.org).



4.33

4.33 A sign message footprint, or *live space,* always comprises less square footage than the entire sign face, which consists of the live space plus dead space, such as margins.

Bilingual and Multilingual Sign Information

Undoubtedly most EG designers will become involved in signage projects that require bi- or multilingual sign information, whether those projects are in the United States or in other countries. English, of course, is the standard language used on signage in the U.S., but in certain regions, cities, and neighborhoods, additional languages may be required on signs due to large populations for whom English is not their first language. (See Figure 4.34.) In the United States, Spanish is the most common second language that's displayed on signage; in many other countries, English is widely employed as a second language to the native language of the country, particularly on signage at international facilities, such as airports, train stations, exposition centers, and so forth.

Designing sign programs to provide effective wayfinding and orientation in environments that serve speakers of multiple languages presents unique challenges to EGD professionals. Obviously, the more languages that need to be displayed on a sign the larger the sign must be, and this can lead to difficulties or trade-offs at sign locations that present physical constraints on sign sizes. Furthermore, in addition to requiring much larger sign faces, research has shown that signage displaying more than three languages is confusing and ineffective. Another issue is that sign messages in many other languages, such as Spanish, French, and German, are lengthier than those same messages in English, making it incumbent on the EG designer to obtain translations of the sign message content concurrent with the development of the English information content system.

To help address some of these language-related design issues, the SEGD participated in the Hablamos Juntos initiative, which examines

4.34

4.34 Bilingual ceiling-hung directional signage at Brigham & Women's Hospital in Boston.

and presents strategies for effective orientation of multilingual users to U.S. healthcare environments. These strategies include use of symbols, maps, and human assistants to augment signage in a "total communication" package for speakers of languages other than English. Although the Hablamos Juntos initiative is geared toward healthcare environments, its findings and recommendations can be applied to other environments serving speakers of multiple languages. For more information, and to access documents from this initiative, go to www.segd.org.

In an integrated communication strategy, applications for mobile devices can provide supportive orientation information in languages that aren't displayed on the physical signs. As stated previously, such technology continues to evolve, and large organizational structures may not support such an integrated strategy across communication channels.

For signage programs in the United States, messages in English are almost always displayed above or before their translations into other languages. For signage programs in other countries, the opposite is usually the case—messages in the country's native language take precedence over their English versions.

Another language-specific design issue that EG designers must account for is reading direction. Consider that while English and most other languages read from left to right, others, such as Hebrew and Arabic, read from right to left. (See Figure 4.35.) And Chinese, which traditionally read vertically from top to bottom, is now also commonly read horizontally from left to right.

4.35 Bilingual directional sign in Dubai. Arabic languages read right to left, so the English is flush right with the Arabic and the arrows.

Even within the English language there are differences that can cause signage dilemmas—specifically, in spelling and nomenclature between American and British English. The British version is typically standard for signage in countries that historically were in the sphere of British influence, such as Singapore and India, as well as for some countries that were not, such as Mainland China. Common examples of these variations are listed here.

American Usage	British Usage
Exit	Way Out
Restroom	WC (for water closet or wash closet) or Toilet
Elevator	Lift
Garage	Car Park
Center	Centre
Theater	Theatre

Pictorial Information Content

Thus far, this chapter has focused on word-based information content, but some sign information can be communicated pictorially, without words. Pictorial content includes symbols, which are pictures that represent things or concepts, and diagrams, such as maps. Note that in this context the words *symbol, glyph, icon,* and *pictogram* are basically synonymous and are used interchangeably, although this book primarily uses the term *symbol.*

The intention of this section is to give a general overview of pictorial information content for signage; it is not intended as a technical dissertation on semiotics.

Symbols

Symbols are used on signs as a shorthand substitute for words, but to be effective, they must be easy to understand. For example, the symbol of an airplane can substitute for the word *Airport*, and a symbol in the figure of a man can substitute for *Men's Restroom.* Directional arrows, too, can be considered symbols, in that they serve as a pictorial shorthand for worded directions such as *Straight Ahead, Turn Left*, and the like.

Symbols are very useful in signage programs for three reasons:

- They conserve sign space.
- Their meaning can transcend language barriers, as the airplane symbol does.
- They can sometimes communicate more clearly and concisely than words, as arrows do.

The meaning of certain symbols, such as directional arrows and the airplane symbol, is immediately obvious to most people. The meaning of other symbols has to be learned, and can vary by culture. For example, consider the symmetrical red cross symbol on signs, which connotes first aid in most Western cultures; yet, worldwide, its connection to first aid isn't as obvious as the airplane symbol is to airport. That is because the red cross derives its connection to first aid from its use by the International Federation of Red Cross and Red Crescent Societies, and this is a learned connection. In predominantly Muslim cultures, however, the International Federation of Red Cross and Red Crescent Societies uses a red crescent symbol on signs to connote first aid. (Note: To protect the trademark rights of the Red Cross relief organization, the red cross symbol used in signage has been replaced recently by a green cross symbol to indicate first aid.)

Even the seemingly universal symbols of male and female figures for men's and women's restrooms don't transcend all cultures. Typically, these symbols are based on Western dress, with the man in slacks and the woman in a skirt; but these depictions are less effective—and can even be offensive—in cultures where both men and women wear long robes, such as certain countries in the Middle East.

As useful as symbols are, many concepts are too complex to be readily communicated by them. For this reason, it's almost impossible to design a sign information content system that consists entirely of symbols. But judiciously used, symbols can streamline communication on signs. And because symbols can transcend language barriers, they can be very useful on signage at facilities where users of many languages and cultures gather, such as airports, medical facilities, and theme parks.

In some cases, symbols can be used alone, without words, to communicate the necessary information, but again, only if they are well-understood and culturally appropriate. In other cases, symbols can be used to reinforce the word messages, or to serve in a sense as a second language to help users not familiar with the written language displayed on the signs. In still other cases, symbols may not be used at all to communicate the sign information. And, finally, all three of these alternatives are possible within a given sign program. (See Figure 4.36.)

There are several vocabularies of symbols, some of which have been adopted for official, standard use by governing and regulatory bodies in the United States. A more in-depth discussion of symbols is contained in Chapter 5, "The Graphic System."

Diagrams

In addition to symbols, diagrams also convey sign information content in a pictorial manner. By far, the most common diagrams used in signage are maps. The fascinating and deep subject of maps in general, and in signage in particular, could comprise a book unto itself. The purpose here is to provide a brief overview of the information content role maps play in signage programs.

Maps are exceptionally useful in communicating the position of places and spaces—including transportation links such as train and bus routes—in relation to each other, and therefore as wayfinding and navigational aids. Maps can visually substitute for a complex series of directions in

4.36

4.36 Options for communicating sign information include use of a symbol only, use of symbol paired with text, and use of text only.

words, as they do on evacuation route map signs in hotel rooms. As stated earlier, however, many people do not understand maps; moreover, maps require detailed study because most people cannot interpret them quickly. Accordingly, from a design standpoint, maps should generally be considered as adjunct information content for a signage program.

Of course, maps also usually require legends in order to communicate effectively, and those legends are in the form of words and/or symbols. To prevent confusion, it's imperative that map legend nomenclature match the nomenclature used in a sign program's overall information content system. More in-depth discussion on maps is presented in Chapter 5, "The Graphic System."

Another example of diagrammatic sign information is the interstate highway signs that depict the positions of the various traffic lanes and turnoffs at complex interchanges.

Signage Master Plans

A signage master plan, at least as defined in our office, is often the result of the information content development process. It is a document in which sign locations and messages are planned for the long term, a plan that is, in many cases, adopted in phases over time. The point is that it takes a long-term view, considering the informational needs of a site over time, minimizing informational or nomenclature changes as the site itself changes.

Signage master plans work best for planned environments that have predicted growth patterns. The EG designer develops an information content system for the planned environment at full buildout, rather than taking a piecemeal, reactive approach as each site within it is built. Signage master plans take a holistic approach—the big-picture viewpoint regarding informational needs. In this way they are a proactive rather than reactive means to predict the informational needs of a site. Simply put, signage master plans provide for and predict the future informational needs of a site in an effort to minimize changes to the signage as the site is developed over time.

Chapter Wrap-Up

The dedicated purpose of signage is to communicate information; therefore, the development of the information content system—what the signs say and where they say it—is the foundation of all sign programs. You can use the methods and advice in this chapter to plan any program's content infrastructure, after which you'll be well prepared to jump into actual design activity for the program's graphic and hardware systems, the subjects of the next two chapters, respectively.

5 The Graphic System

Graphics make sign information visible and give the information "voice."

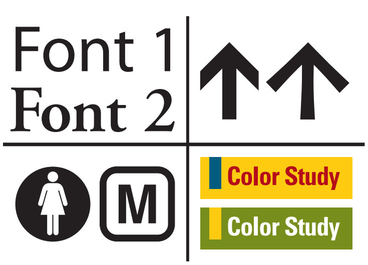
The word "graphic" has ancient roots in the Greek word *graphikos,* which means "writing." The evolution of written and visual, or graphic, communication—as opposed to spoken communication—is one of humankind's greatest cultural achievements. No doubt humans communicated in spoken words before they invented ways to write those words, but the world's great civilizations didn't really begin to advance until humans developed writing systems to record, preserve, and accumulate knowledge.

The graphic system for a signage program is part of this great cultural legacy of visual communication. The sign graphic system makes the sign information content system tangible, in that it embodies and conveys the sign program's informational content. The graphic system gives structure, form, and style to the information that is communicated on signs.

The EG designer utilizes and manipulates a vocabulary of visual communication devices in developing the graphic system for a sign program. These include typography, symbols, color, diagrams, and other graphic elements such as rules, bars, circles, squares, and other geometric and decorative or illustrative elements. (See Figure 5.1.) The EG designer then arranges these graphic devices into a unified system of layouts for the various sign types and messages in the signage program.

This chapter discusses the vocabulary of graphic devices used for signage and how they are arranged into layouts; it also offers an overview of methods for applying graphics to signs. The intent here is to introduce the basics of graphics as they pertain to signage, not to serve as an exhaustive treatise on graphic design. And, while the core principles of graphic design apply to signage in both the static and digital realms, this chapter is geared toward static signage.

This chapter also touches on some of the graphic design aspects of the ADA's SAD signage provisions, but it is by no means exhaustive nor should be considered technical or legal advice on ADA conformance. Indeed, the ADA is not the primary focus of topics covered in this chapter



5.1 The graphic system.

because they represent centuries of graphic evolution—particularly in the typographic domain—and these historically rooted principles are important to discuss without the filter of the ADA. Additionally, the ADA signage provisions apply only to signage programs within the United States, although some other countries also have accessibility guidelines that affect signage design.

EG designers working on signage projects in the United States are advised to become thoroughly familiar with the 2010 ADA Standards for Accessible Design, available in HTML and PDF formats at www.ada.gov and http://www.access-board.gov. The SEGD 2012 ADA White Paper Update is also an important reference, downloadable at http://www.segd.org/2012-ada-white-paper-update. ADA technical assistance is available by calling the U.S. Access Board at 800–872–2253 or by calling the U.S. Department of Justice at 800–514–0301.

Typography Overview

Typography is the backbone of the sign graphic system because, as stated in Chapter 4, "The Information Content System," most of the informational content of a sign program is conveyed by words rather than pictorial elements. The word "typography" has its roots in a medieval Latin word *typographia,* meaning "letterpress printing," but also referring to the style, arrangement, or appearance of typeset matter. The latter is the subject of this section, as it applies to signage.

The invention of printing from movable type in Western culture is credited to Johannes Gutenberg (1390–1468), who implemented the idea of casting individual letters into metal type. (See Figure 5.2.) Printers composed these individual metal letters into words, sentences, paragraphs, and pages, then locked the composed type into a printing press, inked the type, and pressed it into contact with paper to transfer the ink to the paper. Gutenberg is also credited with much of the typographic measurement and terminology still used today, which has its origins in the era of metal type, which spanned close to 600 years, until digital type supplanted it in the late twentieth century.

Every written language has a set of characters that comprise the language. In modern Western alphabetical languages, many of which are based on the ancient Roman alphabet (also known as the Latin alphabet), the character set is relatively small, consisting of upper- and lowercase letters, numerals, special characters, and punctuation and diacritical marks. A standard character set for a typical modern Western language with a Latin-based alphabet consists of about 245 characters. In nonalphabetical Eastern languages, such as Chinese, Japanese, and Korean, the character sets can consist of upward of 20,000 characters.

5.2 A piece of metal type. Metal type, now obsolete after five centuries of use, formed the basis for the currently used typographic measurement system.

Whatever the language, these character sets are expressed in *typefaces,* which vary in the way they depict the characters stylistically. Note that, today, the terms *type font*, or just *font,* are often used interchangeably with *typeface*, but this book uses the more correct term *typeface* when referring to the unique visual characteristics of any given set of typographic characters. Think of a typeface in the same way you do a human face: each has its own unique distinguishing stylistic features. In contrast, *font* historically refers to a complete assortment of type of a given size, face, and weight, as typified by a drawer of old-fashioned metal type holding the entire character set of the 10-point size of the typeface Bodoni in the bold weight. Today, *font* refers to the digital file infrastructure that defines and supports the display and printing of a given *typeface* in various sizes. Two vernacular explanations of the difference include thinking of fonts as the generator of characters in a given typeface, and thinking of fonts and typefaces as analogous to MP3 files and the songs they encode.

Also note that there are typically several versions of a typeface: Straight and oblique (italic) at the least, often with variations in weight (light to bold) and character width (condensed to extended) in the straight and italic versions. Such a grouping of versions of a given typeface is termed a type family, and each of these versions within a type family is an individual font.

A plethora of typefaces exist for those languages that have Roman-based characters, including English, Spanish, French, Italian, and German. There are fewer typefaces for Western languages using non-Latin character sets, such as Greek and Russian, or for Middle Eastern alphabetical languages such as Arabic. And when it comes to nonalphabetical Asian languages, such as Chinese, Japanese, and Korean, there are even fewer typefaces. This is understandable, given the difficulty of designing a unified yet distinctive typeface for the thousands of characters that comprise these languages. It is for this reason that typography for non-Western languages will only be touched upon in this section; the focus here is primarily on Latin-based typography, as that is used in the United States. The anatomy of Roman or Latin type is depicted in Figure 5.3.

5.3 Anatomy of type.

5.3

Keep in mind that with such a wide range of typefaces available, particularly for Latin character sets, typically, EG designers use existing typefaces for signage programs, rather than designing new ones. There are three good reasons for this.

- Many existing typefaces are highly legible and well-proven in signage applications.
- Some signage projects, such as those that are part of a larger graphic standards program, actually *require* the use of a specific existing typeface(s), to create or maintain a consistent graphic or brand identity at the client's various facilities and sites.
- Use of existing typefaces is standard practice for signage programs because typeface design is a complex process, requiring specialized skills that are, in most cases, beyond the EG designer's range of expertise. In such cases, engagement of a professional type designer is necessary.

The creation of a new, customized typeface for a given signage program is rare, even though custom type design is gaining ground for branding programs. Should the client wish to include custom typeface design for a signage project, the project design fees must take into account this additional, highly specialized outside service. And, of course, any custom typeface for signage must be designed for high legibility and stylistic longevity, as well as ADA conformance.

Choosing a Typeface

Typeface selection is key to the visual appearance of a sign program's graphic system, particularly as typography is the predominant graphic element for communication of sign information. Selecting a typeface can seem an overwhelming task, however, because as just noted, typefaces abound for Latin character sets. Generally, there are four factors that can aid in selecting typefaces for a signage program:

- Formal suitability
- Stylistic longevity
- Legibility
- ADA/SAD guidelines

Formal Suitability

Formal suitability refers to how well a typeface suits a given project, both in terms of how visually compatible it is with the project environment and its stylistic longevity. Regarding visual compatibility, in broad terms, there

5.4

5.4 Serif letterforms carved into the entablature of ancient Rome's Pantheon.

are two basic typographic styles: *serif* and *sans serif,* each of which has broad stylistic connotations.

The primary distinguishing feature of serif letterforms is the presence of serifs, or "feet," the short horizontal strokes at the upper and lower ends of the main letterform strokes. Serif letterforms were invented by the ancient Romans, and elegant, beautifully carved serif letters still can be seen gracing the archaeological sites of the Roman Empire. Most serif letters also exhibit varying, thick-thin stroke widths within each letterform. It is thought that both serifs and thick-thin strokes were the result of the acts of carving letters into stone with flat-nosed chisels, and of calligraphic writing on paper or skins using flat-nosed reeds as pens. Some of the earliest serif typefaces, whose design is rooted in ancient Roman carved letterforms, date back to the 1570s. (See Figure 5.4.)

Sans serif means without serifs, so it should not be surprising that the primary distinguishing feature of these typefaces is the lack of serifs, or "feet." Most sans serif letters also have relatively uniform stroke widths within each letterform, so uniform or near-uniform strokes are another distinguishing feature of sans serif letters. Although sans serif letterforms are visually simpler than serif letterforms, sans serif typefaces are relative newcomers to the typographic scene, with origins in the early 1800s. (See Figure 5.5.)

Given the ancient origins and visual complexity of serif letterforms, contrasted with the relative newness and visual simplicity of sans serif letterforms, it's no surprise that serif typefaces have traditional connotations and sans serif typefaces have contemporary connotations.

Serif Faces	Sans Serif Faces
Typography Bodoni Roman	Typography Avenir Roman
Typography Caslon 540 Roman	Typography Futura Book
Typography Adobe Garamond Regular	Typography Gill Sans Regular
Typography Goudy Oldstyle	Typography Gotham Medium
Typography ITC New Baskerville Roman	Typography MetaPlusLF Normal Roman
Typography Times Roman	Typography Myriad Roman

5.5

5.5 Examples of serif and sans serif typefaces.

Therefore, serif typefaces are generally better suited for use on signage projects where a traditional look is desired, whereas sans serif faces are better suited for projects where a contemporary look is desired. Sometimes, of course, visual contrast or juxtaposition is desired, which can be created by using a sans serif typeface in a project with a traditional context, by using a serif typeface in a project with a contemporary context, or by combining serif and sans serif typefaces in the same program, which can be necessary due to the ADA's SAD requirements. One of the first questions we ask at our office when we start designing the graphic system for a signage project is: Is this a serif or sans serif project?

Typefaces for languages with non-Latin character sets also fall into serif or sans serif styles to a greater or lesser extent, depending on the language. Those for the more Western Cyrillic (Russian) and Greek languages are available in styles that can be clearly identified as serif or sans serif.

Typefaces for languages such as Arabic, Chinese, and Korean are available in calligraphically derived thick-thin styles, as well as in styles with more uniform stroke thicknesses. Though the more calligraphically derived typefaces do not feature serifs per se, they have the more traditional connotations of Western serif type styles, while typefaces with more uniform stroke widths have the more contemporary connotations of Western sans serif type styles.

Though there are endless stylistic variations and subcategories of Roman letterforms and typefaces, most can be broadly classified as either serif or sans serif. This does not, however, include the large number of typefaces that are categorized as novelty faces, those that are so distinctive and quirky that they can usually be ruled out for use in a signage program. (See Figure 5.6.) And this brings us to the matter of stylistic longevity.

Stylistic Longevity

While trendy, novelty typefaces may be desirable for advertising and other relatively ephemeral, short-lived graphic campaigns, including temporary

5.6

5.6 Examples of novelty typefaces.

event signage, permanent signage programs tend to have comparatively long life spans. In fact, it's not at all uncommon for sign programs to endure for years, if not decades. For this reason, stylistic longevity of typefaces is an important selection factor for permanent signage programs. Trendy typefaces often become quickly dated, thereby prematurely dating a sign program. The ADA's SAD also comes into play, requiring that characters used in signage be "conventional in form." This is not to say that novelty typefaces can never be used in a signage project, for every project is different; nor is it to say that the EG designer has no creative freedom in typeface selection. There are several timeless typefaces, serif and sans serif—some designed centuries ago, others only a few years ago—that have the stylistic longevity suitable for permanent signage programs.

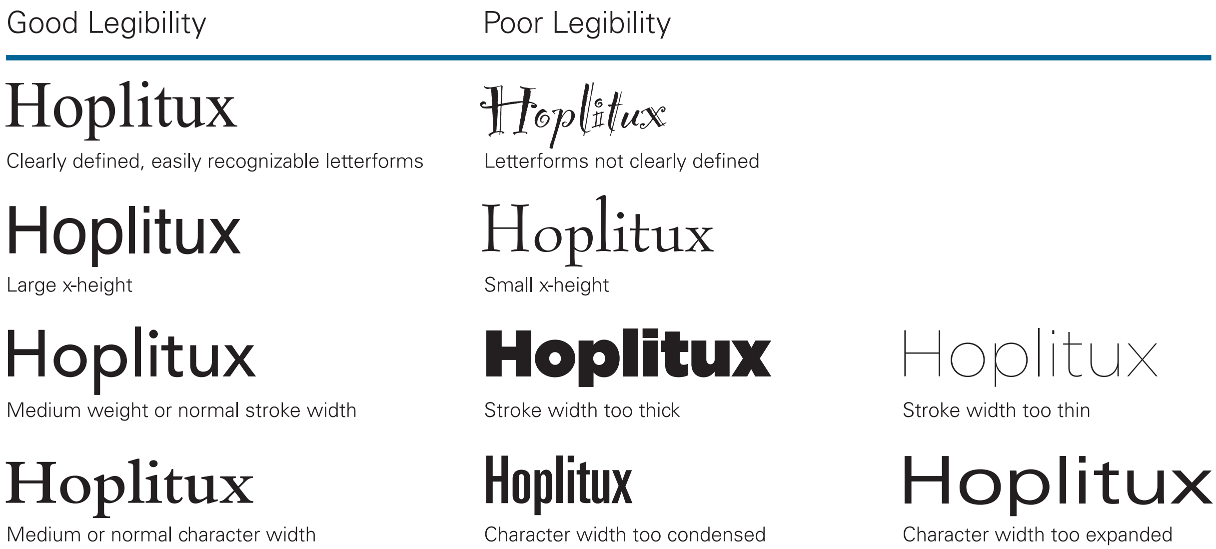
Legibility

Legibility is a crucial factor in typeface selection for sign program graphics, and it's linked to both formal suitability and longevity. Simply put, a legible typeface is easy to read, and since the objective of the graphic system of a sign program is to communicate information, it must be easy to read and understand so that viewers can act upon the information easily and seamlessly. Legible typography is essential for clear communication, and many novelty typefaces are so stylistically errant that they fail to meet the primary purpose of a signage typeface: to be legible.

Scientific studies have been conducted on typeface legibility, but it's not the purpose of this book to go into such technical detail. However, there are some basic parameters that help to determine the legibility of a typeface. (See Figure 5.7.) Legible typefaces tend to exhibit the following characteristics:

- They have clearly defined, easily recognizable letterforms.
- They have a large "x-height."
- They are of medium weight, with stroke widths that are neither too thick nor too thin.
- They are of medium or normal character width, with letterforms that are neither too condensed nor too expanded.

There are also considerations regarding the legibility of serif versus sans serif type in signage. The horizontal strokes of serif letterforms are generally regarded as an aid to reading large blocks of small text, such as in a book or a newspaper, whereas serif faces are often considered to be too delicate in form for signage graphics in critical communication applications such as highway signs. Think about it: You rarely see book or magazine text set in sans serif type and, conversely, you rarely see vehicular-related sign graphics in serif type. This is not to say that serif typefaces can't be used for signage, but that their legibility should be carefully studied for vehicular signage applications.



5.7

5.7 Characteristics of good and poor legibility in typefaces.

ADA Conformance

Typographic conformance to the SAD signage provisions may impact all of the above typeface selection factors, particularly in the United States. Again, it's not the intent of this book to provide technical or legal guidance on the ADA signage provisions, but the EG designer must be thoroughly versed with the SAD's extensive typographic requirements for both tactile/raised and visual characters on signs. These requirements affect typeface selection, and the requirements for tactile/raised characters are different in most cases from those for visual characters. For example, under the SAD, serif typefaces aren't permitted for tactile/raised characters, but are permitted for visual characters. This, in turn, may lead to the need to select both serif and sans serif typefaces that are both ADA-conforming and stylistically compatible with each other for use on different kinds of signs within a given sign program. Keep in mind that this is just one example of the myriad typographic considerations the SAD brings to the EG designer's attention.

Typographic Treatment

In addition to the legibility, or lack thereof, intrinsic to the design of any given typeface, typographic treatment can also affect legibility. Typographic treatment refers to variables that can be manipulated to affect how a typeface looks when it is set, such as *case* and *letterspacing.*

Most Roman-based typefaces are composed of two versions of the same characters: an uppercase ("capital" or "cap") version and a lowercase

Making the Roadscape Understandable: Development of the Clearview Type System

Donald Meeker and James Montalbano

Road and traffic signs are perhaps the single most prominent manifestation of government that citizens confront on a daily basis. They often appear as an eclectic assembly of panels loosely defined by functions to guide, warn, regulate, and identify. The result may be cluttered, seemingly ubiquitous, outdated displays.

To accommodate the Interstate Highway System, road signs were standardized in the late 1950s. A primary focus was to create a uniform system of guide signs nationwide. In the following years, materials and manufacturing technologies changed but the designs and specifications for signs did not. When computer systems dramatically changed planning, design, and production, the same old formats and typefaces were applied in adapted forms. Could the status quo be challenged?

In the late 1980s we were contracted to design a travel information sign program for highways in the State of Oregon. The State wanted an added layer of tourist destinations for motorists but with less clutter. Existing intersections presented a visual cacophony of guide signs, route markers, and miscellaneous regulatory signs. We concluded that it was not possible to add news signs at already cluttered intersections.

After completing the Oregon project, we assembled a team and began to study road sign typography as an academic pursuit. We wanted to aid readability, reduce road sign clutter, and positively impact design, planning, and production. To do that, we had to improve the typography and overall design.

The landmark 1964 work of Jock Kinneir and Margaret Calvert for British Transport was instructive. Their typefaces and formats created a standard in the United Kingdom and many other countries. We studied Adrian Frutiger's typeface for signage at Charles De Gaulle airport and the European DIN standard that was used on road signs. We looked at dozens of sans serif fonts enlarged in both positive and negative contrast to compare in measured viewing conditions. Still, none of the typefaces we evaluated used the system of type weights and widths that our preliminary study suggested. In the end, we needed to design a new typeface that would address all the requirements identified in our analysis.

The two primary stroke weights used for existing guide signs—FHWA Series E-modified used on freeway signs and Series D for conventional road guide signs—were our starting point. The new typefaces would optimize the design of the lowercase because, as we learned, readability is predicated on the clear definition of the word pattern—an attribute not afforded by the typical uppercase displays.

Mixed case reduced the size of word footprints. Since we did not know if one-for-one substitution of a new mixed case would work, we tested the feasibility of our proposed changes. The performance requirements went well beyond basic daytime reading and well beyond conventional testing methods.

As the American population was aging, readability had to address needs of older drivers. In the early 1990s, the FHWA suggested that all sign legends be increased 20 percent in height to accommodate older drivers. That increase would have made all signs half as large overall. The carrying capacity of structures and availability of roadside real estate presented incontrovertible problems, and didn't take into account the perceptual and visual changes that come with aging. For example, older drivers have increased contrast sensitivity at night. Effective signage had to eliminate or control halation (overglow) created by headlamps on new high-brightness sign materials. This led us to study letterspacing and the space surrounding a word as much as the word itself.

With our research partners at The Larson Institute at Penn State University, we undertook studies that looked at legibility and readability. Beginning in the mid-1990s our new typeface designs tested significantly better than existing FHWA standards, but not consistently to our goal of a 20 percent improvement for the same size sign.

Our design focused on eliminating needless massing in letterforms where strokes converge to opening counters and the configuration of terminals that closed letter shapes viewed from a distance. This was done based on very specific requirements for stroke and letter width and became the foundation of the design.

The typeface Clearview was born from a labor of field-testing and research studies. Considering the challenges that distance and movement present, we needed to optimize letterspacing; as the space between letters looks tighter from a distance, and to find the widest possible stroke width for guide signs without overglow.

Influenced by two studies we had conducted on word footprints, we redesigned the original

Clearview lowercase alphabet, making lowercase letters proportionally taller than conventional typefaces. The letters were then slightly compressed to have the same width but to carry a slightly heavier stroke weight. This modification increased the interior shapes of the letters, prevented overglow, and improved the overall readability of the word. In 2002, the refined Clearview was presented to officials from PennDOT, TexDOT, and FHWA. The results were very persuasive. At that point we felt we had the foundation for a typeface design that could be central to overall traffic sign design.

We completed the design of Clearview with plans to create a six-font type system for positive contrast. From that we then developed a second version for negative contrast applications. The

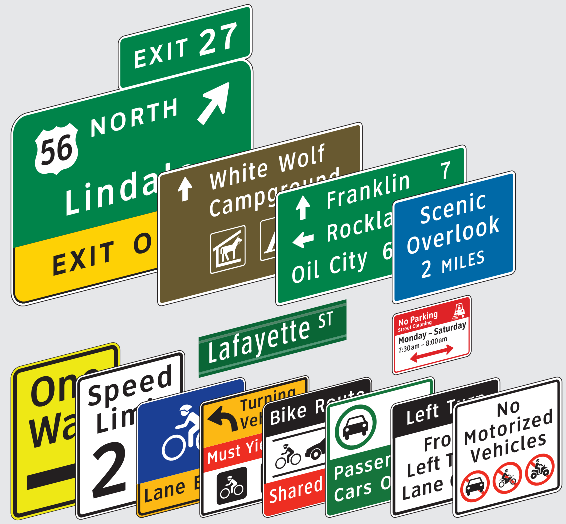
Making the Roadscape Understandable: Development of the Clearview Type System continued

stroke width of dark on light letters for use on retro-reflective materials had to be tuned to equalize the apparent size to that of positive contrast formats.

In the fall of 2004, the FHWA gave state DOTs "interim approval" for the use of Clearview on guide signs. Based on observation of the guide signs, well over half of U.S. state highway departments, cities nationwide, and all provincial governments in Canada adopted Clearview.

We then designed a system of mathematically proportional guide sign formats for conventional roads. Clearview formats provide a way to consolidate three sections in the MUTCD into a common set of layouts and uniform type standards. The Clearview format is easily adaptable to computerized layout because there is a consistent logic to the relationship of all elements: type, space, border, symbols, and so forth.

Upon review of nearly 600 regulatory and warning signs, each based on different layouts with various type weights and sizes, we asked if uniform criteria for design could improve readability. A team at The Larson Institute is now conducting research on the use of Clearview for negative contrast applications primarily for use on safety-critical signs. The preliminary results are very positive and should allow for continuing upgrades to road sign design.



Clearview is more than road signs. It has been applied to designs for parking control and street name signs, regulatory postings, guide signs, as well as a comprehensive system of signs to aid safe cycling. It appears in adapted forms to comply with ADA requirements as used for signage in airports and other public buildings. An expansive text version of Clearview has been developed in eight weights in regular, condensed, and compressed formats.

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version. *Case* refers to which version or combination of versions is used, and this significantly affects both the legibility and appearance of typography. Case treatments include:

- ALL UPPERCASE (CAPITALS or CAPS)
- Title Case (Initial Caps)
- Sentence or mixed case
- all lowercase

Typography

TYPOGRAPHY

5.8 The Title Case treatment of the word *typography* aids legibility because it has a more distinct footprint.

The most common, and most legible, case treatment for sign typography is Title Case, in which all words, with the exception of so-called "helper" words such as conjunctions and prepositions, have their initial letters set in uppercase with all subsequent letters of the word set in lowercase. Much like book titles, most sign messages are single words or a short series of words—for example, Restrooms and Food Court—therefore, title case is the most appropriate treatment.

Title case treatment may seem counterintuitive to nonpractitioners of graphic design, who often have the mistaken notion that all capitals are somehow more legible because they're bolder or simpler. The reality is that because lowercase letters have more distinctive shapes and greater variation among those shapes than capital letters, lowercase letters form a more distinctive word footprint, making them easier to read than an all-caps footprint. (See Figure 5.8.) For confirmation, consider the difficulty of reading a book or magazine with text set in all caps. Such text is set in sentence case, with an initial cap on the first word of each sentence, because it's more legible than all caps.

Sentence case treatment of signage typography is usually reserved for detailed information that is in whole sentences, such as operational, regulatory, or interpretive text. And all lowercase treatment of sign typography, while occasionally seen on sign programs in Europe, is rare in the United States.

Although sign messages in all caps are less legible than messages in title case, particularly for the non-visually impaired, all-capital messages can have a commanding, magisterial, even elegant appearance, à la ancient Roman letterforms—which were all capitals—carved into the edifices built by that civilization. Indeed, certain sign messages, such as STOP and EXIT are mandated by various codes to be displayed in all caps. Additionally, the ADA requires tactile/raised character identification sign messages in all capitals. So, there's no doubt that all-caps case treatments can be appropriate for all typography in some sign programs, and indeed are required for the tactile/raised typography within a program. Keep in mind, however, that since the capital letters are larger than the lowercase letters of any typeface, messages set in all caps take up more space on the sign face than messages set in Title Case at the same type size. (See Figures 5.9 through 5.11.)

Letterspacing is another typographic treatment variable that affects the legibility and visual appearance of typefaces. Letterspacing, also known as *tracking,* is the manipulation of spacing among all the letters in a word. Letterspacing and tracking, which affect spacing throughout a word or group of words, should not be confused with the term *kerning*, which refers to manipulation of spacing between individual character pairs within a word.

Most type fonts, which are digital files, are engineered to set with the default of "normal" letterspacing/tracking, typically indicated as zero (0), which is the "not too much, not too little" spacing people need to comfortably read text. Normal letterspacing can be varied by increments on the plus, or positive (+), side of zero, to increase the space between letters, or on the minus or negative (–) side, to decrease the space to the point of making the letters touch, or even overlap. (See Figure 5.12.)

To aid legibility, signage typography should be set with normal or slightly open, positive letterspacing/tracking. Negative or tight letterspacing treatments, while they can add drama and immediacy to the appearance of typography, impair legibility and so are best employed for graphic design applications other than signage. Two specific instances in which more open typographic letterspacing treatments should be studied are for vehicular-related signage and for internally illuminated signage. Both situations can pose viewing condition and human factor issues that can be mediated by increased letterspacing. In addition, the ADA's SAD has letter/character spacing requirements—which are different for both tactile/raised and visual characters—that support open letterspacing.

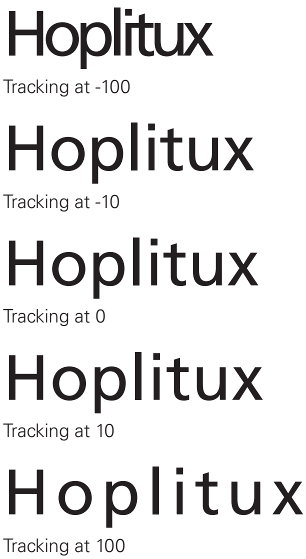
The openness or tightness of normal, default letterspacing varies from typeface to typeface. Some type fonts are engineered to "set tight" at

5.9

5.10

5.11

5.9, 5.10, and 5.11 Different case treatments on signs: all lowercase, title case, all capitals.



normal letterspacing, while others "set loose." Therefore, it's important to study letterspacing variables for each typeface considered for a signage program to select the appropriate letterspacing treatment for optimum legibility and ADA conformance. And, generally, once a letterspacing standard is determined for the chosen typeface(s), to foster visual unity the spacing standard should be used as consistently as possible throughout the program, given the different ADA letter/character spacing requirements for tactile/raised and visual characters. (See Figures 5.13 and 5.14.)

It's important to note that letterspacing increments may vary with different computer programs, including increments for normal or zero letterspacing. The EG designer should check all typography set by others, such as sign fabricators, for letterspacing conformance to the designer's examples. It's also important to remember that regardless of computer program increments, the more open the letterspacing, the more space typography will take up on the sign face.

One typographic treatment is mentioned here only in passing because it is considered amateurish by graphic design professionals and, therefore, should be strictly forbidden in any sign program's typography: horizontal or vertical scaling. Most computer graphics programs allow typefaces to be scaled more or less than 100 percent in the horizontal or vertical axis; but this grossly distorts typeface proportions, and is usually done in an effort to cram a too-long message onto a sign face of limited size by reducing the typeface's standard character width. (See Figure 5.15.) Some graphic designers consider horizontal or vertical scaling of type to be so heinous as to dub it a "type crime." As we say in our office, just like Mr. Whipple in an old TV commercial, "Don't squeeze the Charmin, and don't squeeze the type." Additionally, the ADA places limits on character width-to-height ratios.

5.12 Typographic letterspacing can be made tighter or looser than normal by adjusting tracking.

5.13 Sign layouts with inconsistent letterspacing impair visual unity.

5.13

Typography

Helvetica Regular Set at Track 0

Typography

Univers 55 Roman Set at Track 0

5.14

Typographic Considerations in Signage for People Who Read by Touch

Thus far, we've covered typographic treatments for sighted sign users, but as discussed in Chapter 4, "The Information Content System," the ADA contains provisions to improve signage accessibility for visually impaired people. Again, it's not the intent of this book to exhaustively delineate the ADA's signage provisions, but to provide highlights of its impact on signage design, including sign typography.

ADA guidelines require that identification signs for all permanent rooms and spaces display the room or space name in tactile/raised typography, accompanied by Grade 2 Braille. Tactile/raised typography and Braille are required for people with no or very limited vision who read the identification sign messages by touch rather than sight. For this

5.14 Helvetica is a typeface that sets tight, whereas Univers is a typeface that sets loose.

5.15 Typeface proportions distort badly if character widths are manipulated to fit long messages onto signs of limited width.

Typography

Helvetica Bold Set Normal

Typography

Helvetica Bold Set at 70% Horizontal Scaling

5.15

reason the ADA places other limitations on tactile/raised typography for permanent room identification signs. Within the current SAD, limitations include the following aspects of typography for permanent room identification signs:

- *Character width (termed "Character Proportions" in the SAD)* must not be too condensed (narrow) or too extended (wide), and must fit within the specified character-width-to-height range.
- *Stroke width (termed "Stroke Thickness" in the SAD)* must not be too bold (thick), and must not exceed the maximum stroke-width-to-height specification.
- *Typographic style* is limited solely to sans serif typefaces. Additionally, sans serif letterforms that are italic, oblique, script, highly decorative, or of other unusual forms cannot be used.
- *Case* is limited to all capitals.

As explained earlier in this chapter, Title Case is more legible than all capitals. So why does the SAD require all capitals, as well as the other limitations, for tactile/raised typography? Again, tactile/raised typography is for reading by touch rather than sight and the variety of form that makes lowercase letters easier for people to read by sight makes lowercase letters harder to read by touch than all caps. Similarly, straightforward, non-ornamented letters are easier to read by touch, as are letters that don't deviate much from "normal," in character width or stroke width.

Typography for signs that aren't for permanent room identification, such as directional signs, is classified as "Visual Characters" in the SAD, with a set of requirements introduced in the 2010 SAD. These visual character requirements place limitations on various aspects of sign typography and differ from the tactile/raised character requirements in important ways, so it's important for EG designers to understand the distinctions between the SAD's requirements for tactile/raised characters and visual characters. The ADA also affects other aspects of sign graphics, touched on throughout this chapter and book.

As noted in Chapter 4, "The Information Content System," the SEGD 2012 ADA White Paper Update, which provides the SEGD's current interpretation of the ADA as it relates to signage, provides useful guidance on sign typography and other aspects of SAD signage conformance. The White Paper Update can be downloaded at http://segd.org/2012-ada-white-paper-update. Just as important is the SAD document itself, which is available at www.ada.gov or at www.access-board.gov. It's also advisable to check the Access Board and SEGD websites periodically for updates, clarifications, and webinars on the

SAD and signage. Additionally, the SEGD and the International Sign Association (ISA) have ongoing programs to educate their members about the signage aspects of the ADA.

Symbols and Arrows

Recall from Chapter 4, "The Information Content System," that symbols and arrows are graphic devices that communicate information pictorially—that is, without words. Also recall that the words *symbol, glyph, icon, pictograph,* and *pictogram* are all basically synonymous and are used interchangeably to refer to a picture that represents a word or concept—for example, how a picture of a taxi represents the word *taxi,* or a picture of an airplane represents the concept of *airport.* As a reminder, this book primarily uses the term *symbol* to refer to these pictorial devices, and considers directional arrows as symbols, in that they are pictorial representations for directional indicators such as Straight Ahead, Turn Left, and the like.

Humankind's use of simple pictures to communicate visually predates the development of written languages. Some of the earliest examples of pictorial communication are the Lascaux cave paintings, circa 15,000–10,000 BC, in southern France. It is thought that these paintings tell hunting stories. As cultures advanced, many early written languages were based on the use of pictures in an organized fashion, such as the hieroglyphic language of ancient Egypt. The Chinese language was, and still is, pictorially based, with each character representing a word or concept, as opposed to English, an alphabetical language in which words are assembled from alphabetical characters. And even the Latin or Roman alphabet, as used in most Western European languages, including English, evolved from a series of pictorially based characters.

In signage, symbols can replace typography to communicate certain messages, or augment typographic messages. For example, an airplane symbol can replace the word *airport* on a sign, or a wheelchair symbol next to a destination name can indicate the wheelchair-accessible route to that destination. Symbols can also be paired with typographic messages on signage to reinforce the typographic message, such as when the airplane symbol is paired with the word *airport.* This typographic/symbol pairing can be useful in multilingual signage environments such as airports, hospitals, exposition centers, and theme parks to reduce the need for multiple languages on the signs.

Some symbols, such as the airplane or wheelchair symbols, are almost universally understood, because they directly depict relatively simple concepts, as explained in Chapter 4, "The Information Content System." Other words or concepts, such as *outpatient clinic* or *passenger drop-off* are not as easily depicted in a symbol, so the meaning of symbols developed for such concepts often needs to be learned for the symbols to be understood. And, remember, cultural differences can affect symbol recognition and understanding.

Arrows are symbols that are well understood worldwide as directional devices, replacing lengthy verbal indications of direction. For example, an arrow pointing left is clearly understood to mean "turn left"; therefore, the words *turn left* are typically replaced by a left arrow in sign graphics. The same is the case for other arrow directions, as depicted in Figure 5.16.

Symbol Vocabularies

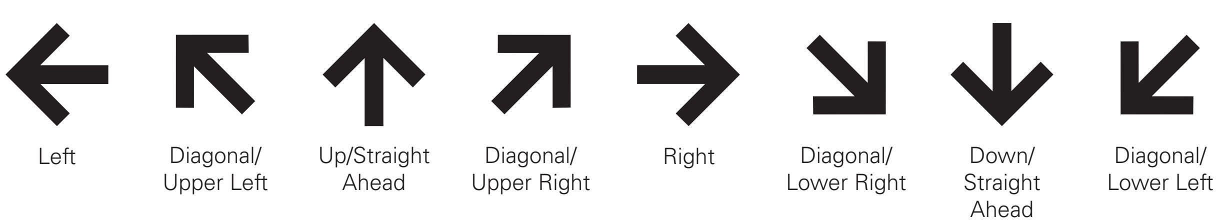
Just as a given typeface can be considered a vocabulary of characters of a given, unified style, EG designers should consider the symbols they use for sign graphics as a vocabulary. In order to communicate clearly, the vocabulary of a sign program's symbols and arrows require visual unity, clarity, and simplicity in their graphic design. And keep in mind that even if other symbols are not used for the graphic system of a given sign program, at the very least that program will require a vocabulary of arrows.

The EG designer has two basic sources for symbol vocabularies:

- An existing symbol vocabulary or vocabularies adopted for the project
- A completely new symbol vocabulary created for a specific project

The second source is far less common than the first. As pointed out earlier in this chapter about custom typefaces, there are three reasons for this, primarily because developing a new symbol vocabulary is a labor-intensive process, requiring much testing and revision. Second, a new symbol vocabulary may not be as readily understood as an existing one. Third, use of an existing symbol vocabulary may be required for a given signage project. For these reasons, just as it's not common for EG designers to include the design of a new, custom typeface in the design services for a signage program, design of a custom symbol vocabulary is

5.16 Arrow directions.



5.16

typically not part of signage design services. And, remember, should the client request the design of a custom symbol vocabulary, the design fee must cover the research and development time involved with this task.

Given that design of a new symbol vocabulary is the exception rather than the rule, we'll turn the focus here to use of existing symbol vocabularies. By far the most commonly used symbol vocabulary in the United States is the AIGA/DOT symbol system, which was developed by the American Institute of Graphic Arts, in conjunction with the U.S. Department of Transportation for U.S. transportation facilities. Development of this symbol vocabulary, which took place in the 1970s, was a major undertaking, involving considerable research and development on behalf of several parties, including various teams of distinguished graphic designers. Examples of the 50 symbols in the AIGA/DOT vocabulary are shown in Figure 5.17; the various display formats are shown in Figure 5.18.

The AIGA/DOT symbols, which have been adopted for signage use by various transportation authorities and facilities, are now in such widespread use they're generally well recognized by travelers

5.17 Selected symbols from the AIGA/DOT symbol vocabulary, which is composed of 50 symbols.

5.17

5.18

5.18 The five different display formats for the AIGA/DOT symbol vocabulary.

5.19 SEGD symbols for accessibility.

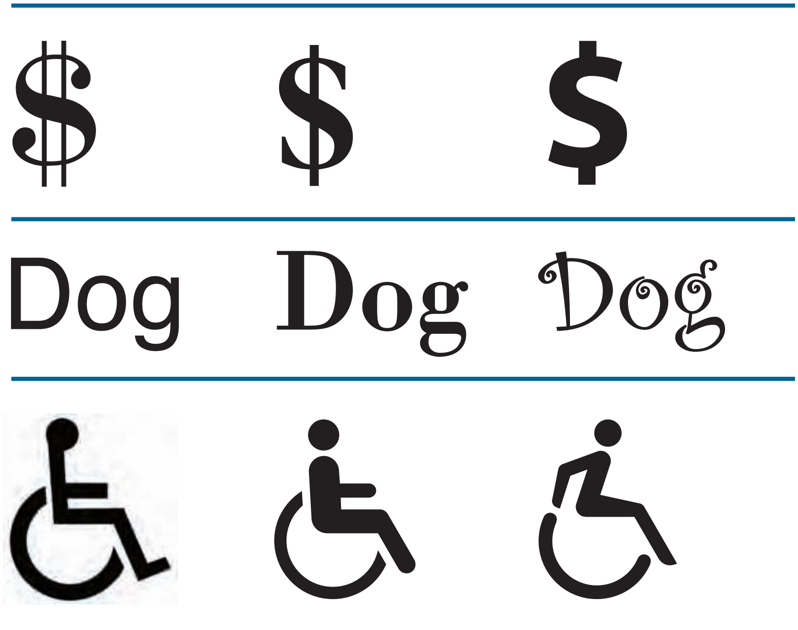
throughout the United States. Digital artwork for this transportation symbol vocabulary is available free of charge at the AIGA and SEGD websites.

In addition to the original AIGA/DOT symbol set, the SEGD developed a set of Symbols for Accessibility, which includes four symbols specifically developed for signage and graphics associated with the ADA. These SEGD accessibility symbols, shown in Figure 5.19, which were designed to be stylistically compatible with the AIGA/DOT symbols, are available free of charge from the SEGD. We add the caveat that official recognition of accessibility symbols has become an open issue that could affect use of the SEGD accessibility symbols.

The most recognized of the SEGD accessibility symbols is the wheelchair accessibility symbol, which varies stylistically from the less visually sophisticated version depicted as the International Symbol of Accessibility (ISA) in the SAD guidelines. Both of these symbols are shown in Figure 5.20, along with a more active version on the right. Although all versions in the figure depict a side view of a person in a wheelchair, only the SAD ISA version on the left is currently considered to be the officially recognized standard. The other three SEGD accessibility symbols shown in Figure 5.19, which also have similar pictorial content but are stylistically different from those depicted in the SAD, should also be presumed not to be officially recognized.

In the interest of improving inclusiveness, legibility, and access for all, various design professionals and advocacy groups in recent decades have

5.19

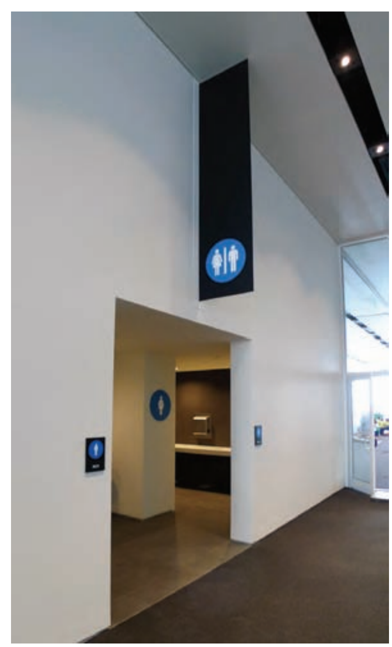


5.20

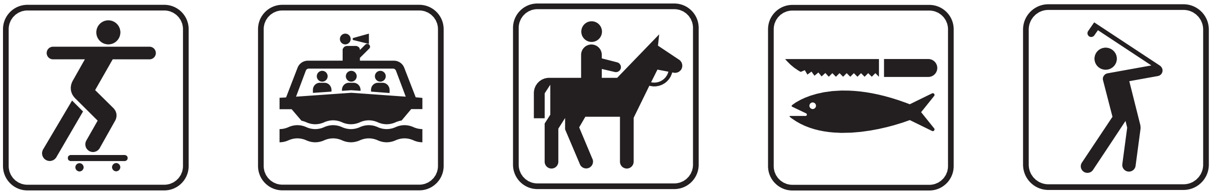
5.20 The intrinsic meaning of the dollar sign, the word *dog,* and the wheelchair access symbol remains the same with different stylistic treatments.

developed different graphic treatments of the wheelchair accessibility symbol. A PDF depicting many of these stylistic variations can be downloaded on the SEGD's Accessibility Symbols page at www.segd.org/accessibility-symbols. Similarly, the informational and visual content of the three access symbols represented in Figure 5.20 is the same—a wheelchair—and they differ only in the graphic style in which they're treated, just as the dollar sign and the word *Dog* have the same informational content regardless of the stylistic differences among the typefaces displaying them. There are ongoing efforts to gain official recognition for more inclusive, humanistic, visually evolved versions of the access symbol.

The AIGA/DOT symbol vocabulary is particularly appropriate if you're designing a sign program for a transportation facility. Many of these symbols, such as those for restrooms, escalators, and stairs, are not specific to transportation and are used on signage for a wide range of facilities. (See Figure 5.21.) But what about symbol vocabularies that venture beyond the transportation focus of the AIGA/DOT symbols? The SEGD has developed a vocabulary of 109 symbols for recreation-related facilities, some of which are shown in Figure 5.22 and which were designed to be stylistically compatible with the AIGA/DOT symbols. The SEGD recreation symbols are available free of charge at the SEGD website. Additionally, as noted previously, the SEGD has participated in the Hablamos Juntos Universal Symbols in Healthcare initiative, sponsored by the Robert Wood Johnson Foundation, and headed by



5.21 Symbols are displayed prominently at the Owensboro Convention Center in Kentucky.



5.22

5.22 Selected symbols from the SEGD recreation symbols vocabulary.

5.23 Selected symbols from the Hablamos Juntos healthcare symbols vocabulary.

Hablamos Juntos with JRC Design. The 54 symbols in the Hablamos Juntos Healthcare vocabulary are also available free of charge from the SEGD. A selected sampling of these symbols is shown in Figure 5.23.

There are also commercial sources for symbol vocabularies beyond the AIGA/DOT and SEGD transportation, recreation, and healthcare vocabularies just discussed. A major source is *Official Signs & Icons 2* by Ultimate Symbol/Mies Hora, which is a compilation of more than 4,800 EPS vector files on CD-ROM, accompanied by a 240-page, four-color hardcover reference book. This definitive resource is the most comprehensive compendium of current standard signs, symbols, icons, and labels ever assembled, and it includes most of the aforementioned symbol vocabularies. Additionally, Ultimate Symbol has converted some of the previously discussed symbol vocabularies into Opentype pictorial fonts, which are available for purchase at the Ultimate Symbol website.

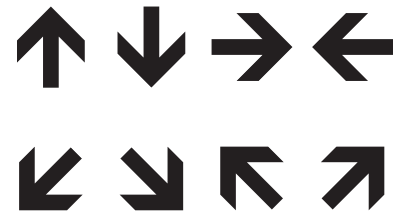
Other symbol and arrow sources include type foundries, many of which have fonts that are symbol vocabularies, and clip art libraries. Note, however, that symbol vocabularies from type foundries and clip art libraries are typically not stylistically compatible with the AIGA/DOT and SEGD vocabularies.

Arrows

Arrows are specialized, yet quite simple symbols, typically comprising a pointed head and a shaft, that are graphic representations of physical arrows, such as those used for sport or hunting. The AIGA/DOT symbol vocabulary also contains a vocabulary of arrows, as shown in Figure 5.24, which is one of myriad stylistic treatments for arrows. Several arrow treatments are shown in the illustration accompanying the sidebar

5.23

"Navigating the MUTCD Community Wayfinding Sign Guidelines," by Craig Berger, presented later in this chapter.



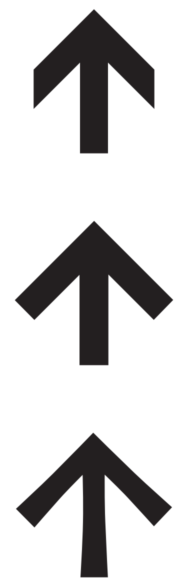
5.24 The AIGA/DOT arrow vocabulary.

EG designers tend to favor arrows with open heads and clear, orderly geometrical styles such as the Helvetica parallel, Helvetica perpendicular, and Optima perpendicular styles shown in Figure 5.25, or some variation thereof. The Helvetica arrows feature uniform stroke widths for the head and shaft, which refer to the basically uniform stroke widths of the Helvetica typeface. The Optima arrow features slightly curved, thick/thin strokes similar to those of the Optima typeface. The Helvetica-style arrows are compatible with sans serif typography, whereas the Optima-style arrow is compatible with serif typography.

Of course, EG designers don't limit themselves to using only Helvetica- and Optima-style arrows, not when such a wide range of stylistic treatments is possible. One word of caution in arrow use is in order, however: Arrows without shafts communicate less clearly than those with shafts, for the shafts reinforce the directionality of the arrows. (See Figure 5.26.) Also, some people may interpret a triangular, shaftless arrowhead as a geometric sign layout element rather than as a directional device. Every project is different, of course, so this is not to say that shaftless arrows should never be used; it simply points out their shortcomings.

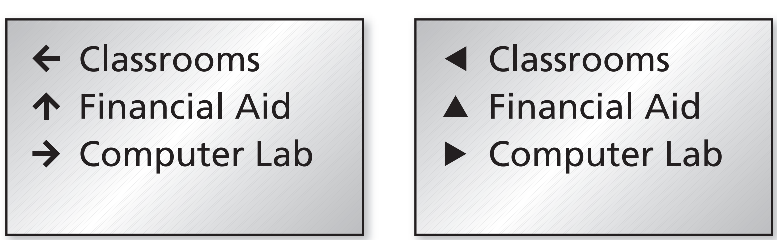
As with other kinds of symbols, the two primary sources for arrows are the creation of a new vocabulary of arrows for a given project and the adoption of an existing arrow vocabulary. Unlike an entire typeface, an arrow is a relatively simple geometric shape, and it can be easily constructed in any kind of vector drawing program and rotated in 45-degree steps for the various directions in the arrow vocabulary. Arrows can also be adopted from several existing sources, including:

- Arrows in the AIGA/DOT symbol vocabulary
- Various typefaces that include arrows, such as Zapf Dingbats
- Symbol and clip art libraries, including the aforementioned *Official Signs & Icons 2*



5.25 Helvetica parallel, Helvetica perpendicular, and Optima-style arrows.

5.26 Arrows without shafts can be confusing.



5.26

Diagrams

Diagrams, particularly maps, often comprise another element of a sign program's graphic system. As stated in Chapter 4, "The Information Content System," the subject of maps and diagrams is a deep one, particularly when maps on smart phones or other mobile devices are included, so this section will only touch on map and diagram design as they relate to a sign program's graphic system.

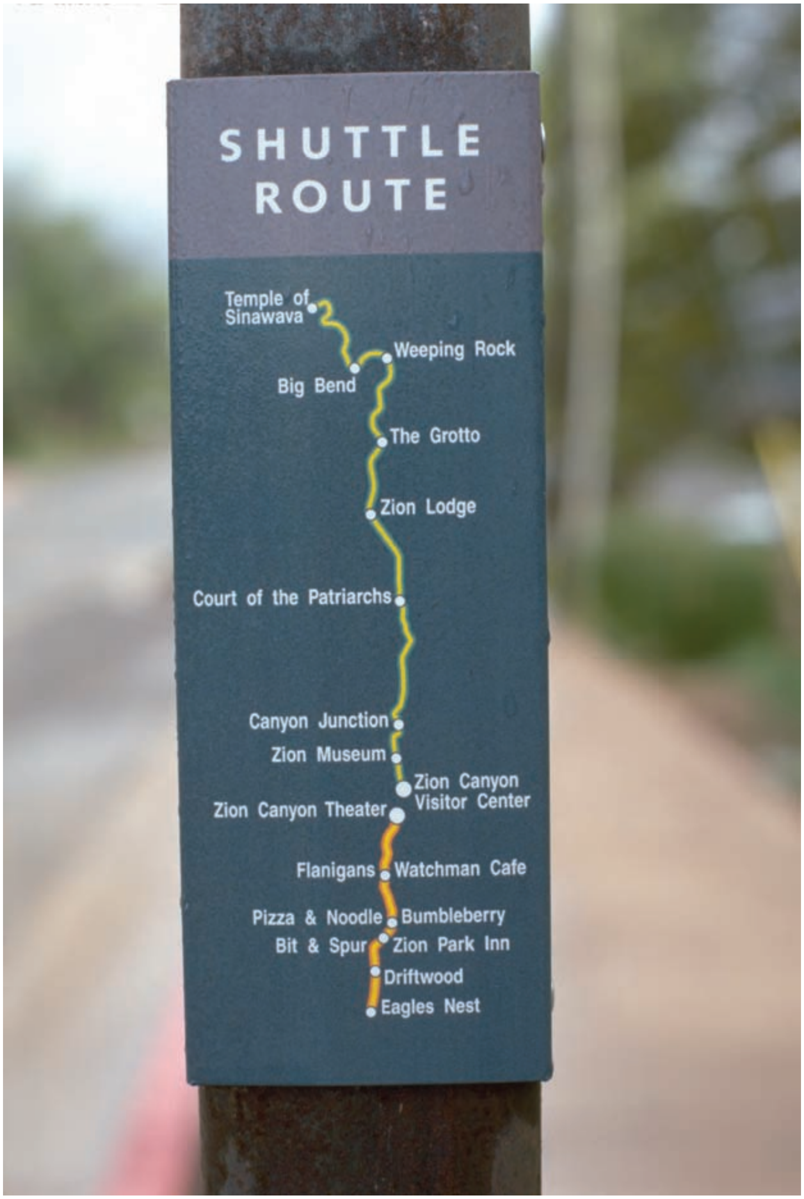
Maps used in signage are site-specific; therefore, they are best custom-designed for the project at hand, either by the EG designer or a commissioned specialist such as a cartographer. It's important to point out, however, that maps and diagrams can be difficult and time-consuming to prepare; furthermore, the need for, or extent of, these elements is often unknown when a fee proposal is prepared for a signage project. That is why EG designers often treat map and diagram design as an additional service to the signage program design.

Stylistic Treatment of Maps

Why should maps be custom-designed for a signage program when there are often many kinds of existing maps for a given environment, including architectural floor plans, Google maps, and maps available from GIS (Geographic Information System) sources? The simple answer is that most existing maps were developed for purposes other than signage and are, therefore, unsuitable for the communication purposes of a signage program, or they have a stylistic look that's incompatible with a sign program's graphic system. Sometimes, however, a suitable existing base map can be adapted and customized to a sign program's purposes. At the very least, existing maps and floor plans can often be used as a starting point for development of signage-purposed maps.

Whether designed by the EG designer or an outside specialist, the communicative and stylistic treatment of maps and diagrams is as unlimited as the communicative and stylistic spectrum of the graphic design field. Map design, in particular, can vary from highly realistic and geographically accurate to highly diagrammatic and abstract. Several examples of different styles of map design are shown in Figures 5.27 through 5.31, as well as throughout this book. The key to map design is for the map and other diagrammatic elements of a sign program to be as stylistically unified with the program's overall graphic system as possible.

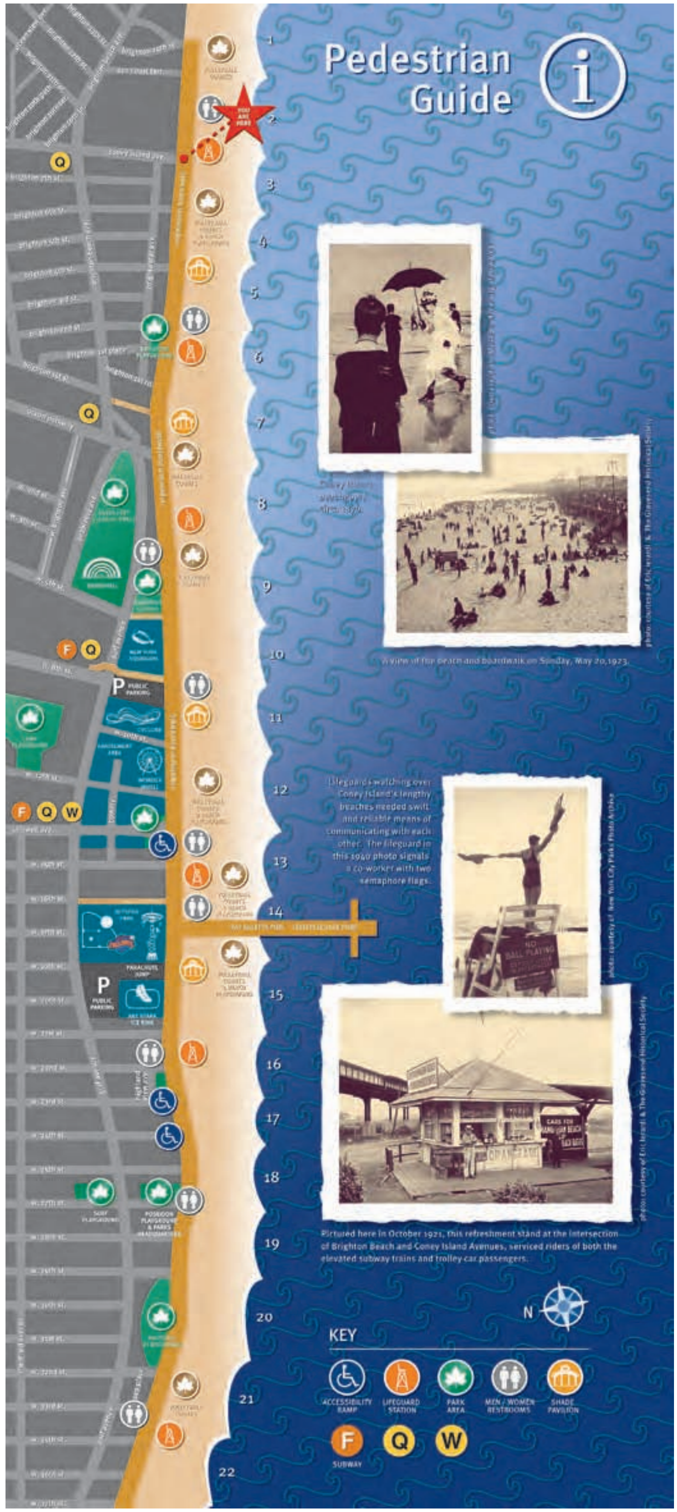
Ways to promote visual unity among a sign program's diagrams and other graphic system elements include using typeface(s), symbols, and colors that are the same as, or at least compatible with, those elements in the



5.27

5.27 Route map at Zion National Park in southwestern Utah.

program's overall graphic system. For example, if the Frutiger type family is used for the sign program's typography, it should also be used for map legend typography. Obviously, stylistic unity is easier to control when the EG designer is preparing the maps or diagrams. If, on the other hand, the maps are being prepared by an outside specialist, the EG designer should thoroughly brief that person on the graphic system's stylistic elements, as well as review his or her work in progress.



5.28 Park map with symbol legends at the Coney Island Boardwalk in Brooklyn, New York.

5.29

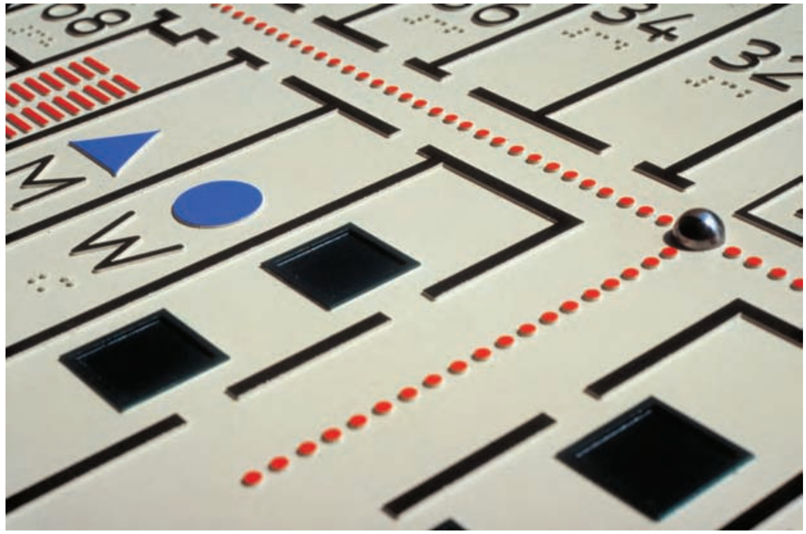
Map Orientation

Map orientation is a major issue in any signage program. When the top of the map is oriented in the direction the viewer is facing, it's described as a *heads-up orientation.* The heads-up orientation aids map comprehension because viewers are facing what's directly ahead of them on the map. Everything else is also logically oriented to the viewer, too: What's on the right side of the map is on the viewer's right, what's on the map's left is on the viewer's left, and what's toward the bottom of the map is behind the viewer. Paper maps, which are printed with North at the top, are

5.29 Cast bronze relief map for a luxury resort complex in Guangdong, China, has a bilingual legend and provides 3D detail unattainable with traditional flat maps.

5.30 Large-scale map of the National Mall in Washington, DC, features a heads-up, perspective orientation to enhance user comprehension. In a heads-up orientation, the top of the map is positioned in the direction the viewer is facing.

5.30



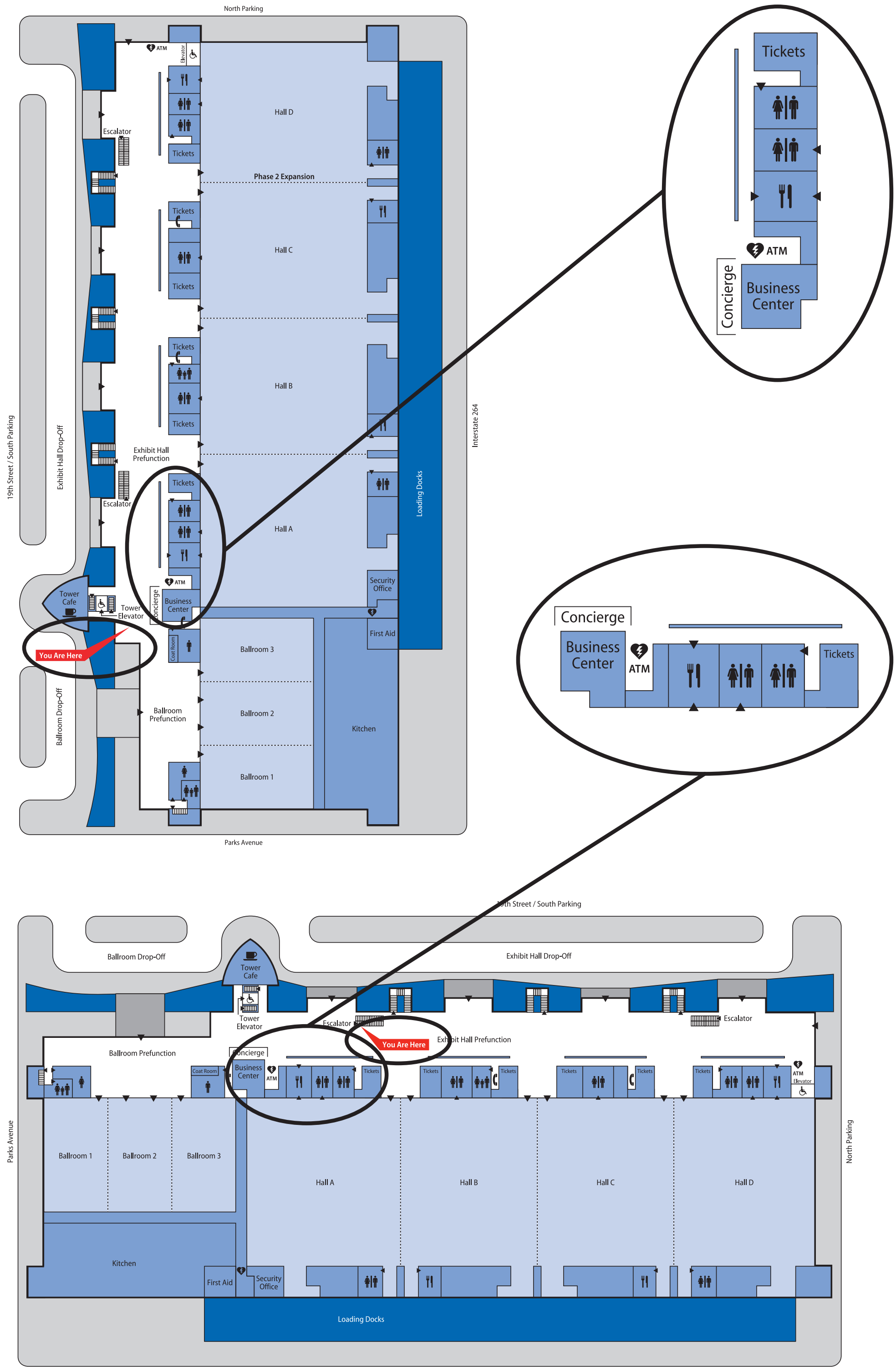
5.31

5.31 Detail of a tactile interior map for the vision-impaired at the Lighthouse in New York City.

flexible—viewers can easily rotate them into a heads-up orientation. GPS-based smart phone and mobile device maps set with North at the top can be similarly rotated, or they can be set in a heads-up orientation, plus they have a moving locator dot that indicates the user's position and directional movement on the map. Not so with signage maps. They're fixed to sign hardware structures and can't be rotated in the hands of the viewer like paper maps or customized to a user's position like mobile device maps.

Although the heads-up map orientation on signs is best for viewer comprehension, it does pose two logistical problems from a design standpoint. First, multiple rotations—typically four, with North, South, East, and West at the top of the map—are required to orient a map heads-up with the viewer. These multiple rotations of the underlying map also require rotation of any legend typography and symbols, so they don't have to be read sideways or upside down, and rotating and refitting legend graphics takes more time than one would think. The second logistical problem has to do with the proportions of a map's footprint. If the footprint is anything other than a 1:1 height-to-width proportion, the map will take up either more vertical or more horizontal space on the sign panel, depending on which way the map is rotated to be in the heads-up orientation. This, in turn, can affect sign panel proportions, as well as the layout of other graphic elements on the sign. (See Figure 5.32.)

Due to these logistical problems, which definitely make heads-up map orientation more costly, many sign programs must make do with all maps oriented with North at the top, regardless of which direction the viewer is facing. This is less than optimum, as the viewer has to go through mental gymnastics to interpret the map's orientation relative to which way he or she is facing.



5.32 Two different heads-up orientations of the same map, with details of typographic and symbol legend rotation.

Regardless of whether maps on signs have a heads-up or North orientation, it's essential to have a prominent graphic indicating where the viewer's location is on the map. This is typically an arrow or a triangular shape pointing in the direction the viewer is facing, with the legend "You Are Here."

Other Graphic Elements

In addition to the communicative graphic elements of typography, symbols, and arrows, all of which purposefully communicate

5.33, 5.34, and 5.35 Uses of rules, shapes, and patterns as organizing and decorative graphic elements.

5.33

5.34

5.35

information, there are other noncommunicative graphic helpers that organize and distinguish the graphic presentation of information on signs. These include rules, bars, boxes, circles, and other simple or ornate shapes and patterns. These various shapes can also be used as decorative features.

With continuing advances in digital imaging, tonal gradients and imagery such as photographs and illustrations can also be used for organizational and decorative purposes. As with all graphic design projects, photographic and illustrative elements should be carefully selected to enhance a sign program's communication function.

Color

We do not live in a black-and-white world, so color is as much an element of a sign program's graphic system as it is of the hardware system. There are many ways in which color can be used in signage programs, as illustrated in the photos throughout this book.

As with all the other graphic system elements discussed thus far, the intent of this section is to give an overview of color selection as it relates to a sign program's graphic system, rather than to provide an extensive discussion of the complex and multihued subject of color.

The Roles of Color in Signage

Color plays several roles in a sign program's graphic system, and it can play these roles individually or severally:

- To stand out from or blend in with the sign environment.
- To augment the meaning of sign messages.
- To distinguish messages from one another.
- To be decorative.

Before looking at each of these roles of color in sign graphics, it's important to know that the EG designer doesn't always have free rein when it comes to selecting a color vocabulary for a sign program. For certain signage programs, use of specific colors may be mandated by official bodies, or dictated by brand identity color standards. And the EG designer should always investigate cultural connotations of color when designing a sign program for overseas projects.

Navigating the MUTCD Community Wayfinding Sign Guidelines

Craig Berger

The last five years have seen a massive shift in the way community wayfinding programs are developed and regulated. Previous to 2009 there were no official guidelines for the development of wayfinding signs on public roadways in towns and cities. This meant that any wayfinding program that deviated from the *Manual for Uniform Traffic Control Devices* (MUTCD) standards was considered "nonconforming" and potentially illegal. State and local officials often permitted these programs by using provisions allowing for experimentation or by allowing for greater flexibility within the guidelines. In some cases, systems were installed without official approval, figuring it was easier to ask for forgiveness than permission.

The Federal Highway Administration (FHWA), the federal agency responsible for providing guidance on regulatory signs administered by the states, worked closely with the planning and design community to change this situation and create standards that would be easily understood by state regulatory officials and cities and towns implementing the system. These community standards are found in section 2D.50 of the MUTCD, which begins to use the term *wayfinding* for the first time in the guidelines, marking a radical shift in the acceptance and promotion of these programs. Since 2009 the number of programs have multiplied and even small towns have developed programs with the reassurance that they would be approved.

Community Sign Highlights

The community wayfinding sign guidelines focus on resolving a number of issues that are most common in the development of these programs. These include:

Jurisdiction: The guidelines make clear that community wayfinding signs are meant for conventional roads only and should not be used on limited access highways and expressways. The signs that are used in these highway environments can coordinate with community sign standards through color coordination and destination nomenclature consistency. Many state agencies encourage the use of gateway signs at the ends of highway exit ramps to make clear the transition from the highway sign system to the community sign system.

Responsibility: The guidelines are flexible when it comes to the creation of areas of responsibility or "sign districts," where community wayfinding design and planning guidelines are created. These jurisdictions can consist of a neighborhood, municipality, or collection of adjacent municipalities. These sign districts can control the destinations permitted on the signs, what signs can be installed, and the appearance of the signs. State regulatory bodies generally need to approve these districts.

Color: The new guidelines substantially open up the color palette for use on signs with a wide range of colors permitted except those that match the colors designated for highway, trailblazer, regulatory, park, or other signs outlined in the MUTCD. The guidelines encourage colors that provide maximum contrast with the sign messages as well as systems that use multiple colors to differentiate neighborhoods and districts. The guidelines also encourage (but do not require) lines of color to separate messages.

Fonts: The guidelines open up the use of different typefaces beyond the Highway Gothic and Clearview fonts permitted on traditional highway and trailblazer signs. Community signs can use any font as long as an engineering study has shown that the font exceeds the legibility standard established by Highway Gothic. While this is not an insurmountable barrier the cost of these studies has limited the number of new fonts being used. The few additional approved typefaces include Futura (research was developed as part of the Miami Beach sign program) and NPS Rawlinson (developed for the National Park Service). Most community sign systems use Clearview, which is the typeface used on many new highway signs.

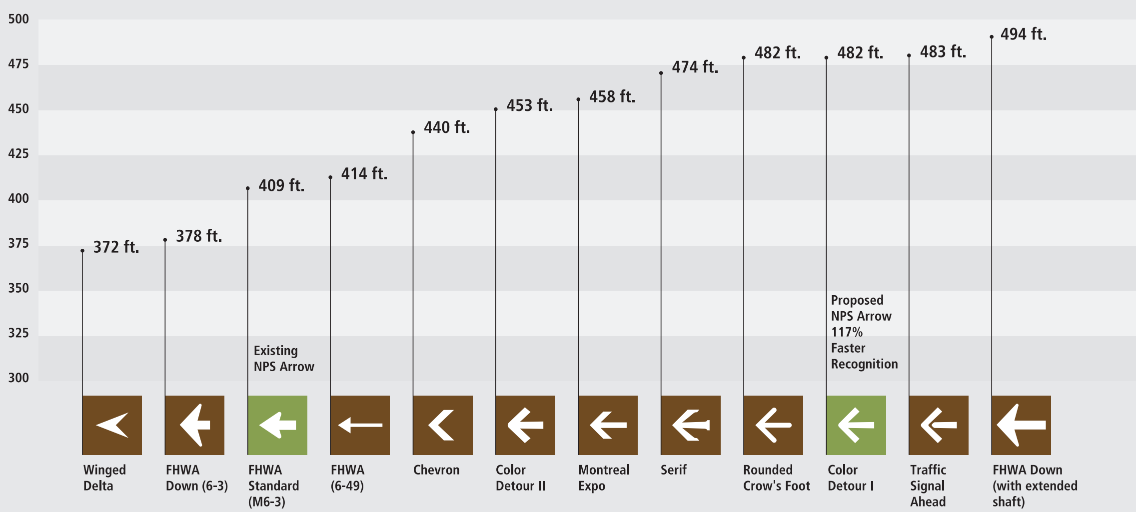
A study developed by Penn State University human factors researchers that focused on arrows for National Park Service signage showed that a wide number of arrow styles surpass the official highway arrow legibility standard, so a wide diversity of arrows are allowed on community wayfinding signs.

Fonts are expected to be upper- and lowercase for destinations with all uppercase allowed for headers and secondary information (in addition, nonapproved fonts are allowed for this secondary information). Font heights must be selected based on standard legibility criteria, such as a minimum of 4″ letter heights.

Messages: The number of messages on a sign is limited to three. Destination names are encouraged to be written in full with abbreviations used only when necessary.

Symbols: Symbols (pictographs) are permitted on signs but cannot be more than twice the height of the font being used. The goal of this standard is to ensure a balance between the symbols and fonts displayed on the signs.

The community wayfinding guidelines have made the development of systems far easier and have produced a number of new programs that have served as precedents. Most planners and regulatory officials use the guidelines as a tool, along with best practices and research to ensure the most legible signs are approved.



Navigating the MUTCD Community Wayfinding Sign Guidelines continued

Many officials still need to be educated about the flexibility of the standards, however, and designers who develop these projects have to be well versed in the MUTCD requirements, as well as possible interpretations that allow for design innovation.

When developing a community wayfinding program there are three important steps to facilitate system approval:

Involve state officials before beginning design: It is important for all parties to understand the precedents and guideline interpretations before starting the design process. Mutual understanding will foster a smoother design process.

Understand the use of precedents: Not all built projects present a correct understanding of the guidelines. It is important to use project precedents that highlight correct interpretation of the guidelines.

Think about research: For larger projects research may be needed to prove the effectiveness of different typefaces. This kind of research has been done for the last 20 years and can be part of an individual sign project.

Craig Berger is the Chair of the Exhibition Program at the Fashion Institute of Technology and is a national leader in community and urban wayfinding programs. He is author of the *Urban Wayfinding Workbook*, available through the International Sign Association.

An example of a situation where colors may be mandated by official bodies include cases where local codes require the use of red for typographic or pictorial sign messages of a warning or emergency nature. Another case in which official bodies may be involved in color selection is in city signage programs that interface with public roadways, referred to as Community Wayfinding Signs in the federal *Manual of Uniform Traffic Control Devices* (MUTCD). The MUTCD is the bible of official U.S. traffic and roadway signage, and MUTCD Section 2D.50 contains provisions for Community Wayfinding Signs that must be heeded by any EG designer involved with city or urban signage programs. Also, such programs almost invariably involve the participation of local Department of Transportation (DOT) officials, who may or may not insist that the city sign program conform to the color or other standards indicated in the MUTCD for various categories of roadway signs, including Community Wayfinding Signs. The MUTCD, which is a useful but unwieldy document, should be on the reference list of any EG designer involved with city or urban signage programs, and can be accessed at www.mutcd.fhwa.dot.gov.

Even when a given sign program isn't affected by official bodies, the EG designer still isn't necessarily free to explore a rainbow of colors. If the client is a large corporation or an institution, such as a university or a transportation authority, it likely has a graphic standards program to promote a consistent graphic or brand identity. These graphic standards programs typically dictate specific colors that can be used for sign graphics, as well as typefaces and symbol vocabularies.

One last word about official restrictions on color use: The current SAD recommends a minimum of 70 percent contrast ratio between the figure and the ground of sign graphics. Here, the word *figure* refers to the typographic and pictorial graphic elements, and *ground* refers to the background on which they appear. Note that this is currently a recommendation, not a requirement. Nevertheless, EG designers should use best practices for good legibility of sign graphics by maintaining adequate contrast between figure and ground—so it's best to reserve use of subtle, understated color contrast for print and Web graphics.

Theoretically, white figures on a black ground, or vice versa, have a 100 percent contrast ratio, even though white never reflects 100 percent of the light that hits it and black never reflects zero percent. So, how does one determine the contrast of black or white graphics on a color background, a given color of graphics on a different-color background, or multiple adjacent colors? Light reflectance values (LRVs) are helpful in this determination, and are available for most paint color systems, including Matthews, a major U.S. manufacturer of sign industry paints. Note that LRVs aren't available for other color systems that many EG designers use, such as the Pantone system. Section 4.1 of the SEGD 2012 ADA White Paper Update contains a formula for calculating contrast percentages based on LRVs.

Color Selection Considerations

Now that we've discussed a number of the constraints on color selection for sign graphics, it's time to move on to the color considerations on projects for which the EG designer does have some freedom to select colors for the sign graphic system.

Color can play a role in whether signs stand out from or harmonize with the sign environment. For those projects where navigation decisions must be quickly and easily made, such as transportation facilities, a goal may be to make the signs stand out from their surrounding environment so that they can be easily distinguished, read, and acted upon. In such cases, color can be one of the most obvious factors to set the sign program apart from its surrounding environment. For other projects, a goal may be to make the sign program blend in more closely with its setting, which can be achieved through the use of sign colors that harmonize with the environmental setting. In general, depending on the overall color palette of a given sign environment, bright, saturated colors can enliven and stand out from the environment, and neutral, more subtle colors can blend with or recede from the environment. (See Figures 5.36 and 5.37.)

5.36 Bright orange letter returns provide dramatic contrast with the subdued color palette of this Nassau Community College building in New York.

5.37 Brown sign structure harmonizes with the urban setting of Mill Pond Park on New York City's East River.

5.38 Color can be used to augment a message, as in this example where the color green reinforces the meaning of recycling.

5.36

Color can also play roles in augmenting the meaning of sign messages and in distinguishing sign messages from one another. Obvious ways color can augment the meaning of a message is when the color red is used for warning or emergency messages, and yellow is used for attention-getting messages. When color is used to augment or distinguish sign messages, the color can be used for either the message graphics themselves (the figure) or the message background (the ground). (See Figure 5.38.) Sometimes color is used in other graphic elements such as squares, bars, or circles to augment or distinguish sign messages.

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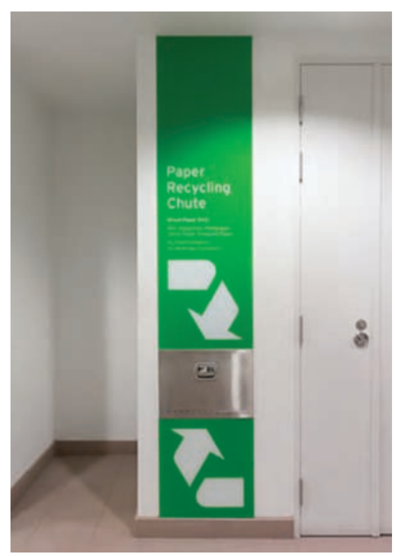

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5.39 Different sign panel colors distinguish various destinations to enhance roadway navigation at Dayton International Airport.

Color-Coding

The use of color to communicate meaning in sign graphics leads to the topic of *color-coding.* Color-coding links a given message with a given color to reinforce the message and to distinguish it from other messages. For color-coding to be effective in signage, a message and color must be linked, because color by itself is generally too ambiguous to communicate a specific message clearly. (See Figures 5.39 and 5.40.)

One of the few instances where color alone communicates a clear message is with traffic signals, but that's because the driving population worldwide has been trained over time to stop on red and go on green. Yet even this clear-cut response doesn't translate to uses of red and green in signage. For example, in many countries, green is used for exit sign graphics because of its association with the concept of *go,* as in "Go out through this exit." In other countries, however, exit sign graphics are red because of its association with danger, warning, and emergency, regardless of the seeming illogic that red is also associated with the concept of *stop,* as in "Do not proceed through this exit." There are two points here: First, the meanings associated with colors are learned and, second, those meanings vary with geographical location and culture.

Most transit systems worldwide use some form of color-coding—in association with numbers, letters, or names—on maps and signage to help users distinguish one route from another. Color-coding can also be useful for signage programs for large, complex, nontransit-related

5.40

5.40 Map for a large high school campus in Australia uses color to distinguish buildings, functions, and departments.

sites, such as in cities, airports, hospital complexes, and arenas and stadiums.

Coming back to the MUTCD and DOTs, color-coding is also used officially for the backgrounds of traffic and roadway signage throughout the United States, even though many drivers in this country don’t really realize the significance of the background colors. These official road sign background colors are listed in the MUTCD.

Clearly, color-coded sign graphics can be useful for both transit-related and large nontransit sign programs, but they should be used thoughtfully and judiciously, for excessive or inappropriate use of color-coding can actually impair rather than enhance the communication effectiveness of a sign program. Color-coding is not a panacea for unclear message nomenclature and should never be relied on to substitute for a poorly formulated sign information content system. Keep in mind, too, that many people have impaired color perception and cannot distinguish between certain colors. And, of course, the more colors that are used in a color-coding vocabulary, the more visually complex the vocabulary becomes, making it difficult for people to distinguish among the various colors and to learn the meaning associated with each color.

In addition to aiding communication and helping sign programs contrast or blend with their environments, color in sign graphics can also play a decorative role. Sign graphic color schemes can range from bold and playful to subtle and sophisticated. As always, every project is different so the key is to select a color palette that meshes with the goals of the project at hand, while aiming for the recommended 70 percent SAD contrast ratio.

Color Palette Sources

There are several sources for the selection and specification of the color palette for a sign program's graphic system. One source commonly used by EG designers is the Pantone Matching System (PMS), which offers a large range of color swatches, each coded by a number for specification use.

The Pantone system was developed as a color standardization and mixing guide for inks used on presses in the commercial printing industry, and is therefore perhaps not the best source for color palettes used in the sign industry. However, most EG designers with a graphic design background are familiar with the PMS system and it resides in the color swatch libraries of the vector drawing programs typically used by EG designers. Most manufacturers of sign coating materials such as paint and vinyl can analyze a Pantone color swatch and create a dead-on or acceptably accurate match for it in paint and other coating media. Additionally, some standard vinyl colors are cross-matched to commonly specified Pantone colors.

Although the Pantone system does contain a seemingly mind-boggling range of color swatches, it sometimes just doesn't offer the exact color that you, the EG designer, are searching for. In these situations, the color libraries of paint companies offer more options, including metallic, metalflake, iridescent, pearlescent, and other exotic colors. As with the Pantone system, each paint swatch in these libraries is identified by a number and/or name.

Many companies manufacture paint in the United States, but only a few manufacture paint formulated for sign applications, and the U.S. sign paint manufacturing industry is rapidly consolidating. Regardless, it's best to start with the color libraries from manufacturers of paints for the sign industry, such as Matthews and AkzoNobel. If the must-have color is in the library of a nonsign paint company, such as Benjamin Moore or Pratt & Lambert, the EG designer can provide a swatch of the desired color for matching by a sign paint manufacturer.

Keep in mind that the gloss level of paint and other sign coatings affects how a given color is perceived. If a paint or coating has a high gloss level, its color will appear deeper and richer than the same color with a matte gloss level. Also keep in mind that the ADA comes into play on paint and other sign coatings and finishes, requiring a "non-glare finish." Coatings, gloss levels, and finishes are discussed further in Chapter 6, "The Hardware System."

Layout

Thus far we've covered typography, symbols and arrows, color, and other graphic elements, which can be considered the ingredients, so to speak, of the graphic system recipe. Layout is the process part of the recipe, during which the EG designer sizes and arranges these graphic ingredients into formats that determine the visual unity, clarity, and style of the graphic system. Just like cooking, designing layouts is a highly creative process with almost limitless options, just a few of which are explored in this section.

Sign layout expresses the visual character of a sign program's graphic system. Layouts can be bold and flashy or quiet and subtle; they can be contemporary or traditional; they can be clean and straightforward or complex and rich. Accordingly, the visual appearance of the sign graphic system should be considered in conjunction with the appearance of the hardware system, for the appearance of each system affects the other, particularly in terms of size and proportion of sign faces.

Layout cannot meaningfully take place until the sign information content system is finalized—that is, the message content for every sign in the program is known. The message content, along with the size and layout of sign graphics, affects the size of each sign object in a program, thereby ultimately affecting the program's hardware system. Accordingly, one of the key tasks in the layout process is determining the size of the graphics for each sign type. Viewing distance is the chief determinant of typographic size for signage programs, although typographic size can also be mandated by local codes and the ADA.

Sizing Typography for Viewing Distance

As stated in Chapter 4, "The Information Content System," effective signage must have adequately sized graphics so users have enough time to read a sign message, understand it, and act on it safely by the time they reach the decision point. Other factors, such as the hierarchical rank of a sign message (primary, secondary, etc.), whether the sign is exterior or interior, whether the sign is for pedestrian or vehicular users, sign viewing angle and setback, the ADA, and more, all interact with viewing distance to determine the size of sign typography. (See Figure 5.41.)

As a starting point for sizing sign typography, an informal rule of thumb is that 1″ of character height, as measured on a nonrounded capital character such as an E, H, or I should be allowed for every 50′ of viewing distance. According to this ratio, sign typography to be viewed from a distance of 500′ should theoretically have a 10″ cap height; sign typography that's to be viewed from 50′ should theoretically have a 1″ cap height.

We use the word *theoretically* here because this 1:50 rule of thumb is not hard and fast, as is no rule of thumb. And it's not without challengers. In fact, some experts advocate a more conservative ratio of 1″ of cap height for every 25′ of viewing distance. Another challenger of the 1:50 formula is the ADA, which mandates minimum and maximum cap heights for tactile/raised characters, and the new SAD, which has a complex table for determining the cap height of visual characters in interior environments based on character mounting height zones and horizontal proximity

5.41

distance. Message hierarchy also raises a challenge to this formula, in that primary messages should be larger than secondary messages on a given sign. Additionally, local codes sometimes mandate specific cap heights for certain sign messages.

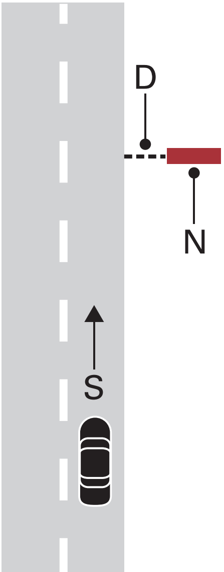
A word about cap height is in order here. The use of cap height is key to the graphic system for signage. In signage graphics, capital letter height is used as the measurement standard, instead of typographic point size, which is used for print and Web graphics. In the U.S., cap height is expressed in inches or fractions thereof, usually in units no smaller than 1/16". Cap height standards use nonrounded letters, typically a capital I, because they're more easily measured, and because rounded letters such as C, O, and S, are larger than nonrounded letters, to maintain optical balance in typeface design. (See Figure 5.42.) Similarly, rounded lowercase letters are also larger than nonrounded ones. Keep in mind that lowercase letters also have descenders, which fall below the baseline of capital letters; and ascenders, which, in many typefaces, rise above the cap height line.

The dynamics of reading, understanding, and acting on sign information are compounded and more critical in driving situations; consequently, more complex formulas are needed as starting points for determining vehicular signage cap heights. As an example, the formula shown in

5.42

5.41 Primary and secondary sign information on a directional sign at the Ohio State University.

5.42 Always measure cap height on flat or squared-off characters, because round characters are larger than the cap height to provide optical balance among different character shapes.



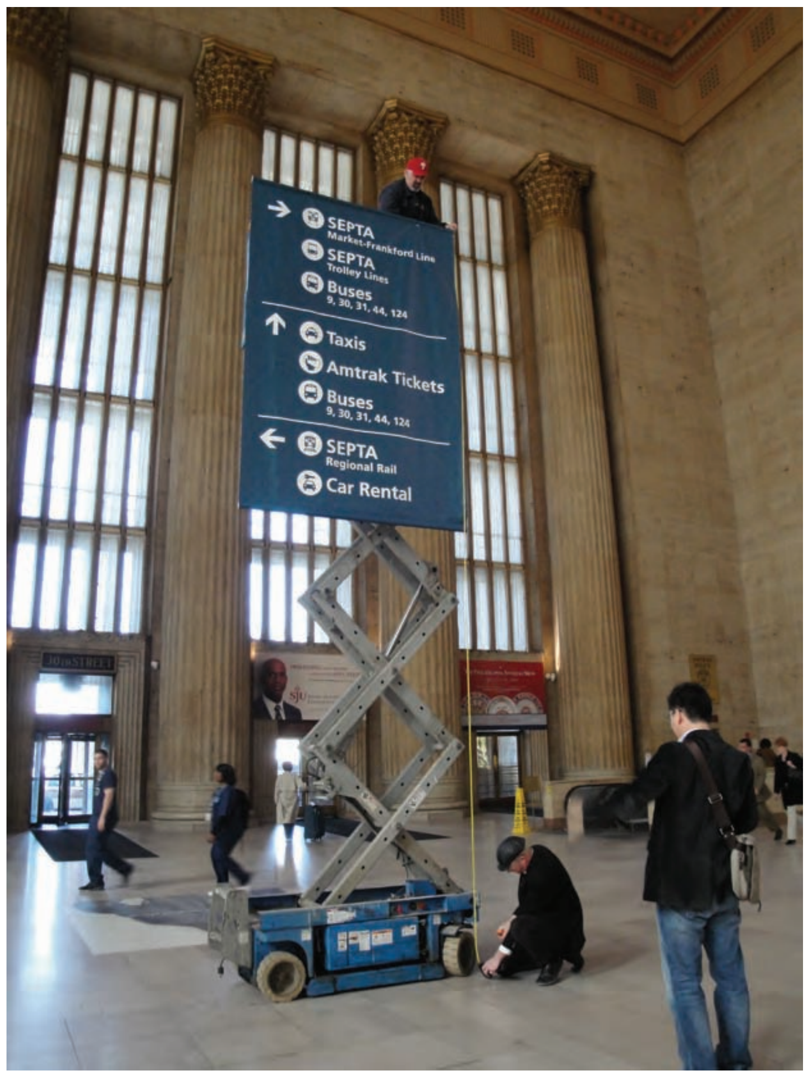
$$\frac{(N+6)S}{100}+\frac{D}{10}=H$$

N: Number of Messages
S: Speed Limit
D: Setback Distance
H: Height of Letters

5.43 This formula for determining letter height for vehicular signage accommodates the variables of speed, setback, and message quantity.

Figure 5.43 accommodates such dynamics as speed, setback, and other vital factors for vehicular signage. The MUTCD's companion volume, *Standard Highway Signs*, also provides guidance on cap heights for various kinds of vehicular signs.

Certainly, formulas and reference guides are useful starting points for determining cap heights, but the only sure way to confirm that typographic sizing is adequate is to test it with mockups and prototypes, optimally under the actual conditions that the signs will be viewed. The degree and formality of such testing varies with each project and design budget, but some form or another of testing and confirming cap heights is highly recommended for every signage project, especially those with a vehicular signage component. (See Figures 5.44 and 5.45.)



5.44

5.44 and 5.45 Whether on an informal or more formalized basis, typographic legibility and sizing should be tested with mockups and prototypes of sign faces.

5.45

Other Factors Affecting Layouts

Sizing sign typography to viewing distance, or to code- or ADA-mandated sizes, is a fundamental aspect of developing sign layouts, but there are other aspects that influence the ultimate design and overall size and proportion of layouts. These include:

- Proportion of symbols and arrows in relation to typography
- Position of symbols and arrows in relation to typography
- Spacing around and between graphic elements
- Layout format proportions
- ADA/SAD guidelines

Proportions of Graphic Elements

There is no "one way" to proportion symbols and arrows in relation to typography, but suffice it to say that symbols and arrows should be large enough relative to the typography to ensure they are clearly visible in directional sign layouts.

With arrows, which are relatively clear-cut shapes, a common method is to size either the width or height of the arrow to the cap height of the typography. Symbols are more difficult because they can be more visually complex than arrows, and are often too small to be legible

5.46

5.46 When arrows and symbols are sized to typographic cap height, symbols may be too small to be legible.

5.47 Arrows and symbols sized at 120 and 150 percent of cap height.

when sized to the cap height of the typography, particularly if they are enclosed by a square or circular surround. In such instances, symbols can be sized to a multiple of the cap height: for example, at 1.2 times the cap height, which makes the symbols 20 percent larger than the cap height; or at 1.5 times, which is 50 percent larger. Of course, arrows can be sized to the same proportions as symbols in relation to the typography. Once proportional relationships are established between symbols, arrows, and typography, those relationships should be maintained as consistently as possible for all typographic cap heights displayed on the signs. (See Figures 5.46 through 5.48.)

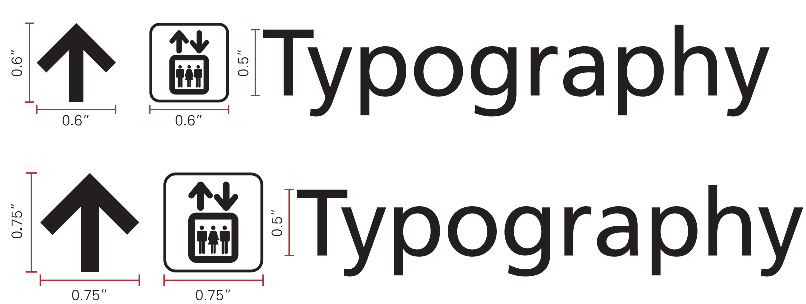
Positions of Graphic Elements

As with the proportional relationships of typography, symbols, and arrows, there are several options for the way they are positioned in relation to each other in directional sign layouts. Two of these options, shown in Figures 5.49 and 5.50, include:

- **Side-by-side positioning** (arrows and symbols positioned in line with typography)
- **Stacked positioning** (arrows and symbols positioned above [or below] typography)

As can be seen from the simple examples in Figure 5.51, the proportions of the sign face can vary depending on whether the graphic elements are positioned side-by-side or stacked.

When arrows and symbols are positioned in line with the typography, there are several options for aligning them horizontally. A commonly



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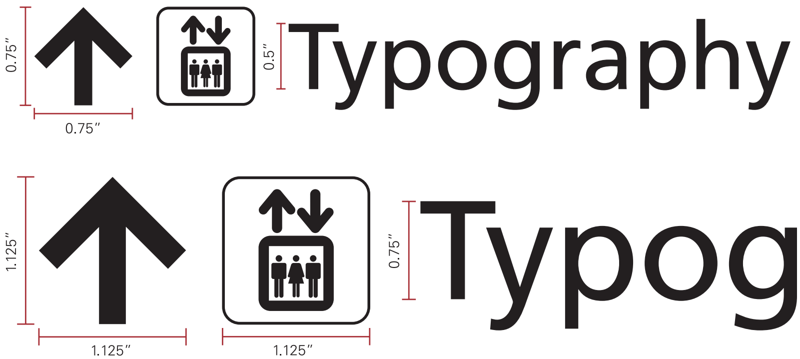

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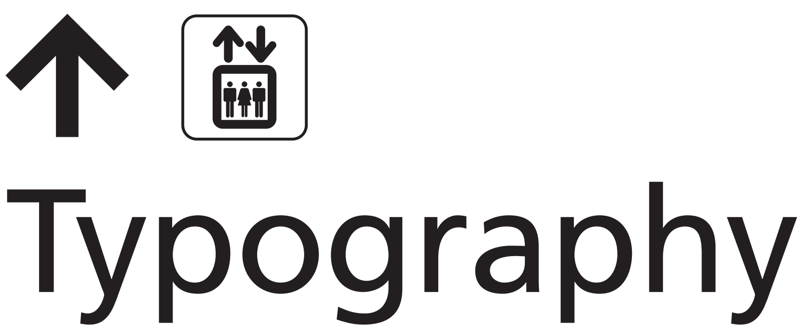
5.49



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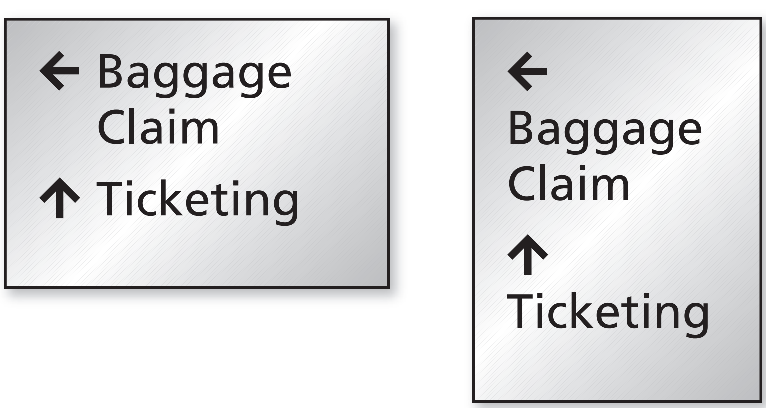


5.51

5.48 Once established, proportional relationships among graphic elements should be maintained at various sizes.

5.49 Arrows and symbols positioned side-by-side, or *in line*, with typography. In this example, bottoms of arrows and symbols align with the typographic baseline.

5.50 Arrows and symbols positioned above, or *stacked*, with typography. In this example, the vertical space separating them is .5 of the typography's cap height.

5.51 Sign face proportions can vary with side-by-side or stacked positioning of arrows/symbols and typography.

5.52

5.52 Horizontal centerlines of arrows, symbols, and typography aligned.

used method is to align the horizontal centerlines of the symbols and arrows with the horizontal centerline of the typographic cap height. (See Figure 5.52.) Similarly, if the arrows and symbols are positioned above or below the typography, their alignment in relation to each other and their distance from the typography need to be established.

To compound the two positioning options just described for layouts—and their creative possibilities—arrows and symbols can be placed to the left or right of the typography, or be centered with the typography, if the arrows/symbols are positioned above or below the typography. But this is not to say that symbols and arrows are necessarily always paired with each other; for example, arrows may be set off from the typography, whereas the symbols may be placed at the end of a line of typography.

Note that it's fairly common to place arrows at the left side of a sign layout regardless of which direction the arrows are pointing, or whether the arrows are positioned in line with or above/below the typography. Considering that most languages are read from left to right, left placement of arrows makes sense, as it fixes the arrows at the beginning of each sign message. It also organizes all the arrows on the left side of the sign layout. Of course, there are also valid reasons, such as MUTCD standards, to place arrows on the same side of the typography in which the arrow is pointing—for example, placing right-pointing arrows to the right side of the message typography. Again, the possibilities for positioning and aligning typography, symbols, and arrows in sign layouts are endless, but once a positioning scheme is determined, it should generally be employed across the entire range of sign types in a program, to enhance visual consistency. The Gallery section at the end of this book shows graphic element alignment schemes within a variety of sign programs.

Spacing of Graphic Elements

Spacing around and between graphic elements also affects sign layout proportions and sizes. The terms *figure* and *ground,* which were introduced earlier in this chapter, can be linked to the discussion in Chapter 4, "The Information Content System"; specifically, the figure is the *message footprint,* consisting of the typographic and other graphic elements, and the ground is the background area, or *sign face perimeter,* consisting of *dead space* in which the figure is displayed. The space taken up by the figure graphics is termed the *live space* or *live area,* so a sign face consists of both live and dead space.

Recall from Chapter 4 that the live space consumes significantly less than 100 percent of a sign face's area. The rest of the sign face is taken up by dead space, which includes:

- Margins around the perimeter of the sign face
- Horizontal letter and word spacing within lines of typography
- Horizontal spacing between side-by-side graphic elements, such as gutters between arrows, symbols, and typography
- Vertical spacing between lines of typography
- Vertical spacing between stacked graphic elements, such as spacing between typography and other graphic elements

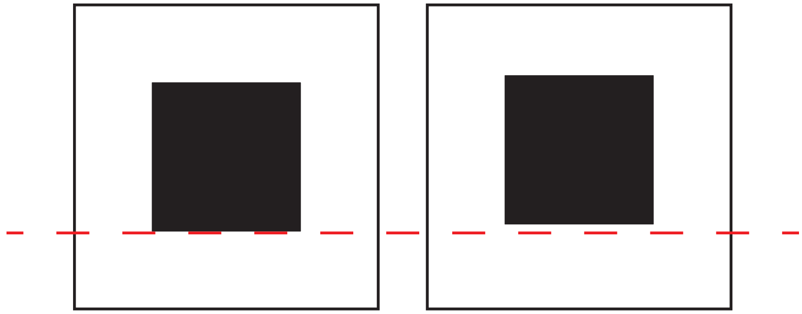
Dead space is essential for the legibility, clarity, and organized appearance of the sign graphic system, so this section explores each of the dead space elements.

Margins are the dead space around the perimeter of a sign face, and each sign has a top, bottom, left, and right margin. As with most other aspects of layout development, there's no magic rule for determining how large or small margins should be. Needless to say, however, margins should not be so small that the graphics appear too close to the sign perimeter, nor so large that the graphics appear dwarfed by the margins. A good starting place is to look at margins that equal the cap height of the primary message in the layout; for example, 1″ margins for typography with a 1″ cap height. This relationship can then be enlarged or reduced by multiples of the cap height, such as by 1.2 times cap height for a larger margin or by .8 times cap height for smaller margins. And here's a visual balance tip for horizontally centered layouts: Bottom margins should always be slightly larger than top margins to make them appear equal, as shown in Figure 5.53. This trick is borrowed from picture-framing professionals, who cut picture mattes with the bottom matte border slightly larger than the top. It makes sense for arranging type, too, because descenders hang below the typographic baseline.

Horizontal spacing within lines of typography includes letterspacing and word spacing, both of which are essential for good type legibility.

- **Letterspacing** or **tracking,** the space that separates the letters within words, was covered earlier in this chapter.

5.53 To achieve visual balance on horizontally centered layouts, make the bottom margin slightly larger than the top margin.



5.53

- **Word spacing** is the space that separates words, and it typically automatically adjusts with the letterspacing, or tracking, that is specified when type is set on computer programs used by EG designers and sign fabricators.

Horizontal spacing is also necessary between side-by-side graphic elements, such as gutters between arrows, symbols, and typography. The term *gutter,* which comes from print graphic design, refers to the space between columns of text on a page. Similarly, in signage graphics, *gutter* can refer to the space between columns of arrows and typography, or the space between columns of arrows and symbols. A good starting point is to use half (.5) the cap height as the unit for gutter spacing, and then adjust it by a greater or lesser multiple, if desired. The same is the case for horizontal spacing of symbols or arrows that are placed at the end of lines of typography. The key to effective horizontal spacing of graphic elements is to space them closely enough so that they appear to belong together and to conserve sign space, but not so tight that the elements appear too crowded. (See Figure 5.54.)

As shown in Figure 5.55, typographic line spacing is an important *vertical spacing* element, and can be expressed in two ways:

- As the unit between the baseline of one line of typography to the baseline of the next line of typography (baseline to baseline spacing), which is the open space between the lines plus the cap height.
- As the unit between the baseline of one line of typography to the cap height of the next line of typography (baseline to cap height spacing), which is the open space itself between the lines.

A starting place for determining the amount of vertical line spacing on a baseline-to-cap height basis is to allow half (.5) the cap height, which translates to 1.5 cap height from baseline to baseline. This ratio can then be adjusted up or down depending on the typeface being used and other factors. For example, the ratio may have to be increased for typefaces with ascenders that rise above the cap height, or decreased if the

5.54

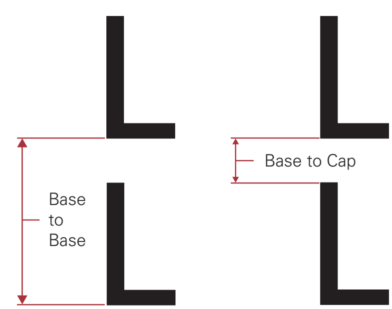
5.54 Gutter spacing between arrows, symbols, and typography should not be too tight or too open.

typography is set in all capitals. Note that for both tactile/raised and visual characters, the SAD has specific requirements for baseline-to-baseline spacing of multiple-lined messages.

The line spacing starting-place ratio discussed above is fine for a single message that continues on multiple lines of typography. But another consideration when determining line spacing is how to separate multiple messages, which can each be single or multiple lines, on a given sign layout. Obviously, if all the messages have the same line spacing, it's hard to distinguish one message from another. In such cases, a larger line-spacing ratio is needed between messages than within each message. (See Figure 5.56.)

Vertical spacing between stacked graphic elements, such as between typography and symbols and/or arrows, is also a layout consideration, as when symbols or arrows are placed above or below typography or each other, as shown earlier in Figure 5.50. Again, a good starting point is to use half the cap height as the open-space ratio between the stacked elements, then adjust it up or down to visually balance the layout.

Note that in addition to the ADA line spacing requirements mentioned above, the SAD has specific requirements affecting the size, positioning, and spacing of graphic elements on permanent room identification signs.

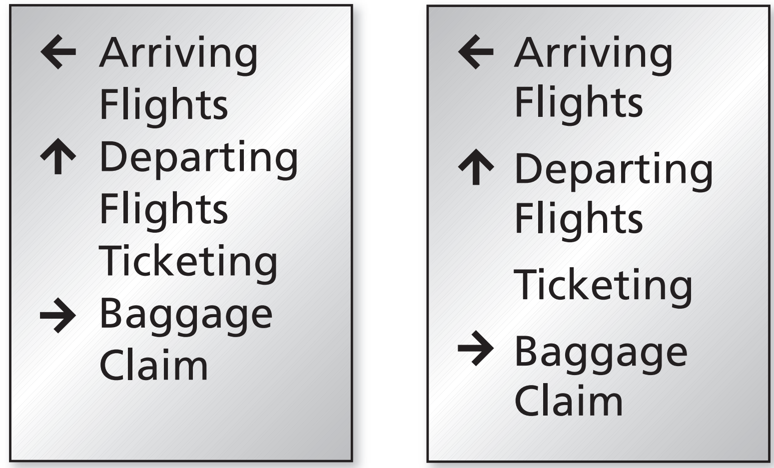


5.55 The two ways to indicate typographic line spacing.

Layout Format Proportions

Layout *format proportions* pertain to the perimeters of the various sign types/faces within a program. The proportions of layout formats ultimately translate into the proportions of sign faces or panels, as expressed in the sign hardware system. Layout format proportions need to account for the maximum quantity of information that is programmed for any given

5.56 When messages have multiple lines on multiple message signs, increasing the line spacing between messages helps to clearly separate them.



5.56

sign type, and the formats can be imposed by site conditions, by the EG designer, or by a combination of both.

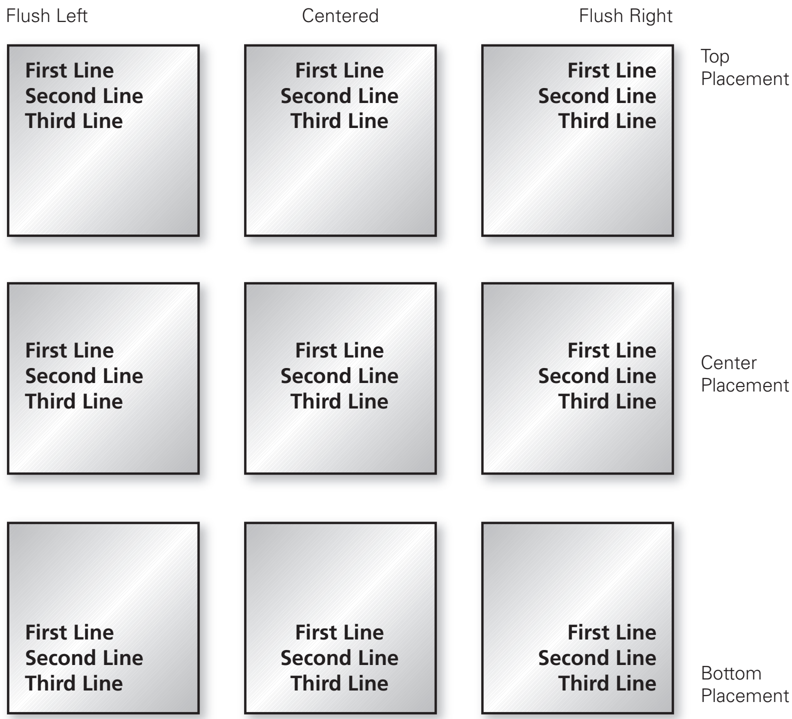
An example of a layout format being imposed by site conditions is when low ceiling heights require horizontally formatted overhead signs to fit the programmed messages, typically arranged in multiple columns across the sign face. An example of a designer-imposed layout format is when the EG designer decides that all the signs in a program will have a square format. Usually, the layout format proportions for comprehensive sign programs end up being determined by both site conditions and the EG designer. Obviously, the fewer different format proportions a sign program has, the more visually unified the program will be.

Once formats have been established, the EG designer has many ways to place the typography and other graphic elements, both horizontally and vertically, onto the formats.

- Regarding horizontal alignment, the graphic elements can be arranged to align flush left, centered, or flush right.
- Regarding vertical placement, the graphic elements can be arranged at the top, center, or bottom of the sign format.

Figure 5.57 contains a matrix showing these various basic placement options.

Because both single- and multiple-line messages may be programmed for a given sign format, the EG designer also has options for vertical placement of single- and multiple-line messages on the same format.



5.57

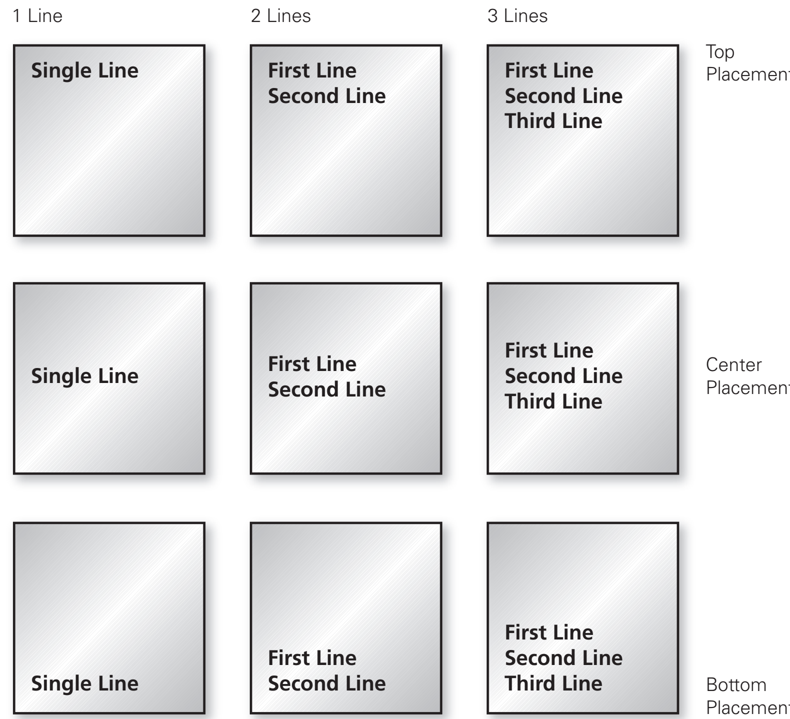
5.57 Basic alignment and vertical placement options for sign graphics.

These options include hanging from the top, building from the center, and building from the bottom, as illustrated in Figure 5.58.

Message Content and Layout

As noted, any variety of messages can appear on a given sign type, which is a critical factor when designing layouts. Since the quantity of message content and the size of the graphics determine the final size and proportional format of a sign type, it is imperative to design layouts for the worst case—meaning the longest—message or set of messages that is to appear on that sign type. Consider a simple example of a theoretical Sign Type A programmed to display a variety of messages, ranging from Women to Electrical Equipment Room—No Storage. If a Sign Type A layout is sized to accommodate only the short message, then longer messages will not fit in the sign format, which can lead to costly design or fabrication changes after the sign design package has been finalized.

The importance of designing layouts to accommodate the longest message or messages cannot be overstated. The problem is not fitting less information at a readable or mandated size onto a sign



5.58

5.58 Vertical placement and message-building options for single- and multiple-line messages.

of a given size; the problem is fitting more information than planned for. Remember that a sign can always display less information but that more can't be crammed onto it—at least not at functional or ADA- or code-mandated sizes. This is the single most important reason that it is imperative to develop the sign program's information content system: so that the EG designer can identify the largest message content a layout must accommodate *before* designing the graphic system. To ignore worst-case scenarios in layout development is to invite costly design and/or fabrication changes further on in the design process.

Another important point to keep in mind is that—again, depending on message content—multiple layouts can be designed for a given sign format. For example, a theoretical Sign Type B could display directional information on one unit and identification information on another, and different layouts would be required for each of these kinds of messages. And as stated in Chapter 4, "The Information Content System," the fewer the sign types, the more economical and ecological the sign program is to fabricate, and the more unified its appearance. Therefore, it makes sense to display different kinds of information on a given sign type and develop corresponding layouts, rather than to develop a different sign type for each kind of information. (See Figure 5.59.)

5.59

Destination Arrangement on Directional Signs

More often than not, directional signs display multiple destinations, with arrows pointing in several different directions. This raises the question of how to arrange these destinations and the arrows linked to them in the sign layout. There is no standard method for destination arrangement, but there are several options, including the following:

- Arrange by *arrow direction,* whereby all destinations in each given direction are listed together in the layout. But we read from left to right and top to bottom, so the question then arises as to which direction should start the destination listing at the top of the sign layout. Some EG designers start by listing destinations to the left at the top of the sign, as left turns are typically the most difficult to negotiate, and then list directions moving increasingly to the right—for example, listing left destinations first, then destinations straight ahead, then destinations to the right. Other EG designers will list straight-ahead destinations first, as they're in the clearest line of movement. Regardless of the starting point, the directional arrangement order should be consistent for all signs in the program. One advantage of arranging by arrow direction is that it's more visually organized—all destinations in a given direction are listed together rather than being dispersed throughout the listing. Another potential advantage is that one arrow in a given direction can serve for multiple destinations, rather than having to pair an arrow with each destination.
- Arrange in *alphabetical order,* whereby destinations are listed alphabetically. The argument for this method is that people look for places by name rather than direction, which is a valid premise. Its disadvantages are that an arrow must be paired with each destination and that directions be interspersed throughout the

5.59 Different information content and layouts displayed on the same format and/or sign type promotes visual unity of a sign program.

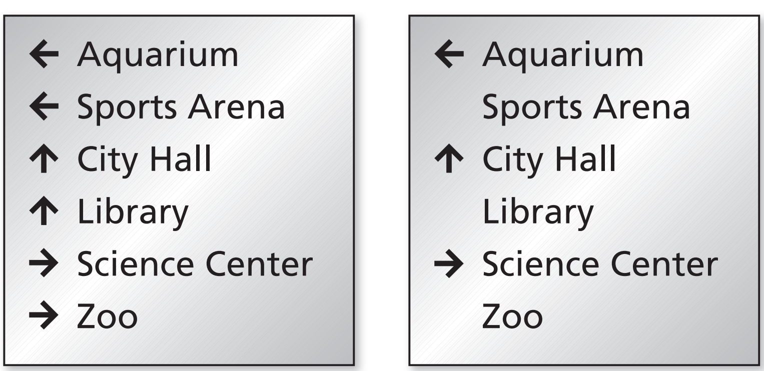
destination listing—that is, the first destination may be to the right, the second to the left, the third to the right, and the fourth straight ahead.

- Arrange by *proximity,* whereby destinations are listed from the nearest to the farthest. The argument for this method is that destinations should be listed in the order in which people will encounter them, which also has some validity. This method has the same disadvantages as the alphabetical arrangement; in addition, it requires that the proximity to each destination be ascertained from each sign location, to ensure the proper list order on each sign.
- Arrange by *importance,* whereby someone determines which are the primary destinations in an environment, and those destinations are always listed at the top of the layout. This method gets into message ranking and hierarchy, which was discussed in Chapter 4, "The Information Content System," and it does make some sense in certain settings. It does, however, have the same disadvantages as the alphabetical arrangement method. An additional disadvantage is that it may cause political bickering over which destinations are the top-ranked ones, and this, obviously, can cause project delays.

As noted, there are pros and cons to each of these arrangement methods, and since each project is different the EG designer and client should agree on which method suits the project at hand and use that method consistently throughout the project. Also note that these methods can be combined to some extent. For example, destinations can be arranged by arrow direction first, and then alphabetically within each directional category, as shown in Figure 5.60. An example of destinations arranged in alphabetical order is shown in Figure 5.61.

5.60 Messages organized by arrow direction. An arrow can be paired with each destination or serve for multiple destinations in each direction.

5.61 When messages are organized alphabetically, an arrow must be paired with each destination. The resulting interspersed arrow directions can be confusing.



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Overview of Sign Graphic Application Processes

This discussion of the sign graphic system wouldn't be complete without an overview of the basic ways in which graphics can be applied to signs, especially because, in addition to layout, graphic application processes greatly affect the appearance of a sign program's graphic system.

Generally, graphics are applied to a sign in one of three ways: flat, raised, or incised. Basic techniques for each are discussed here, but keep in mind that every year many new, proprietary graphic application techniques and materials are developed for the sign industry, and that existing techniques are being constantly improved. Ways for EG designers to keep abreast of these technological developments are to attend the industry expos of the International Sign Association (ISA) or the SEGD, or to ask sign fabricators what new technologies they're adopting. Also keep in mind that the basic techniques described here can be combined with each other and/or with lighting treatments (discussed in Chapter 6, "The Hardware System") to create truly unique sign graphics.

As with sign hardware materials and techniques, various sign graphic application techniques have various degrees of environmental impact regarding resource and energy consumption, solvent release, hazmat use, wastestream consequences, and others. EG designers can find helpful information on the SEGD website at www.segd.org/green-resources.

Flat Graphics

Flat graphics are essentially applied to the same plane as the sign surface itself. Five common techniques for applying flat graphics to just about any sign material include:

- **Full-color digital imaging.** This is large-format imprinting, typically by inkjet, on any number of opaque or translucent, flexible or rigid substrate materials, ranging from cloth to paper to self-adhesive vinyl films to rigid panels up to 2″ thick, with a photographic range of color and continuous tone. Digital imaging onto rigid substrates is often called *direct imaging* because it doesn't involve the application of digitally imaged vinyl film to the rigid substrate. Digital imaging for the sign industry is a four-color (CMYK) process, typically with the addition of at least two other colors such as opaque white, metallic silver, and even gloss or matte spot clear coats. Reproduction quality varies with the resolution of digital output, and is constantly improving. Other characteristics: fair to excellent durability, depending on substrate, top coatings (including UV inhibitors), and in-line ink curing techniques; unlimited color and tonal ranges; and low to medium expense. There are several proprietary products in which the digitally imaged substrate, typically paper, is laminated or embedded in

5.62 Digital imaging allows full color and tonal ranges on signs, such as this banner sign at the Cambridge Public Library.

5.63 Temporary sign at an AIGA Gain conference uses direct digital imaging on rigid foam board substrate.

5.64 Digital imaging on a paper substrate embedded in a high-pressure laminate map panel at Mill Pond Park, New York.

5.62

clear plastic resin or fiberglass, for virtually indestructible protection of the graphics. (See Figures 5.62 through 5.64.)

- **Vinyl decals.** These are self-adhesive, integrally colored, and opaque, translucent, transparent, or reflective vinyl film cut by computer into letterforms and other graphic elements. Other characteristics include: excellent reproduction; fair to good durability; limited colors and no tonal ranges unless digitally printed; and low expense. Vinyl film manufacturers offer a range of grades for various applications and are constantly introducing new product lines, colors (including metallics), textures, and gloss levels; custom color films can be produced if certain minimum quantity requirements are met. White or clear vinyl films are a common substrate for digitally imaged graphics; less widely available polyolefin films offer a greener alternative to vinyl. (See Figures 5.65 and 5.66.)

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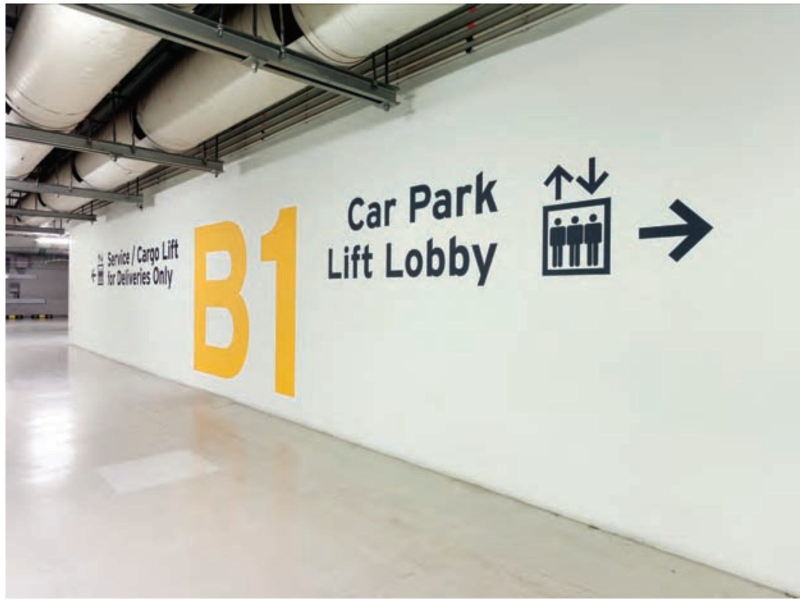
5.65 and 5.66 Applied vinyl graphics are widely used in interior and exterior signage applications, such as a directional pylon at a corporate campus in Swiftwater, Pennsylvania, and window graphics for an AIGA design conference.



5.67 Frisket-painted graphics on a masonry wall provide durability and large-scale reproduction in a parking garage in Singapore.

5.67

- **Screen printing** uses thick, opaque inks applied with a silkscreen, which is a sophisticated, computer cut or photographically produced stencil adhered to a fine mesh material stretched on a frame. Silkscreening is also used to apply the adhesive to which metal leaf is applied for gilded graphics. Other characteristics include excellent reproduction; good to excellent durability; unlimited colors; some limits on tonal ranges; and medium to high expense. *Frisket painting* is a similar technique that uses a strippable computer-cut vinyl stencil, sans silkscreen, which is positioned directly on the sign panel or architectural surface for application of painted graphics. (See Figure 5.67.)
- **Porcelain enamel.** This glass-based coating is typically applied to steel or aluminum by silkscreening and then fired to melt the coating into a hard, smooth, glossy surface. Reproduction quality is generally excellent depending on supplier. Other characteristics include: excellent durability—it's almost indestructible; some limits on colors and tonal ranges; and high expense. (See Figure 5.68.)
- **Handpainting.** Using this technique, sign paints are applied by hand with a brush, so reproduction quality depends on the skill of the painter. Other characteristics include fair to good durability; unlimited color and tonal ranges; and low to high expense. In this era of increasingly sophisticated computerized sign graphics imaging, the almost-lost art of handpainting is gaining appreciation for its humanistic qualities.

5.68 Porcelain enamel provides excellent durability for exterior signs, such as this sign on the National Mall in Washington, DC.

Raised Graphics

Raised graphics are dimensional in that they are raised from a sign or architectural surface. Raised graphic applications are important in part because, as you'll recall, tactile/raised Latin and Braille characters are required by the ADA for permanent room identification signs.

Common techniques for raised graphics include:

- **Cut solid graphics.** These are solid letterforms or other graphic elements cut from metal, plastic, wood, glass, or stone, and mounted to a sign face or an architectural surface. Cutting devices are typically computer-controlled, and include mechanical routers, waterjets, and lasers; but these graphics can also be produced by a band saw controlled by skilled human hands. Cut solid graphics tend to be more suited for smaller, thinner graphic elements, including tactile/raised characters, than fabricated graphics (described next). Other characteristics include generally excellent reproduction; good to excellent durability, depending on material; and medium to high expense. Also, color availability depends on material or applied paint, and tonal range is possible with the application of direct digital imaging or digitally imaged self-adhesive vinyl film. (See Figure 5.69.)
- **Fabricated graphics.** These are hollow graphics, typically letterforms, with faces and sides (*returns*) cut separately and joined together. Commonly used materials are metal and plastic, which can be used singly or in combination, such as an all-metal letter or a letter with metal returns and a plastic face. Fabricated graphics are mounted to a sign face or an architectural surface and are better suited for larger, thicker graphics than cut solid graphics. Other characteristics include generally excellent reproduction; good to excellent durability; and medium to high expense. Also, color availability depends on materials or applied paints and films, and tonal range is possible with direct imaging or the application of digitally imaged self-adhesive vinyl film. Translucent plastic faces and/or returns can be backlit. (See Figure 5.70.)
- **Cast metal graphics.** These are solid or semi-hollow letterforms or plaques such as medallions, for which metal is melted and cast into a mold typically prepared by a craftsperson, with or without digital tools. Reproduction quality depends on the skill of the mold maker and/or quality of digital tools. Other characteristics include excellent durability; possibility of bas relief sculptural effects; colors limited based on metal used and/or any paint applied to recessed areas of plaques; no color tonal range; and high expense. (See Figure 5.71.)
- **Cast plastic graphics.** For these graphics, liquid plastic resins are cast into letterforms or plaques, with molds made by computer or

5.69 Solid cut glass letters laminated to a glass logo field at ABC Broadcasting's New York City headquarters.

5.70 Monumental fabricated characters combine stainless steel, acrylic, and LED lighting for the signature identification sign at Shanghai's AZIA Center office tower.

5.71 Cast bronze medallion integrates with the paving along Boston's Freedom Trail.

5.72 Cast plastic resin plaque sign with raised graphics at the Cira Centre office tower in Philadelphia, Pennsylvania.

5.70

hand. Cast plastic materials can range from opaque to transparent, and reproduction quality varies with the mold-making process. Other characteristics include good to excellent durability; color variation based on process or applied paints; tonal range possible with digital imaging; and low to medium expense. (See Figure 5.72.)

- **Photopolymer.** Plaques with raised graphics are made from a photosensitive plastic sheet that forms raised graphics, including

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5.73 Painted photopolymer sign plaque with raised graphics at the Edinburg Children's Hospital in Texas.

Braille, after light exposure and chemical processing. Other characteristics include good to excellent reproduction quality; good to excellent durability; and low to medium expense. Opaque photopolymer sheet colors vary with applied paints; tonal range is possible with digital imaging. Clear photopolymer sheets can have colored paint or digital imaging applied to the back (second) surface of the material, or can be backed with various other materials, including digitally printed paper inserts. (See Figure 5.73.)

- **Rasters.** These are small spheres of metal or plastic partially inset into a sign plaque to form Braille characters. Other characteristics include: good to excellent reproduction quality; good to excellent durability; colors limited to materials used or can vary with applied paints; tonal range not applicable; and medium to high expense. (See Figure 5.74.)
- **3D printing** is beginning to find applications in signage, particularly for graphics raised from a flat background. 3D printing is an additive manufacturing (AM) process, which builds up layers of fusible material, typically plastic, into three-dimensional shapes from a digital model; this high-tech process is somewhat akin to the centuries-old technology

5.74

5.74 Identification sign at Stanford University's Bing Concert Hall has cut metal raised characters and raster bead Braille.

of building coils of clay into three-dimensional vessels. 3D printing can create highly complex shapes, which could lead to dimensional patterns and bas relief images on signage. Although 3D printing is not yet in wide use in the signage industry, EG designers and sign fabricators alike can begin to embrace this exciting technology and its creative potential for dimensional sign graphics.

Incised Graphics

Incised graphics are dimensional, in that they go into the sign's surface.

There are several techniques for incising graphics, and many of them can also be used for raised graphics.

- **Sandblasted graphics** are formed when sand-based grit is blasted with compressed air through a heavy rubber computer-cut stencil mask to carve graphics into the sign surface, which is typically stone or glass, but can also include metal. Reproduction quality depends on the skill of the sandblaster and/or quality of the digital tools used. Other characteristics include excellent durability, unlimited range of colors to fill the incised graphics, and medium to high expense. (See Figure 5.75.)
- **Acid etched graphics** are limited to metal and glass, which are covered with an acid-resistant mask in nongraphic areas and then exposed to acid, which eats away the base material in graphic areas. Other characteristics include excellent reproduction quality, excellent durability, unlimited range of fill colors, and medium to high expense. (See Figure 5.76.)

5.75

- **Engraved or routed graphics** are graphics cut into the sign surface with mechanical routers, waterjets, and lasers. Higher-end applications are computer-driven; older processes use metal lettering templates in cheap, low-tech applications. Devices can cut partially through the sign surface or completely through (stencil cutting). Stencil-cut surfaces can be open, or can be backed or inlaid with other material; backed and inlaid graphics can be internally illuminated. Reproduction quality ranges from very low to excellent, depending on technology used. Other characteristics include good to excellent durability, color range that varies with technology used, and low to high expense. (See Figures 5.77 through 5.79.)

5.75 The names of donors are sandblasted into granite columns at the MidState Medical Center in Meriden, Connecticut.

5.76 Etched and paint-filled graphics on a bronze medallion reflect the status and prestige of New York City's Rockefeller University.

5.76

5.77 Router-cut graphics on metal panels creates an open stencil effect at the Summit Bechtel Reserve of the Boy Scouts of America.

5.78 Monumental letters are water-jet cut into stone panels, fitted with translucent glass insets, and backlit for One Raffles Quay tower complex in Singapore.

5.79 Laser-cut, backlit letters inlaid into the reception desk at Ocean Financial Centre in Singapore.

5.77

- **Hand carving.** Typically, wood or stone is mechanically carved with either hand or power tools, with or without computer assistance. Reproduction quality depends on the skill of the carver and/or quality of digital tools. Other characteristics include good to excellent durability, unlimited range of fill colors, and medium to high expense. (See Figure 5.80.)

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5.80

5.80 Graphics hand-carved into cleft bluestone slate monument sign.

Chapter Wrap-Up

This chapter itemized the elemental building blocks of a sign program's graphic system: typography, symbols and arrows, color, and other graphic elements. It then covered the basics of how all these elements are "cooked" together to form a cohesive whole in the layout process. And just as endless variations on recipes make cooking so creative, there are endless variations possible for developing graphic layouts, which frees the EG designer's creative instincts to set the appearance of the sign program's graphic system.

The chapter also reiterated the importance of developing the information content system so that the graphic system can accommodate the worst-case (i.e., longest) messages, as well as different kinds of information content. The chapter concluded with basic methods for applying graphics to signs, which, like layout, play a major role in the appearance of the sign program's graphic system. This chapter also showed how layout affects the size and proportion of signs, which sets the stage for designing the sign program's hardware system, as discussed in Chapter 6, "The Hardware System."

6 The Hardware System

Sign hardware is the physical embodiment of signage—the environmental objects that display the sign information, as conveyed via the sign graphics.

The hardware system of a sign program is all the physical "stuff" you can actually touch or bump into; it's the tangible, three-dimensional (3D) component of a sign program. The hardware system is also the vocabulary of shapes, structures, materials, finishes, mounting, and lighting, as well as the method(s) the EG designer uses to unify all these elements into a family of sign objects. (See Figure 6.1.)

It is the three-dimensional, sculptural aspect of signage that distinguishes it from other forms of graphic design, an aspect that is more grounded in industrial and architectural design than graphic design. And its intrinsic three-dimensionality is what makes signage such an exciting design challenge. Many people think of signs as basically flat objects that display graphics—which they certainly can be—but as this chapter will show, a sign program's hardware system can be far more visually rich and exciting than a series of flat panels. In our office, we approach the design of a sign program's hardware system by asking a question: Since signage is inherently three-dimensional, how can we exploit that third dimension?

This chapter examines the three-dimensional elements the EG designer manipulates in designing the hardware system of a signage program. It also provides an overview of basic materials, finishes, coatings, and lighting techniques that the EG designer fashions into physical sign objects.

While the focus of this chapter is on fundamental concepts of the 3D attributes of signage, keep in mind that aspects of the sign hardware system are affected by the ADA and local codes. As with Chapter 5, "The Graphic System," this chapter touches only on some of those aspects, and it is not intended to be an exhaustive guide to, nor should be considered technical or legal advice on, ADA conformance. See Chapters 4 and 5 for sources that provide ADA information, including the 2010 SAD document itself.

6.1 The sign hardware system.

Shape

Shape, or form, is probably the most obvious expression of a sign program's hardware system. The shapes used in a signage program give the program its visual unity and distinctiveness in three-dimensional form. Shapes are virtually limitless for the sign hardware system, and basic shapes can be combined and synthesized into even more distinctive shapes. This section looks at the vocabularies of basic sign shapes the EG designer can manipulate in hardware system design.

Basic Sign Shapes Based on Mounting

Signs do not magically float in space; they must be mounted on or into something else, and what they are mounted to is a major determinant of the intrinsic form a given sign will take. Basically, signs are mounted on horizontal surfaces—such as floors or ceilings—from above or below, or on vertical surfaces—such as walls—from the back or side. This leads to the following four basic types of mounting:

- **Freestanding or ground-mounted,** in which the bottom of the sign is fixed to a horizontal mounting surface, such as a floor. (See Figure 6.2.)
- **Suspended or ceiling-hung,** in which the top of the sign is fixed to a horizontal mounting surface, such as a ceiling. (See Figure 6.3.)
- **Projecting or flag-mounted,** in which the side of the sign is fixed perpendicular to a vertical mounting surface, such as a wall. (See Figure 6.4.)
- **Flush or flat wall-mounted,** in which the back of the sign is fixed parallel to a vertical mounting surface, such as a wall. (See Figure 6.5.)

6.2 Freestanding, or ground-mounted sign at Wheelock Place retail mall in Singapore.

6.3 Boat-shaped suspended, or ceiling-hung sign at Port Imperial Ferry Terminal in Weehawken, New Jersey.

6.2

6.3

6.4

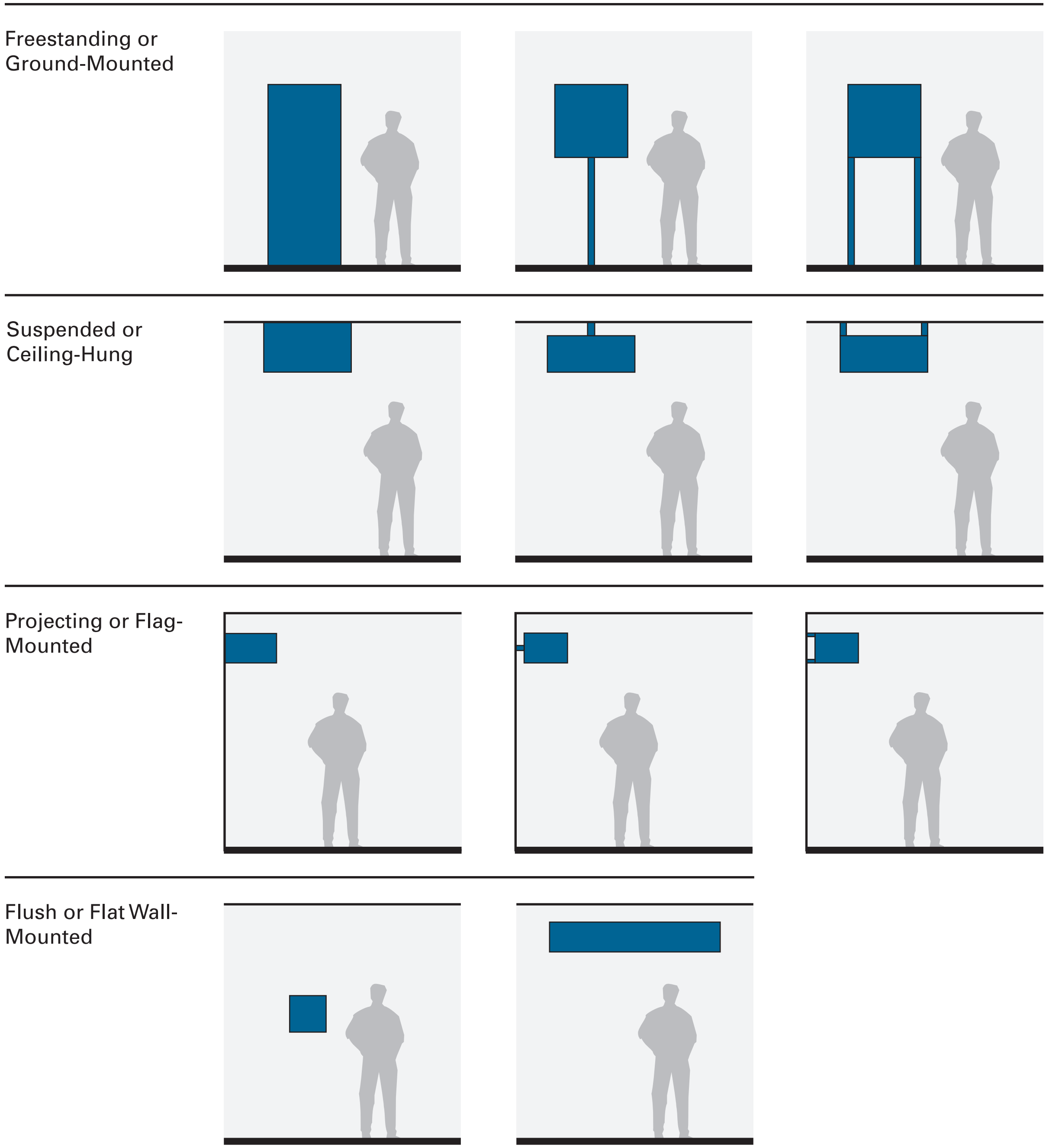
6.4 Projecting, or flag-mounted sign at City of Chander City Hall in Arizona.

6.5 Flush, or flat wall-mounted sign at the Mamaroneck Public Library, New York.

The mounting or support structure for each of these types of mounting can be either hidden or expressed, leading to the following overall sign forms listed below and shown in Figure 6.6.

Note that all of these types of sign mounting can occur at various heights and that the ADA and local codes can affect those heights, as well as other sign dimensions, as touched on in Chapter 5, "The Graphic System," and later in this chapter.

6.5



6.6

6.6 Sign form variations based on mounting type.

Freestanding Sign Forms

- Pylon or monolith, in which the entire sign body rises from the ground or floor
- Lollipop, or "sign on a stick," in which a sign panel on a single post rises from the ground or floor

- Multiple-posted, in which a sign panel on two or more posts rises from the ground or floor

Suspended Sign Forms

- Suspended monolith, in which the entire sign body hangs from a ceiling or underhang
- Suspended pendant, in which a sign panel on a single post hangs from a ceiling or underhang
- Suspended multiple-posted, in which a sign panel on two or more posts hangs from a ceiling or underhang

Projecting Sign Forms

- Projecting monolith, in which the entire sign body projects from a wall or other vertical surface
- Projecting lollipop, in which a sign panel on a single post projects from a wall or other vertical surface
- Projecting multiple-posted, in which a sign panel on two or more posts projects from a wall or other vertical surface

Flush-Mounted Sign Forms

- Wall plaque, in which the back of the sign is attached to a wall or other vertical surface, such as a soffit or transom

Monolithic sign forms typically have hidden, internal support structures, and wall plaques typically don't require expressed, or visible, mounting structures. The support structures are expressed, however, in the other sign forms just outlined.

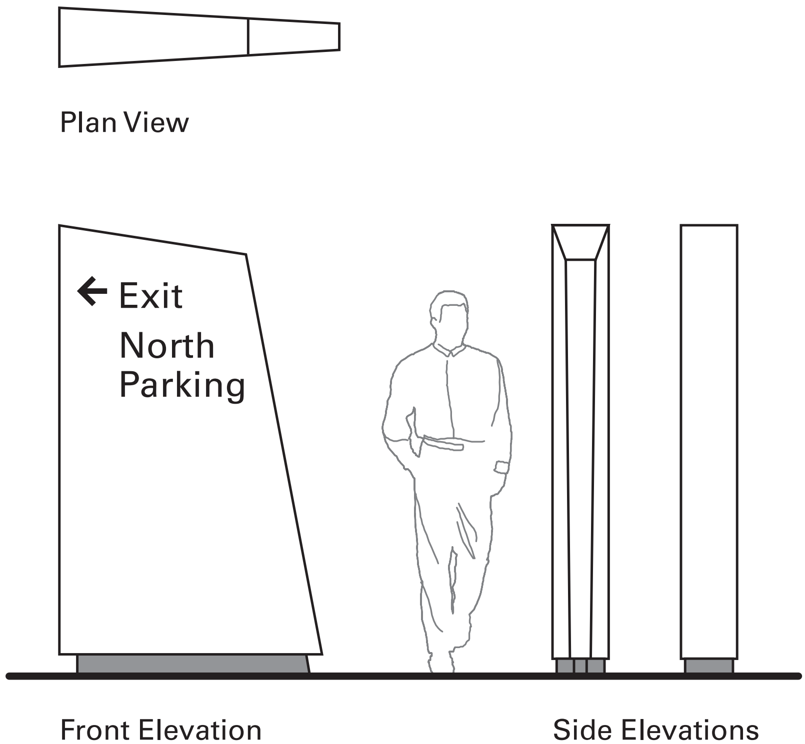
All of these sign forms, except relatively thin, flush-mounted ones, can be viewed "in the round," providing opportunities for expression of three-dimensional details, as well as providing faces for graphics on more than one side. All non-flush-mounted sign forms can have a minimum of two sides for graphics, if graphics on two or more sides are appropriate and useful.

Given the basic sign forms dictated by mounting factors, sign shapes can be generated based on geometry in elevation, plan, and sectional views, as shown in Figures 6.7 and 6.8.

- *Elevation* views depict the vertical surfaces of an object—front, sides (profiles), and back.
- *Plan* views depict the lateral footprint or perimeter of an object as viewed from the top.
- *Sectional* views expose the internal parts of an object, depicting slices cut through an object, either lengthwise (longitudinal) or across

6.7 Plan and elevation views of a freestanding sign.

6.8 A section view through a sign shows its internal components and/or assembly.



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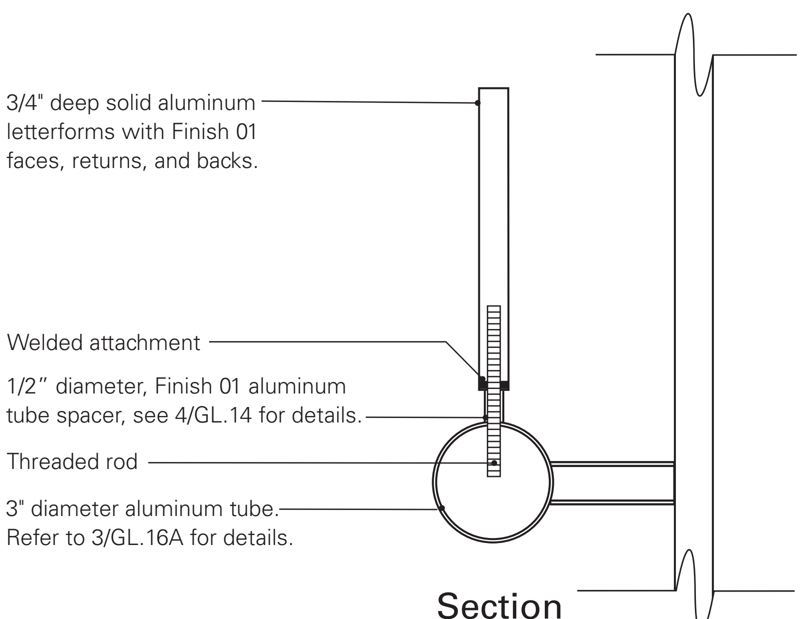


6.8

(traverse), just as a carrot can be cut along its length or across it, with the resulting slices exposing the carrot's structure differently with each direction of cut.

The key views of sign shapes are elevation and plan, and they are examined in the following sections of this chapter.

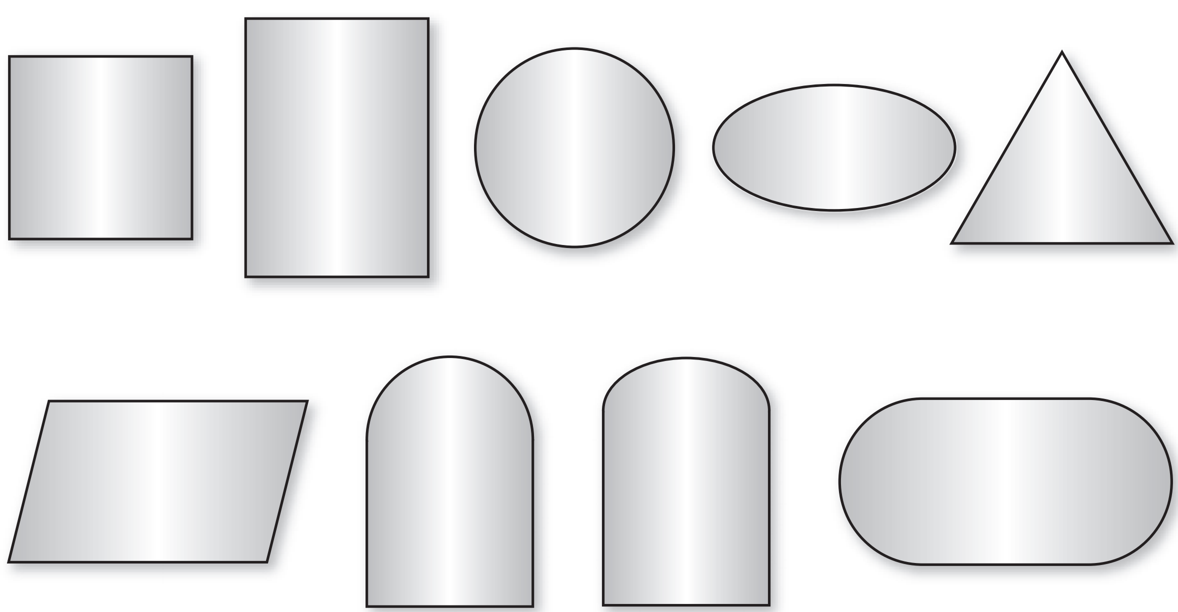
Vocabulary of Basic Sign Shapes Based on Geometry in Front Elevation

An unlimited number of sign shapes, as viewed straight-on in front elevation, can be generated from elements of the most basic geometric forms: the circle, square, and triangle. Hence, sign shapes in front elevation can be composed of curved, rectilinear, or angled elements, or combinations of these elements. Keep in mind that these shapes can be used for a sign panel on posts, or can be used monolithically. Also keep in mind that graphics are typically most efficiently fitted onto sign shapes that are overall rectilinear in front elevation. See Figure 6.9 for a basic vocabulary of front elevation shapes. These shapes can also be layered over each other to create different plane levels in front elevation, as shown in Figure 6.10.

Vocabulary of Basic Sign Shapes Based on Geometry in Plan

The geometry of the top, horizontal view of a sign body or sign panel, although generally more subtly expressive than the front

6.9 Basic vocabulary of sign shapes in front elevation.



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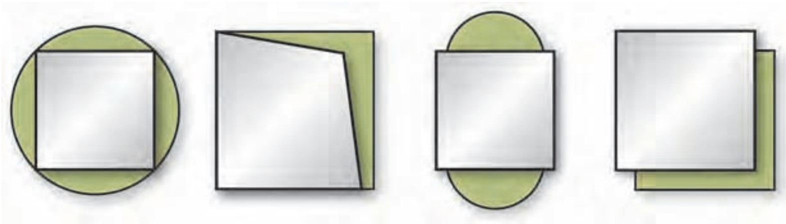


6.10

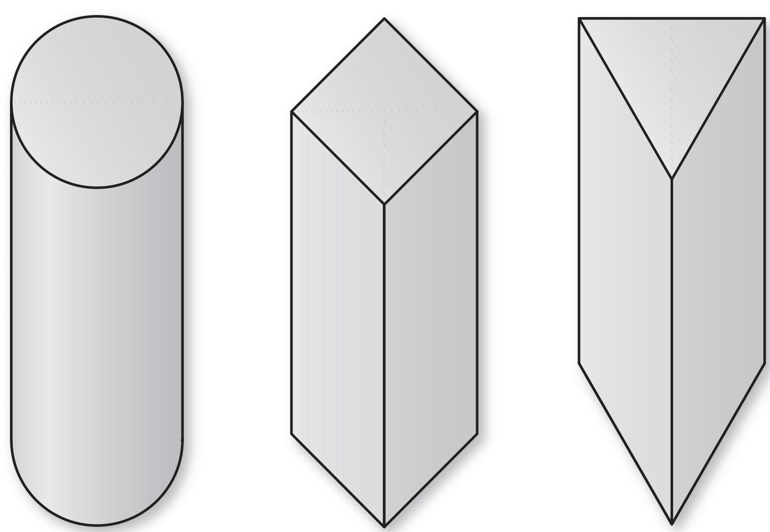
6.10 Basic sign shapes layered over each other in front elevation can create depth and visual interest.

6.11 Basic sign or sign post shapes based on simple geometric shapes in plan.

6.12 a, b Curved panels in plan provide formal unity to the signage program for the Sanofi Pasteur campus in Pennsylvania's rustic Pocono Mountains.

elevation shape, can also provide a limitless number of plan shapes. As with front elevation shapes, plan shapes are composed of curved, rectilinear, and angled elements, as well as combinations of them. Keep in mind that plan shapes can be used for a sign panel on posts, for the posts themselves, and for monolithic sign bodies. Figure 6.11 shows a basic vocabulary of plan shapes, and Figures 6.12a and 6.12b show a sign program with sign panels curved in plan. Also keep in mind that some plan shapes, or variations thereof, can be rotated 90 degrees to the vertical and be used for the side elevations or profiles of signs. And to further compound shape generation possibilities, different plan shapes can be combined with different front elevation shapes, as shown in Figure 6.7, in which a wedge-shaped plan view is combined with a trapezoidal front view to create a distinctive sculptural form. A sign combining different plan and elevation shapes is shown in Figure 6.13.

6.12a



6.11

6.12b

6.13 Exterior signs at the Pacific Design Center in Los Angeles are a synthesis of several formal shapes that work together to create a distinctive stylistic appearance.

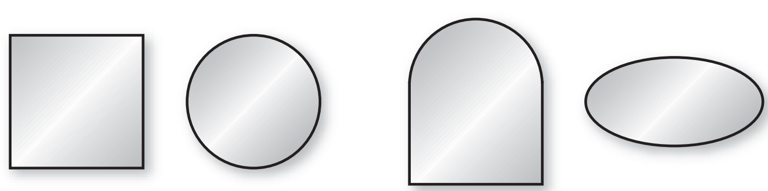
Connotations of Form

While 3D sign shape and form do not literally communicate information in a denotative way as sign graphics do, the 3D aspect of signage has powerful stylistic connotations. Three-dimensional sign forms, and the ways the EG designer synthesizes them into sign hardware objects, have stylistic connotations in the same way the shapes of typographic letterforms do. The key, then, to designing a sign program's hardware system is to determine the appropriate 3D formal qualities for the project at hand.

As an example of some of the formal aspects the EG designer mediates in a sign program's hardware system design, consider the myriad styles of that common everyday object we call a chair. Does the chair have a high or low seating height? Is it on four legs, a pedestal, or is it cantilevered? Is it mobile or stationary? Is it all one material, such as wood, or a combination of materials such as steel and leather? Is it upholstered? Is it simple or complex? Is it traditional or contemporary? Similar stylistic questions come into play when designing a sign program's hardware system.

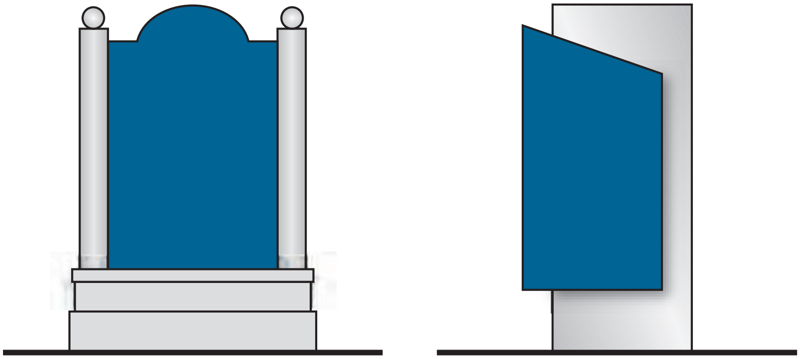
It is beyond the scope of this book to delve into a lengthy examination of the connotations of 3D form, as it is a very complex subject, but it's important to highlight a few very basic pointers on signage hardware system form:

- Some front elevation sign shapes are inherently traditional or contemporary. For example, tombstones and horizontal oval shapes have more traditional connotations, whereas more basic shapes such as squares and circles have more contemporary connotations. (See Figure 6.14.)
- Sign objects are often a synthesis of many formal elements—particularly those signs with exposed fasteners or exposed structures such as posts—and each element has its own formal connotations. How these elements fit with and transition to one another is a key to the stylistic appearance of the sign object.
- Generally, the simpler and sleeker the sign objects, the more contemporary the appearance of the hardware system. Conversely,



6.14

6.14 Sign shapes with contemporary versus traditional connotations.



6.15

the more complex and ornate the sign objects, the more traditional the appearance of the hardware system. (See Figure 6.15.)

- The stylistic characteristics of the graphic system affect the stylistic characteristics of the hardware system, and generally speaking the two should mesh. For example, a crisp, contemporary graphic system is better suited to a contemporary hardware system. Of course, there are some projects in which juxtaposing contemporary graphics with traditional hardware is entirely appropriate, even if difficult to pull off.
- Just as the appearance of the sign graphic system can be quiet and elegant or bold and flashy, so can the appearance of the hardware system. The key is determining which stylistic approach is most appropriate to a given project. For example, clean, simple, almost utilitarian hardware forms may be appropriate for a subway system's signage, but not for a grand hotel's signage. (See Figures 6.16 and 6.17.)

6.15 Complex, elaborate sign shapes tend to be more traditional in appearance, in contrast to simpler, sleeker shapes, which tend to be contemporary in appearance.

6.16 Serif typography harmonizes with the rich, traditionally styled hardware system for Smith College in Northampton, Massachusetts.

6.16

6.17 Sans serif typography harmonizes with the contemporary styling of the sail-like hardware system for the Virginia Beach Convention Center.

At our office, we discuss whether a sign program's hardware system should fade away or stand out from the project environment, which has some correlation to the concepts of harmony and imposition discussed in Chapter 1, "What Is Environmental Graphic Design?"

Unity of Form

It's relatively easy to develop shape or form for a single sign or type of sign, but signage programs are typically composed of several types of signs, which can range from small wall plaques to large freestanding and suspended units and everything in between. In other words, the EG designer must design a whole family of signs for a given project, and this family must be unified in appearance to enhance the sign program's cohesiveness and effectiveness. And just as a human family is composed of individuals, each of whom usually shares some visual similarities that identify them as a related family unit, so too a well-designed sign program is composed of different sign types that share common visual features that identify them as related to each other. You can see examples of projects with unity of form within sign families in the Gallery section at the end of this book.

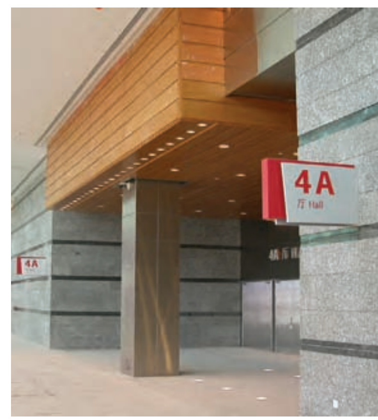
A sign program's graphic system contributes to its two-dimensional unity, and a program's hardware system contributes to its three-dimensional unity, primarily expressed via shape and form, and supported by materials, colors, and finishes. Maintaining unity of 3D form across a broad range of sign mounting conditions and sizes is one of the great design challenges in signage program development, one that really gets the creative juices going. In contrast to architectural design, which typically embraces the design of a singular object—albeit a highly complex one, a building—design of a signage program's hardware system is more akin to industrial design, in which several different individual objects are often designed as part of a larger line of related products, such as cookware or furniture ensembles.

It's difficult to pin down how an EG designer creates unity of form within a sign family's hardware system, but it typically relies on consistent use of a common or similar 3D detail, or combination of details, throughout all the sign types, regardless of size or mounting condition, in a program. (See Figures 6.18a, b, and c.) Simple examples of common details and detail combinations include designing all the sign panels in a program to be curved, or designing all the sign panels in a program to be curved and then overlaid on partially exposed flat background panels.

Commonalities in mounting structures, such as ground-mounted posts and ceiling-suspension hangers, are details that can also lend formal unity to a sign program's hardware system. See the Gallery section for examples of formal details that unify sign programs.

6.18a

6.18b



6.18c

6.18 a, b, c Monumental, ceiling-suspended, and projecting signs for the Suzhou International Expo Centre in China share related design traits to create three-dimensional formal unity.

EG designers don't need to be slavish in adhering to a common 3D detail or details, but they do need to employ some sort of consistency to visually relate all of the hardware elements of a sign program to each other. Continuing with the curved panel example just given, within a specific sign program, sign panels that are curved in plan may be more appropriate for the vertically formatted signs, while panels that are curved in side elevation may be more appropriate for the horizontally formatted signs. The key common detail feature is the curved panels, not whether they're bowing out on the horizontal or vertical axis.

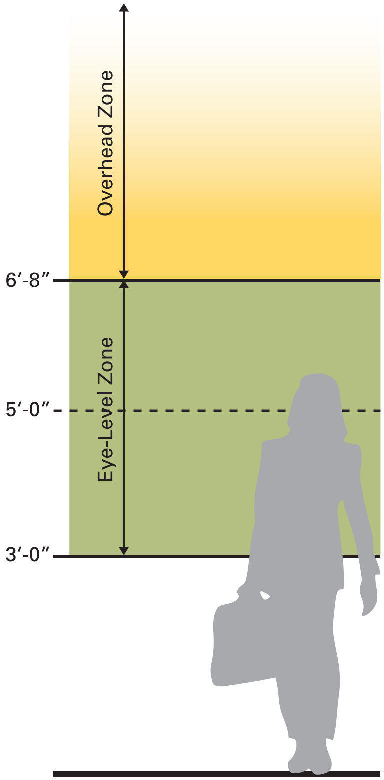
The EG designer can use sketches, drawings, simple study models, and 3D computer modeling applications to develop 3D formal unity among all the sign units in the program. It's always useful to look at the entire sign family together and at one scale to see how the units formally relate to one another in the program's range of mounting conditions, as well as in the program's range of sizes.

Sign Mounting Considerations

As stated earlier in this chapter, how signs are mounted is a key determinant of a sign's form, and this section of the chapter explores the factors the EG designer must consider for sign mounting.

Overhead and Eye-Level Mounting Zones

A sign's location, viewing distance, and hierarchy help determine mounting heights and methods. There are two basic zones for placement



6.19 Eye-level and overhead sign viewing/mounting zones. Signs mounted in the eye-level zone are generally for close-up reading; those in the overhead zone are for distance reading.

of sign information and, therefore, for mounting the sign panels that carry that information: an *overhead zone* and an *eye-level zone.*

Generally, for interior environments, signs that convey primary and, sometimes, secondary information are mounted in the overhead zone; signs that convey detailed and/or lower-hierarchy information are mounted at eye level. The reason for this rule of thumb makes sense: Important primary sign information needs to be located high enough so that it's not obstructed by people, vehicles, plants, or other objects in the environment. Less important sign information doesn't need to be—and, in fact, shouldn't be—so prominently placed, and detailed sign information has to be placed at eye level for close study. (See Figure 6.19.) For example, in an airport, primary directional signs and identification signs such as gate identification numbers are typically mounted overhead, whereas signs conveying less important information, such as office identification, or detailed information, such as an airport orientation map, are placed at eye level. (See Figure 6.20.)

Of course, many environments, such as museums and hotels, are often more subdued and low-key than those of airports, and in these more subdued environments overhead signs may be completely inappropriate. There are also situations where it's useful to repeat the same information in both the overhead and eye-level zones. A good example of this is a signage program for a retail store in a mall, where an overhead primary identification sign is installed for viewing across the expanse of the mall, and a secondary identification sign is placed at eye level to enable people

6.20

6.20 Directional pylons at the Dallas/Fort Worth airport display large graphics in the overhead zone for quick reading at a distance. Smaller, more detailed graphics are displayed in the eye-level zone for close-up reading.

walking along the storefronts, and underneath the primary sign, to read the same information.

The zone for displaying eye-level sign information is roughly between 3′-0″ and 6′-8″ above the finished floor (AFF); the zone for displaying overhead information is anywhere above 6′-8″ AFF. Keep in mind that if detailed sign information is displayed below 3′-0″, many people would have to stoop to read it; and if it's displayed above 6′-8″, many people would have to crane their necks to read it. Also keep in mind that overhead information is often displayed on tall, ground-mounted signs, not only on suspended or projecting signs.

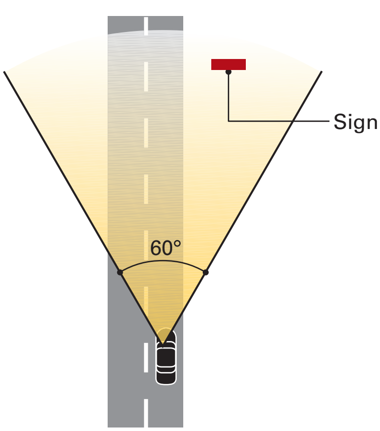
In the midst of this book's discussion of the overhead and eye-level zones, it's important to remember that the ADA has specific provisions related to sign mounting heights. For example, the SAD requires a specific mounting zone for baselines of tactile/raised characters on identification signs for permanent room, which is within the eye-level zone defined here. The SAD also has a table that specifies character cap height based on three specific visual character mounting height zones, as well as lateral proximity distances. This table spans both the overhead and eye-level zones defined here and does not permit baselines of interior visual characters to be mounted as low as the lower limit of the eye-level zone discussed in this section. Additionally, the ADA also has a general requirement for a minimum overhead vertical clearance, which affects all interior and exterior overhead signs on pedestrian circulation paths, such as ceiling-suspended, post-mounted, and projecting overhead signs. Keep in mind that these are but a few examples of how the ADA relates to the overhead and eye-level zones discussed here. As stated in Chapters 4 and 5, EG designers need to thoroughly familiarize themselves with the ADA/SAD. Refer to those chapters for ADA/SAD information sources.

The concept of overhead and eye-level zones is somewhat different for exterior signage programs. Generally, for pedestrian-oriented exterior signage, these zones are the same as previously discussed. For example, detailed pedestrian information such as neighborhood maps or bus schedules should be placed in the eye-level zone for comfortable reading, and directional information should be placed in the overhead zone so it's above most obstructions in the exterior environment. Wear and vandalism are also considerations for exterior pedestrian signage: The lower sign panels are placed, the more prone they are to being hit by moving objects, covered with graffiti and stickers, or degraded by other kinds of wear and tampering.

Although the eye-level zone is applicable to exterior pedestrian signage, it has little applicability to vehicular-oriented signage, beyond drive-up windows at banks and fast-food purveyors where drivers are not moving and can study detailed information such as a menu. Vehicular sign information, by necessity, must be succinct for rapid assimilation by drivers moving at speeds up to 70-plus miles per hour. Because of the speed factor, the information on the vast majority of exterior vehicular signs is not, and cannot be, studied in great detail, as can eye-level interior and exterior pedestrian signs. The *Manual on Uniform Traffic Control Devices* (MUTCD), as discussed in Chapter 5, "The Graphic System," is a valuable reference when designing vehicular signs.

Generally speaking, when it comes to designing vehicular signage, the slower the speed, the more detailed and lower the sign information can be placed. Moreover, the level of detail of vehicular sign information rarely approaches that which is feasible for pedestrian signage—that is, although vehicular sign information can range from less to more detailed, it can rarely be as detailed as pedestrian signage information. For example, on high-speed roadways such as freeways, primary information must be limited to as few words or lines of text as possible to communicate the message—many, in fact, comprise only one or two words. At lower speeds, drivers can absorb more information, such as when they approach an intersection with a stop sign or traffic light and slow down long enough to read directional information for several destinations.

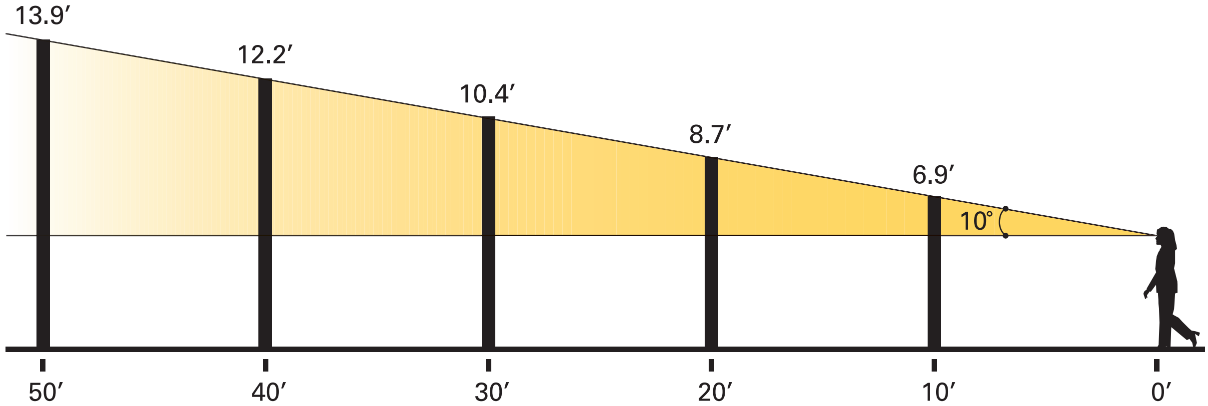
Vehicular signage can be literally overhead, in that drivers pass underneath the sign information—for example, signs mounted on overpasses, above garage entrances, and on freestanding sign support structures spanning the roadway. While these *pull-through* or *pass-under* signs are fairly common in vehicular signage, more common are pass-by vehicular signs, which are mounted adjacent to the roadway and often require far less complex support structures than freestanding pass-under signs. Pass-by sign panels are typically mounted lower than pass-under signs, but still need to be high enough to minimize obstruction by vehicles, trees, and other objects in the roadway environment.



6.21 Roadway sign mounted within a 60-degree horizontal field of vision.

Another important factor is that the human eye has a limited range or angle of vision—unlike the Google Street View cameras, we do not have 360-degree horizontal vision. And we don't typically rotate our eyes and our heads and necks unless absolutely necessary, such as when backing out of a parking space. Accordingly, signs should be mounted within normal/natural lines of vision when people are looking straight ahead.

Horizontally, the angle of vision extends 20 to 30 degrees (40 to 60 degrees total) from the vertical centerline of the eyes when looking straight ahead. Figure 6.21 depicts a sign mounted perpendicular to the line of sight within a 60-degree field of vision. Note, however, that other diagrams may indicate a more dynamic horizontal vision field for people moving in cars based on proximity to the sign.



6.22

6.22 Signs mounted within a 10-degree vertical field of vision.

Vertically, the angle of vision extends 10 to 15 degrees up and down from the horizontal centerline of the eye. Figure 6.22 shows a 10-degree angle up from the centerline. It doesn't show a downward angle because other objects tend to obscure sign information placed below the horizontal centerline, unless the viewer is within relatively close range of the sign.

As noted above, people typically will not rotate their heads to read sign information beyond their horizontal angle of vision; likewise, they generally will not crane their necks to read signs in the overhead zone. Figure 6.22 illustrates how signs mounted in the overhead zone should be primarily for distance reading. It also illustrates how the top height of a sign can increase with viewing distance, as well as how the size of a sign, along with its graphics, should increase with viewing distance.

This information about sign-mounting zones and viewing angles and distances can be useful to EG designers, but it is fungible and therefore should not be considered immutable fact. Sign viewing is a dynamic process with many variables, particularly regarding whether the viewer is moving forward on foot or on wheels. As with many other aspects of EG design, such as typographic size, the designer should conduct some degree of testing, formal or informal, to determine sign mounting positions suitable for the conditions of the project at hand. Three-dimensional computer modeling applications can be helpful to informally test sign mounting positions. And, as always, the EG designer must keep in mind conformance with local codes and the ADA signage provisions, which in many cases are more stringent than the general mounting zone dimensions discussed above.

Architectural and Site Factors Affecting Mounting

As clearly stated throughout this book, signage programs exist within an environmental context, be it interior, exterior, or both, and the EG designer needs to consider the physical characteristics of the environment within which the signs are to be mounted. Ceiling clearances, wall and corridor widths, obstructions such as columns or trees, and other elements all affect sign mounting decisions. For example, a given building may have ceilings that are too low for ceiling-suspended signs to provide the minimum ADA clearance, given the sign information content at the minimum visual character cap heights per the SAD table. In such cases, ceiling-suspended signs may not be a design option, so the EG designer must consider other types of mounting, which will in turn affect the formal qualities of the sign hardware system.

Another architectural/site factor is whether the environment provides adequate opportunities to mount signs on existing structures, such as walls, columns, and ceilings for interior signs, or light poles and overpasses for exterior signs. In situations where there are no appropriately located existing structures for sign mounting, such as in the middle of a shopping mall's atrium or an open urban plaza, freestanding signs will be necessary, which naturally has formal consequences for the hardware system. It's also possible that the EG designer may find that freestanding mounting is completely appropriate for certain sign types even when existing structures are available for sign mounting. In an urban signage example, the EG designer may determine that freestanding signs will provide clearer sightlines and encounter less visual competition than sign panels mounted on existing structures such as light poles.

Sign mounting must be structurally stable; therefore, it must be coordinated with architectural or site conditions, whether the sign program is for an existing environment or new construction. In new construction, the EG designer can coordinate sign mounting with the project architect, structural engineers, and/or sign fabricator. In existing environments, the EG designer can coordinate sign mounting with the sign fabricator and/or a structural engineer if an architect isn't involved.

Exterior, ground-mounted signs require *footings* or *foundations,* which are concrete legs or pads that penetrate deep into the soil to anchor the sign. The aboveground sign structure can be directly buried into the fresh concrete footer(s) or can be attached at a later time by anchor bolts to the structure laid with the footing(s). In either case, the ground must be dug to lay the footings, which means that below-grade utility lines may be breached during the digging. To avoid interfering with local services such as water, electric, data, or sewer, the sign fabricator should call for a *markout* of utility lines in the installation locale. Indeed, in many locales digging without a utilities markout is against the law.

As you'll learn later in this chapter, there are myriad ways to join sign parts together and to join signs to their mounting surfaces. But, as stated in Chapter 2, "The Design Process," EG designers are not trained or licensed to practice structural engineering or architecture, and should therefore specify that all engineering of sign structures and attachments be performed by professionals in those fields or by the sign fabricator.

Sign Size Considerations

Many of the same factors that must be considered regarding sign mounting must also be considered regarding sign size. Certainly, the relationship of viewing angle, viewing distance, and mounting height is a key determinant of the size of any given sign type, as are architectural and site factors, such as a low ceiling or limited wall space. And, as stated in Chapters 4 and 5, sign hierarchy and the quantity of message content are two other key size determinants for any given sign type. So important are they, in fact, that it bears repeating that it is imperative to design for the worst-case (longest) message or set of messages programmed for each sign type.

For vehicular signage, road speed and the number of lanes affect the amount of time and the distance that drivers have to react to a sign. These factors, in turn, affect the letter height of a sign message and the total area of the sign panels that display the messages, as shown in Figure 6.23. The information in Figure 6.23 is a starting point only, and as with sign mounting, some degree of testing is necessary to determine the letter heights and panel sizes most suitable for the project at hand.

Recall from Chapters 4 and 5 that local codes may dictate message content and the cap heights of messages for certain interior signs,

6.23 Table indicating letter heights and panel sizes for vehicular signs.

Lane Quantity	Vehicular Speed (MPH)	Reaction Time (Seconds)	Distance Traveled During Reaction (Feet)	Letter Height (Inches)	Total Area of Sign (Square Feet) Commercial Industrial Site	Other Sites
2	15	8	176	4	8	6
	30		352	7	25	18
	45		528	10	50	35
	55		704	14	100	70
4	15	10	220	4	8	6
	30		440	9	40	28
	45		660	13	90	64
	55		880	17	150	106
6	15	11	242	5	13	10
	30		484	9	40	28
	45		726	14	100	70
	55		968	19	190	134
Freeway	55	12	1,056	21	230	162

6.23

typically those with life safety messages. Although not all codes mandate a specific size for the actual sign panels on which such messages appear, some do, so it's always important to check the local codes applicable to the project at hand to see if certain panel sizes are mandated. And even when panel sizes for such signs aren't specifically mandated in a code, the message content and graphic sizes dictated by the code *will* play a role in determining panel sizes. This is also the case with the ADA; although the SAD doesn't require specific sign panel sizes, its requirements for attributes of sign graphics, such as sizes, positions, spacing, and others, affect the panel sizes on which graphics are displayed.

Also note that the SAD section on protruding objects, which is separate from the SAD's signage section, places dimensional limits on 3D objects, including signs, in pedestrian circulation paths. Generally, these ADA limits include depth of objects protruding from walls, overhang of single post–mounted objects, vertical clearances of double post–mounted objects, and vertical clearance of overhead objects—most within specific vertical or horizontal ranges. Both interior and exterior sign dimensions can be affected by the requirements of the SAD's protruding objects section, and the EG designer is advised to become familiar with all the specifics of its requirements. Sources for ADA/SAD requirements are provided in Chapters 4 and 5.

Chapter 4, "The Information Content System," explained how local sign ordinances may restrict the size of exterior signs, usually expressed in terms of square footage. Other sign ordinance restrictions may include other aspects of the hardware system for exterior signs, such as height, form or shape, materials, illumination, and other factors.

Overall Size

Thus far this section has focused on the size of sign panels, the part of a sign that displays messages, as opposed to the overall size of a sign, including its mounting structures. In the case of flush wall-mounted signs, where the back of the sign panel is mounted directly to a wall, there is no visible ancillary structure to support the sign panel, so the overall size of this kind of sign is the sign panel itself. In the case of freestanding, suspended, and projecting signs, however, there is some sort of support structure for the sign panel, and this structure contributes to the overall size of the sign. As noted earlier in this chapter, the support structure may be exposed, as in the single vertical post of a lollipop sign, or may be hidden, as in a monolithic pylon.

This discussion of the overall size of a sign is germane to local sign ordinances as they may restrict two aspects of size: actual height from the ground to the top of the sign (*height restriction*) and the square footage of the sign (*area restriction*). Refer back to Chapter 4, "The Information Content System," for more on local exterior sign ordinances.

Depth

Another important sign hardware size consideration is depth. We can't forget that signs, even flush-mounted wall plaques, are three-dimensional objects and that depth is that added third dimension! Depth of a sign can range from negligible—essentially two-dimensional or planar—to deeper than its length or width. Factors that contribute to determining depth include:

- The depth required of mounting structures to adequately secure the sign.
- Informational requirements: Signs with messages on one or two sides can be relatively thin, but signs that have information on three or more sides need to be deeper, to provide an adequate message area on each sign face.
- ADA/SAD limitations on depth of objects, including signs, protruding or projecting from walls into circulation paths. As stated previously in this section, the SAD also places other dimensional limits on signs on circulation paths.
- The visual effect sought by the EG designer.

Proportion and Scale

Proportion and scale are related to size in the sign hardware system. The rule of thumb for proportion is to trust your gut; that is, if a freestanding sign looks too thin depth-wise to stand up, it probably won't unless it has major foundational support. Conversely, excess depth can make signs appear too bulky. Accordingly, to achieve three-dimensional proportional harmony, it's important, at the very least, to study the front and side views of all the sign types in a sign program; quick study models and 3D computer rendering programs can be even more helpful for visualizing and refining sign program forms and proportions. Always consult with a sign fabricator or engineer if you have any questions about structural matters.

The EG designer can also manipulate the scale of the sign hardware system in relation to the program's environment. The scale of the various sign types can be just right for their surroundings, or the scale of certain or all the sign types in a program can be enlarged to create a bigger, more dramatic visual impact. In certain environments, smaller-scaled signs may be appropriate to create a sense of subdued elegance, but they should never be so small that they cannot be easily read at the intended viewing distance or that they do not conform with any ADA or local code requirements for typographic or panel sizes.

A final word about size in the sign hardware system: The fewer sign sizes there are in a program, the more visually unified the program will be.

Keep in mind that a sign of a given size can display variable quantities of information content, from a little to a lot—although never so much as to cause information overload—depending on how the various kinds of sign messages are laid out in the graphic system.

Sign Lighting Overview

Just as lighting adds interest and drama to stage productions, lighting can add interest and drama, as well as visibility, to signage. Lighting components are physical objects, making sign illumination part of the sign hardware system. Basically, there are three options for lighting signs: external, internal, or nonillumination. This section presents a basic overview of sign lighting techniques in relation to each of these sign illumination options.

Decisions on whether to light and how to light some or all the sign types in a program depend on many factors, among them whether a sign is in an interior or exterior environment, ambient light levels within the sign program's environment, a sign's hierarchical rank (primary, secondary, tertiary) within the program, cost considerations, local sign ordinances, the desired visual effect, and others. In addition, new technologies and products for lighting signs are always being developed, so the EG designer may want to engage a lighting consultant, electrical engineer, or sign fabricator for more technical information on sign illumination.

Electrical power is required for both external and internal illumination. Typically, electrical power from the grid must be brought to the sign location, which is a cost factor that requires coordination between the EG designer and the project architect or electrical engineer, as well as between the sign fabricator and other construction trades. Ongoing electrical consumption is another cost factor. Sign illumination may be on around the clock, or be controlled with an automatic timer to save energy. The latter is the case in particular for exterior signs or interior signs in high-daylight environments. Maintenance is also a consideration, as most illuminated signs must be checked periodically to replace burned-out lamps and to ensure that other electrical components are in good condition. Due to these cost and maintenance factors, lower-hierarchy signs within a program, such as room identification plaques in a hotel, are rarely illuminated. It's also important to remember that local sign ordinances may place limitations on the illumination of exterior signs, such as "dark sky" requirements to reduce glare and light pollution from a variety of lighting sources.

In signage programs for new construction, the earlier the EG designer can identify the locations of illuminated signs, the easier it will be for the project's engineers to coordinate sending power to those locations without change orders or ripping out finished surfaces to lay electrical conduit. Even if it's still undecided as to whether a given sign type may be illuminated, it's wise to have power run to the appropriate sign locations so that the power is there when or if needed. Of course, the EG designer should be judicious and not have power run to hundreds of sign locations where it's unlikely to ever be needed.

The previous paragraphs apply to traditional sign lighting and electrical delivery methods. That said, white light emitting diode (LED) lighting has revolutionized sign illumination and to a certain extent, electrical power delivery to signs. LED lamps have longer life, consume less power, and have fewer hazmat disposal consequences than the former workhorse of the sign industry, fluorescent lamps. In some cases, the power consumption of LEDs can be low enough that the sign power source can be solar, which does not require wired connection to the electric grid or consume power from it. Solar power does require collection and storage devices, and is a rapidly developing technology, so it can be useful for the EG designer to consult with a sign fabricator or sign lighting manufacturer who has knowledge of current solar energy technology and components.

Whether signs are grid-wired or solar-powered, or externally or internally illuminated, at the minimum, the EG designer should be aware of the items noted below. Keep in mind that sign fabricators, lighting consultants, and lighting manufacturers can be useful sources of technical assistance on sign illumination.

6.24

6.24 Flush, ground-mounted floodlights wash over the externally illuminated verde marble site identification sign at the International Trade Center in Mt. Olive, New Jersey.

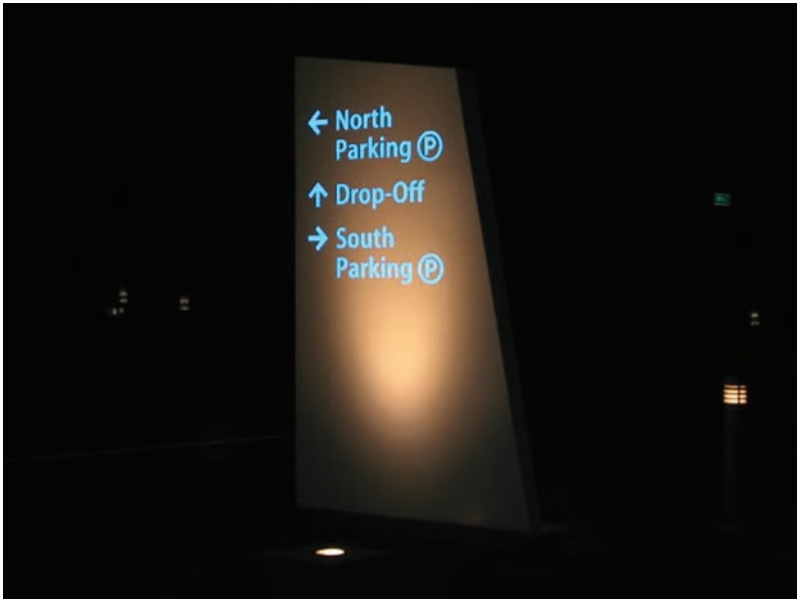
- Externally and internally illuminated signs must be fabricated so that they are evenly illuminated with no so-called hot or cold spots.
- All electrical components must be Underwriters Laboratory (UL) approved and in conformance with any applicable safety or energy codes.
- All electrical engineering for a sign program should be performed by other parties with the proper credentials, such as an electrical engineer or a sign fabricator.

External Illumination

The term *external illumination* refers to lighting that is outside of a sign but specifically dedicated to and aimed at the sign for purposes of illuminating it. (See Figure 6.24.) This definition does not include *ambient lighting,* which is lighting dedicated to other purposes in the sign environment, such as general room or street lighting. External lighting reflects off a sign's surface and is achieved with floodlights or spotlights directed onto either the entire sign face or just the sign graphics. External illumination is more commonly used for signs in exterior environments than interior environments, although it can make for very dramatic effects in interior settings.

External light sources include LED, fluorescent, halogen, mercury or sodium vapor, incandescent, and other kinds of lamps. Although all these sources emit what is generally considered *white light,* the color temperature of the light varies with the source, and the color temperature of the light source can tinge the color of the sign itself. For example, sodium vapor lighting has an orangey cast and mercury vapor has a bluish cast; even white LEDs and common tubular fluorescent lamps are available in various color temperatures, ranging from cool to warm. The fixtures housing external light sources can be mounted below or above the sign, and can vary from sleek and minimalist to highly noticeable, so the look of the lamp fixtures must always be considered in external sign illumination, as must their position, to reduce glare and light spillage.

One external sign illumination technique that doesn't require electrical power is specially engineered reflective vinyl films that capture, intensify, and reflect light from car headlights. These retroreflective vinyl films are available in white, black, and a limited range of bright colors. They can be used for reflective sign graphics, reflective sign backgrounds, or both. But a word of caution here: Never use reflective black film on reflective white film or vice versa, because both reflect white light, resulting in disappearing graphics! Retroreflective vinyl films are manufactured in a variety of grades and are typically used for traffic control and roadway directional signs at sites where there is little or no ambient lighting at night. (See Figure 6.25.)



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Internal Illumination

Internal illumination refers to light that is transmitted from within a sign. (See Figures 6.26 through 6.32.) It is commonly used for signs in both exterior and interior environments; as such, internally illuminated signs can take several forms, the most common being a rectangular sign box with a translucent plastic face on which the graphics and background are completely backlit—increasingly by white LED lamps, which are rapidly

6.25 External light illuminates retroreflective vinyl graphics, which can be illuminated simply by car headlights without light fixtures or electrical power.

6.26 A sign structure at Brooklyn's Atlantic Terminal incorporates two kinds of internal illumination effects: the opaque stainless steel side panel, where only the graphics are backlit, and the advertising panel, where the entire image is backlit.

6.26

6.27 This internally illuminated sign at a New York University dormitory combines backlit graphics with a halo lighting effect.

6.28 An internally illuminated sign for a Kansas City parking garage where the glowing neon tubing light source is formed into various shapes.

6.29 Internally illuminated monument sign in Singapore; prismatic, dichroic acrylic letters inset into a stone wall are backlit with white LEDs to create a changing spectrum of color as viewers pass the sign.

overtaking fluorescent lamps as the light source. This entirely backlit box form is typified in signs for big-box stores, gas stations, and other commercial establishments. Some internally illuminated sign boxes have just the graphics backlit on opaque backgrounds, which is less commercial in appearance, while others have only the backgrounds backlit with opaque graphics.

Typically, the light source in an internally illuminated sign is completely hidden, although sometimes the glowing light source itself is the sign, as in those made of exposed neon or other luminous tubing. Some internally illuminated signs aren't even rectangular boxes; instead, they're individually fabricated letters that can be lit in three ways: with light coming through the face of each letter, with light coming through the face and returns (sides) of each letter, or with light spilling out around the returns of an opaque letter in a halo or silhouette effect. Another form of internal illumination is edge lighting, where a light source is aligned on the edge of a transparent glass or plastic sheet and is conducted through the transparent sheet to illuminate graphics etched or sandblasted into it; translucent vinyl is also often used for graphics on edge-lit signs.

There are many light sources for internal sign illumination, with new forms and technologies being developed and refined on a regular basis. White LEDs have largely overtaken the tubular fluorescent lamps which were the workhorses used to backlight most sign boxes. Similarly, LEDs have largely replaced custom-bent neon-type lamps for backlighting individually fabricated letters. This LED sign lighting revolution, which continues to

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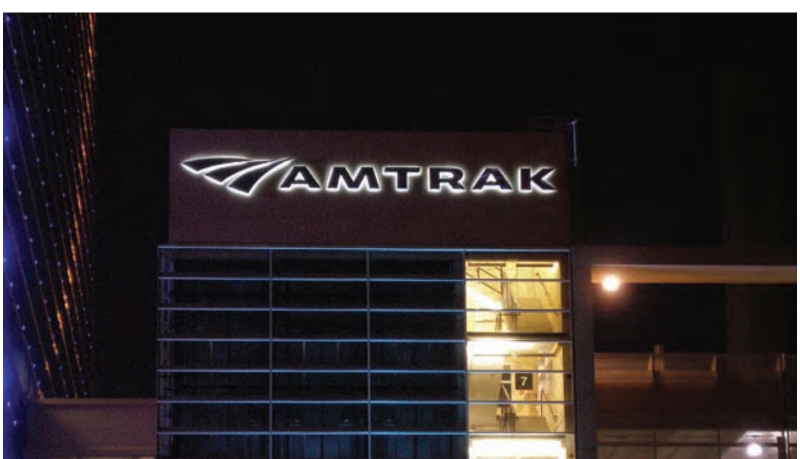
6.30 Electricity produced by a solar collector and stored in batteries powers LED lights to internally illuminate a Woodward Avenue Tribute, one of several interpretive, placemaking towers that celebrate Detroit's history.

6.31 Internal illumination creates dramatic halos of light that silhouette opaque dimensional graphics on a Philadelphia parking garage.

6.32 This internally illuminated sign on a pedestrian bridge in Hong Kong is edge lit, where the LED light source, placed along the edge of clear acrylic sheet, illuminates the engraved graphics.

evolve, has allowed thinner sign boxes and smaller backlit letters, with the added benefits of energy savings and longer lamp life. Another benefit—or detriment, depending on your viewpoint—is that certain LED lamps can sequentially change color from white to any number of colors. EG designers should be aware of poor LED sign lighting applications, which include hot spots on backlit signs, and any application that reveals the point sources of the individual LED lamps, unless the goal is to emulate strings of holiday lights.

Typically, internally illuminated signs must be thicker than other types of signs, to accommodate lamps and their mounts, the space



6.31

6.32

required between the lamps and the sign face, plus wiring and other electrical components. Providing access to the interior of sign boxes, for servicing lamps and electrical equipment, is also an important consideration when designing internally illuminated signs. The EG designer should take care to specify that all internally illuminated signs be fabricated to prevent leakage of light at seams and joints, and with adequate venting to dissipate any heat that can build up within the sign. Additionally, the EG designer should specify that all illumination is to be even, with no hot or cold spots.

Nonillumination

Nonillumination of signs is a perfectly viable option for signs in exterior or interior environments with high enough ambient light levels (whether from artificial or natural sources) for signs to be seen and read without dedicated sign lighting. Entire sign programs have been developed with no illumination at all for many environments, and function perfectly well.

Nonillumination also makes sense if the site doesn't operate at night or if an overly commercial look is not desired. Nonillumination is, obviously, the least expensive option, requiring no electrical installation, no ongoing on-grid energy-consumption costs, and no costs for solar energy collection and storage devices.

Sign Materials Overview

Sign materials are just that—raw materials, such as pallets of aluminum sheets or steel I-beams. It's the EG designer's creative mind and the sign fabricator's skills that give materials form and life as three-dimensional sign objects. And that is one of the truly magical aspects of EG design.

Materials are the essence of a sign program's hardware system—they are the very stuff from which signs are fabricated. As such, they have a significant bearing on the visual appearance of the sign hardware system. The EG designer has a virtually endless range of materials from which to compose a sign program's hardware system, and fascinating new materials are introduced on a regular basis. An entire book could be written on sign materials, so by necessity this section highlights only the basic materials that can be used in the sign hardware system.

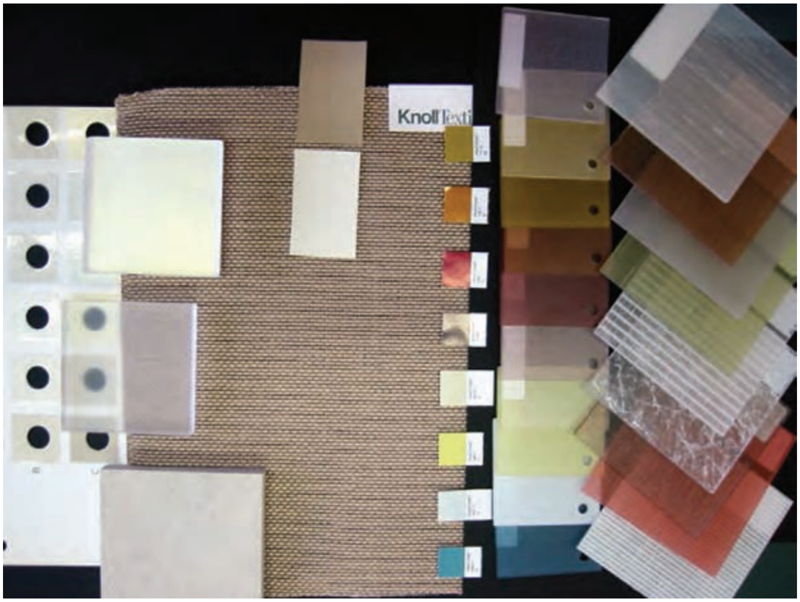
Some sign materials are used as purely *structural* components, either expressed or hidden, while others are used as exposed *finish* components, such as sign faces, plaques, and cladding over internal structures. And some sign materials, such as wood and aluminum, are used as both structural and finish components.

Materials as Your Muse

The guideline here is: Let the materials be your muse. Certain sign materials that are inherently attractive are rarely covered up with paints or other opaque coatings, although they may require a clear coating for protection. Other sign materials are covered up with opaque coatings because they need to be a specific color, they need to be protected from the elements, or they're inherently unattractive. Most materials can take a variety of finishes—smooth, rough, grained, and so on—that either come from the material's manufacturer or are added in the sign fabricator's shop. (More on this later, in the "Overview of Sign Coatings and Finishes" section.)

Each basic type of sign material has inherent qualities, such as the transparency of glass, the flexibility of fabric, or the shininess of metal, and each of these qualities can and should be exploited by the EG designer. Plastics are perhaps the ultimate material chameleon, in that they can mimic glass, metals, or even wood and stone. Plastics also have inherent qualities that are valuable unto themselves, such as ease of formability, break resistance, and their relatively light weight. Several examples of the various sign materials available are shown in Figure 6.33.

6.33 Endless material options are available for sign programs: a collection of material, pattern, and color samples.



6.33

Unity of Materials

Unity of materials is just as important to the visual coherence of a sign program's hardware system as unity of form. As with sign form, the point is to use a unified materials palette to create a family resemblance among all the various types of signs within the program. This doesn't mean that all the materials within the program's palette need to be used on each and every sign type, but that perhaps one or two materials are featured in all the sign types in the program. See the Gallery section at the end of this book for examples of sign programs with unified materials.

Materials and Processes

Materials for exposed sign finish components are available in a variety of forms, most commonly in flat sheets, plates, or slabs of various thicknesses, and can be processed in various ways, depending on the specific kind of material. All flat finish materials can be cut into various shapes or drilled with holes by various processes. Aside from cutting and drilling, workability diverges with the inherent physical properties of each basic material. For example, as shown in Figure 6.34, sheets of metal can be bent at an acute angle or rolled into a curve relatively easily, but stone can't be bent or rolled because it's brittle and will break. In another example, plastic is the only sign material that can be readily vacuum-formed into a specific shape by heating the plastic sheet and drawing it down over the shape with a vacuum pump; after the plastic cools, it retains the shape.

6.34 A metal panel is rolled into a simple, graceful curve on this sign for the Palms Casino in Las Vegas.

It is apparent from just these two examples that there are many workshop processes for even basic sign materials, and that new processes such as 3D printing (discussed in Chapter 5) are becoming available, so a comprehensive discussion of them is beyond the scope of this book. There's no doubt, however, that EG design is facilitated by a basic knowledge of the techniques by which various sign materials can be processed in a shop, and there are several sources for gaining that knowledge.

The SEGD website provides a message board for its members, where both professional (designers) and industry (fabricators and manufacturers) members share information about sign materials and fabrication processes, among other topics. Most SEGD industry members are willing to meet with EG designers to discuss materials and production techniques for a given project, and are often willing to conduct shop tours for EG designers, which can be very illuminating to both newcomers and seasoned professionals in the field. Additionally, SEGD industry members hold a trade exposition at the SEGD's annual conference, which is a wonderful source of information on materials and fabrication processes, including several that are cutting-edge. EG designers can also access technical information at www.signweb.com, which is geared toward sign fabricators, or by attending the International Sign Association's annual Expo, which showcases both cutting-edge and traditional sign materials and manufacturing processes.

Materials for sign structural components, whether expressed or hidden, are available in a variety of forms. Wood structural components are typically solid, and available in several cross-sectional shapes, such as square, rectangular, round, and sometimes more elaborate shapes, such as fluted columns or turned spindles. Metal structural components are typically hollow or open extrusions or forgings. Many of these shapes are used for general construction industry applications and are available in a variety of basic cross-sectional shapes, such as round, square, and rectangular tubing, as well as L-shaped angles, C-shaped channels, and the classic I-beam. There are also manufacturers of extruded aluminum support components with more varied sectional shapes geared specifically to signage applications.

Size Does Matter

It's important to keep in mind that both finish and structural signage materials are manufactured in certain standard sizes, as this will have consequences for the appearance of a sign program's hardware system. Not only can material size be a design constraint, but so can the size of equipment for working, finishing, or applying graphics to the material. Size is generally less of a problem with the smaller sign types within a program, but it can become a major challenge when working with the larger sign types, where seams and joints can become a design factor.

Seams and joints can generally be minimized or hidden on opaque or painted-over materials such as metal, wood, and opaque plastics, but they cannot be hidden on fabrics or transparent materials such as glass or clear plastics. When faced with material or processing size constraints, the EG designer will often press the "reveal" technique into service, which is a neat design trick that actually exposes and plays up a seam or a joint. This can often look better than trying to hide a joint that can't be hidden successfully.

From a green standpoint, size can come into play with smaller sign types cut from larger material stock. The goal in such cases is to size the signs cut from the larger stock in such a way as to minimize the amount of unused material that's left over (see Figure 6.35); sign fabricators can provide guidance to EG designers on this consideration.

6.35

6.35 No waste: A single sheet of aluminum cut into wedge shapes and arranged in a staggered formation evokes music and rhythm for this Harlem, New York, amphitheater.

Basic Sign Materials

While reading about the basic sign materials described in this section keep in mind that there are many proprietary products with their own unique qualities and properties within these broad categories of sign materials. Additionally, there are many products that are composites of these materials, capitalizing on properties of each constituent material to create a new set of properties—for example, an aluminum-plastic "sandwich" that's as flat as a solid sheet of aluminum of the same thickness but with substantially reduced weight. And, of course, new sign materials are constantly under development.

Sources for information on materials and products used in signage include manufacturers' and suppliers' catalogs, design and architecture magazines, and companies that provide compendia of manufacturers, such as Sweets and the Thomas Register. Most of these sources, as well as others can be found on the Internet (e.g., www.materialconnexion.com), which is invaluable for conducting materials research. Also note that EG designers should always obtain samples of materials they're considering for use and that most materials manufacturers are happy to provide samples to designers. Most EGD offices maintain a library of materials information, ranging from catalogs and swatch books to samples and mock-ups.

A word about sustainable design and materials: It is beyond the scope of this book to examine the environmental factors relating to materials and processes for a sign program's hardware system or for application of sign graphics. Suffice it to say that EG designers should always consider the environmental impact—from sourcing, to manufacture and processing, to

How Green Is Green?*

Life Cycle Assessment can shed light on signage design and fabrication processes.

Naomi Pearson

What do we mean when we say "green" or "sustainable"? Everything we make takes a toll on our environment and health. Even sustainable, green solutions impact our environment. It's those environmental and health impacts—starting from how we source raw materials through how the results of our designs are used and disposed of—that determine how sustainable our solutions are.

Life Cycle Assessment (LCA) analyzes the environmental impacts of a product or process by compiling and evaluating energy and material inputs and environmental outputs during five phases:

Phase 1: Raw Material Acquisition

Phase 2: Manufacturing

Phase 3: Fabrication and Distribution

Phase 4: Energy Use/Maintenance

Phase 5: Waste Management; Reuse, Recycling, Landfill, Incineration

Who Is Using LCA, and How?

In the 1960s, when concerns over limited raw materials and energy first became widespread, LCA models were created to assess energy use and to project future resource supplies and use. Fast-forward to the present, and LCA is increasingly being adopted by designers and promoted by organizations and companies galvanized by heightened environmental awareness.

The U.S. Green Building Council has incorporated Life Cycle Assessment credits into the LEED rating system and offers courses on using LCA as a tool to measure sustainability.

"Tally," an Autodesk Revit LCA plug-in that tracks environmental impacts of entire buildings in real time was launched at the Greenbuild conference in November 2013. This tool was developed by architects working with LCA experts.

The U.S. Environmental Protection Agency has defined a standard for using LCA to assess the environmental aspects and potential impacts associated with a product, process, or service.

Apple Computer uses what it calls a "Life Cycle Impact" calculation to illustrate how Apple holds itself accountable to LCA phases.

The International Organization for Standardization recommends LCA principles for environmental management. And for print design, ISO 14000 Certified printers offer compliance with LCA principles set by the ISO.

Using LCA in EGD

During the past several years, the SEGD's Sustainability Forum has issued a Green Paper, supplied green audits, covered sustainable lighting methods, discussed EGD's relationship to LEED, and provided Material Guides, among other sustainable strategy initiatives.

LCA principles can build on the groundwork laid by the SEGD Green Committee, providing a comprehensive approach to considering the environmental impacts of graphics in the built environment. This approach begins by plugging sets of EGD variables into the five LCA phases early in the design process. By looking at how the environmental impacts of each phase contribute to the project's overall sustainability, EGD practitioners can make decisions and trade-offs to achieve the best results overall.

Listed below are some examples of how typical EGD variables can be applied to the five LCA phases.

Phase 1: Sustainable Strategies for Raw Material Acquisition

- Reuse of existing panels, posts, or hardware conserves material and energy that would otherwise be used for processing and manufacturing new material. Reuse also eliminates environmental outputs such as manufacturing by-products.
- Natural resources can be preserved by choosing products containing raw materials that have been sustainably harvested by, for example, the Rainforest Alliance and certified by the Forest Stewardship Council.
- Bioplastics made from renewable, nonedible plant substances like castor oil are on the rise as healthy alternatives to petroleum-based plastics derived from fossil fuels. Biobased inks and bioresins are also options gaining traction.

Phase 2: Sustainable Strategies for Manufacturing

- Use of a closed-loop process that reuses by-products rather than outputting by-products into the waste stream as toxic effluents.
- Where economically and technically feasible, use of deployed dynamic media such as digital displays or mobile devices such as smart phones, to help eliminate the manufacture of static signage updates.
- Transparency allows access to manufacturing information direct from product makers. One source is Architecture firm Perkins + Will's online Precautionary List (www.transparency.perkinswill.com/PrecautionaryList), which offers help by detailing the health effects of some of the most toxic materials produced, such as PVC (polyvinyl chloride). Healthier alternatives suitable for signage such as polyofelin are also shown.

Phase 3: Sustainable Strategies for Fabrication and Distribution

- Mechanical installation and mounting without toxic adhesives, or specification of water-based adhesives.
- Keeping material dimensions in mind early in the design process enables the maximization of sheet sizes, print media widths, and so forth. The end result is less wasted material.
- Fabricating locally, and shipping the shortest distance possible with green packing materials is ideal.

Phase 4: Sustainable Strategies for Energy Use/ Maintenance

- Installation of timers and dimmers encourage energy savings.
- Energy used by electronic displays is weighed against the benefits of updating messaging without replacing static sign components. Consideration of environmental pros and cons determines the best outcome.
- Emphasis on durability for long-term installations minimizes the amount of energy and resources required for maintenance over time.

Phase 5: Sustainable Strategies for Waste Management

- A design with a short life span is best served by a sustainable plan for disposal, reuse, or recycling of signage components.
- Minimizing the amount of material that ends up in a landfill is best.
- Many materials marketed as "biodegradable" do not typically decompose because they are not exposed to oxygen. Instead, methane is generated as waste decomposes under anaerobic conditions.

How Green Is Green? continued

Time, Accountability, and Measuring Sustainability

Finding time to research materials and processes, making sense of the growing number of sustainability claims, and breaking through proprietary information roadblocks can be major challenges for anyone attempting to adopt more sustainable design practices. Third-party rating systems have been a longstanding, reliable way to quickly evaluate environmental factors that play a part in Life Cycle Assessment.

Searchable libraries of products pre-vetted for health and environmental impacts offer immediate product transparency, and help find innovative products and newly developed bio-based materials. The Pharos Chemical & Material Library rates products based on health and ecological impacts using comparative chemical hazard lists identified by GreenScreen for Safer Chemicals as well as product reporting and metrics systematized by the customer-led Health Product Declaration Collaborative (HPDC).

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* *Adapted from SEGD Design Number 28 (2010), with permission.*

delivery, to disposal and recycling—of the materials and processes they specify. Good, solid design that's not overly trendy—and therefore not quickly dated—also contributes to environmental sustainability. The SEGD Green Paper on Sustainability, available at the SEGD website, is a good source of information on green practices in EGD.

Metals

Metals, in both structural and sheet forms, are among the most highly utilized sign materials. Additionally, certain metals can be melted and cast into complex forms, including hardware components such as sign bases and as medallions and plaques.

All metals have good to excellent structural properties, although they all oxidize or corrode to a greater or lesser extent. Metals can take a range of surface finishes, from a mirror polish to a coarse-brushed grain. Metals can also be painted, although stainless steel, bronze, and brass are so attractive in their natural state they rarely are. Typical metals used for signage include:

Aluminum. Used for sign faces, plaques, cladding, trim, and lightweight to medium-weight structures, as well as for castings. Considered one of the "white" metals, aluminum is a lighter shade of gray than stainless steel. Other characteristics include: good appearance; good durability; light weight; and medium to high expense. Aluminum also typically benefits from clear or opaque protective coatings, although such coatings are not necessarily required. (See Figure 6.36.)

Carbon steel. This metal is typically used for concealed medium-weight to heavyweight sign structures, not for appearance. Other characteristics

6.36 The federal star feature of this cast aluminum base distinctly brands all of the signs in Washington, DC's citywide signage program. A north arrow cast into the base orients visitors to the City's street plan.

6.37 The sides of this stainless steel totem are rolled into a scroll shape for this honorific sign at the Tisch Children's Zoo in New York City's Central Park.

include: high durability; heavy weight; and medium to high expense. Carbon steel also requires rust-inhibiting paints or coatings.

Stainless steel. Stainless steel is typically used for sign faces, plaques, cladding, and trim (it's generally too expensive for structures). Another of the "white" metals, stainless steel is a darker shade of gray than aluminum. Other characteristics include: excellent appearance (it's rarely painted); excellent durability; heavy weight; and high expense. Because it does not rust, or rusts minimally, (hence the name "stainless") protective coatings are not usually required. (See Figure 6.37.)

Bronze, brass, and copper. These copper alloys (also called the "yellow" or "red" metals) are typically used for sign faces, plaques, trim, and castings. Like stainless steel, they're too expensive for structures. Other characteristics include: excellent appearance; good to excellent durability; heavy weight; and high expense. These alloys also require a protective coating to maintain their metallic shine—although often they're intentionally oxidized to a rich brown or green patina before coating, or allowed to weather naturally without coating. (See Figures 6.38 and 6.39.)

Plastics

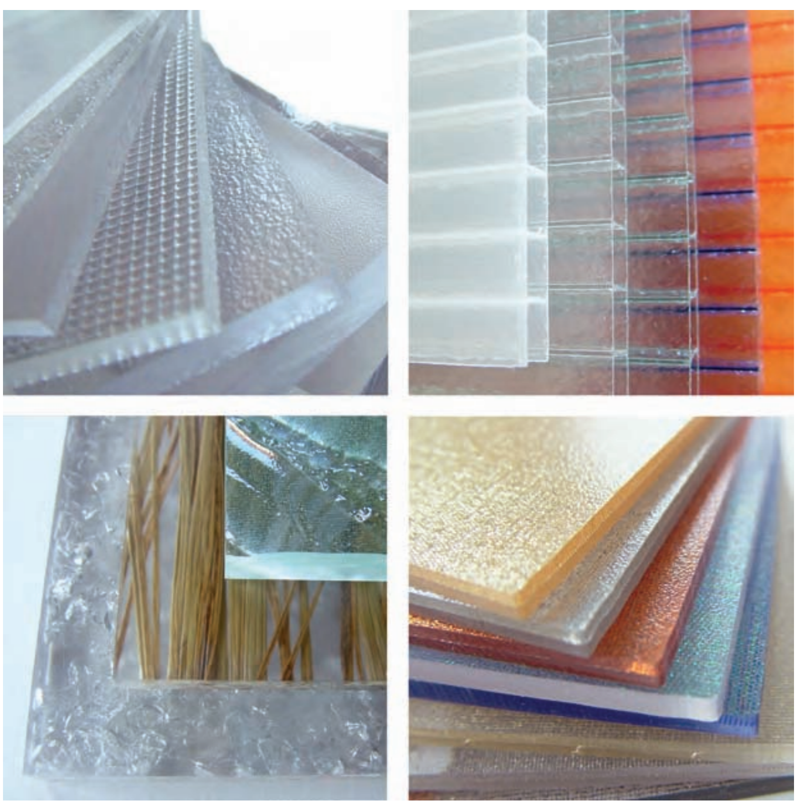
Plastics have a number of unique properties that can be exploited for signage, such as transparency, formability, break resistance, and relatively low weight compared to other sign materials. As such, plastics are another commonly used sign material, although they're used primarily for exposed finish components, not structural components. And because certain plastics allow light to pass through them and are shatter-resistant, they are almost always used for internally illuminated sign faces. Plastics

6.38 Rockefeller University signage features curved oxidized bronze plaques highlighted with satin-finished unoxidized bronze medallions.

6.38

6.39

and plastic resins are also moldable by various processes into an infinite variety of shapes, an invaluable feature in signage design and production. Plastics in sheet form are most commonly used in signage, although plastic resin liquids and pellets can also be cast into various sculptural forms. (See Figure 6.40.)



6.40

6.39 Clear acrylic sign panel with edge-lit graphics on the second surface and cut copper letters on the first surface.

6.40 Plastic sheet is available in a wide variety of colors, textures, and forms including laminations and embedments; recycled plastics are gaining use in signage.

6.41

6.41 Certain plastics can be thermoformed to create dimensional shapes, as featured on this internally illuminated entrance sign for the Buenos Aires subway system.

The two primary sign plastics are *acrylic* and *polycarbonate* (commonly called *polycarb*), both of which have the glasslike properties of transparency and translucency; but, unlike glass, they don't chip and shatter. In fact, polycarbonate is the clear, bulletproof material used to shield bank tellers and presidential limousines.

There are some technical differences between acrylic and polycarbonate, but they are both used for sign faces, plaques, cladding, and trim. Due to their capability to be transparent or translucent, they are widely used for the faces of internally illuminated sign boxes and letters. They're also widely used for vacuum-formed sign faces that have graphics in relief, as well as for clear protective lenses on signs such as directories and menu boards. (See Figures 6.41 and 6.42.)

6.42 Clear acrylic directory sign with masked and painted areas that reveal a window for changeable information at a Stony Brook University medical building, New York.

Acrylic sheet, in particular, is available in a fairly wide range of colors and textures, from completely transparent to completely opaque, and both acrylic and polycarbonate can be painted to a custom color. There are several manufacturers of acrylic and polycarbonate sheet, each with its own trade name and line of colors, textures, and other features. Grades with UV inhibitors should be used for exterior signage, as both acrylic and polycarb tend to yellow with exposure to the sun. Both feature a good appearance, medium to high durability, light to medium weight, and medium to high expense. Most plastics, including acrylics and polycarbonates, do not require any applied protective coatings, but they do tend to scratch more readily than other sign materials.

Other plastics used in signage include styrenes, vinyls, phenolics, and photopolymers, all of which have their own unique properties. There are several manufacturers of signage materials (which typically come in sheet form, some of which are flexible) made from these types of plastics. Many are sold under trade names and use proprietary manufacturing techniques that result in unique products, such as expanded polyvinyl chloride (PVC) sheet that's half the weight of solid PVC sheet, but is very strong for sign panel use. Other specialized plastics used for signage include metallized or holographic films and sheets; photosensitive plastic sheets, which yield tactile/raised and Braille graphics when exposed to light and are chemically processed; and plastic resin sheets embedded with all kinds of decorative materials or with glass fibers for strength.

The list of proprietary plastic products that can be used for signage is virtually unlimited, and new products are constantly being introduced. A word of warning, though: Some of these plastic products look downright cheap and tacky, whereas others are very attractive.

Glass

Glass was invented centuries before plastics, and because of its inherent transparency, glass has long been used as a signage material, particularly as clear protective lenses on sign cabinets such as directories. Glass has also long been used for edge-lighting applications and as the tubing that encases neon and other luminous gases used for signage. Glass sheet is used for sign panels, lenses, and plaques, typically in transparent form with the familiar slightly greenish tint; a completely colorless low-iron content glass sheet is also available, but at greater expense. Additionally, glass sheet is available in a wide variety of colors, levels of transparency or opacity, and surface textures, typically from specialized art glass suppliers.

Glass sheet is very hard and scratch-resistant, but with a great enough impact, it will shatter or chip. For this reason, glass is often tempered or laminated or both. Tempered glass sheet is treated after manufacture so that it will crumble into rectangular clumps rather than shatter into sharp shards on impact. Tempered glass, however, cannot be cut, drilled, sandblasted, or otherwise mechanically processed without risk of breaking, so any tooling or incised graphic application processes should be performed before a glass sign is tempered.

Laminated glass can be tempered or not, and consists of two or more sheets of glass that are permanently laminated together with a plastic

6.43 Three laminated glass panels comprise the tenant identification pylon at Philadelphia's Cira Centre. The middle panel uses a translucent lamination interlayer; the outside panels use an optically clear interlayer.

6.44 Curved glass panels are laminated with a printed translucent interlayer for the Woodward Avenue Tribute towers in Detroit. Interlayers can be printed in full color or black and white.

interlayer that holds the glass fragments together if the laminated sheet is impacted. The lamination interlayer is quite strong; in fact, the most common application of laminated glass is in car windshields, which deform little even if riddled with cracks from an impact. Large freestanding glass signs can be self-supporting if made from several sheets of glass that are laminated together, although laminated edges should be protected from the elements on exterior signs. Also, many glass suppliers can provide graphics on the lamination interlayer, as well as manipulate the interlayer's color, texture, and opacity. Ceramic frit, which is applied to a glass surface and baked to become integral with it, is a very durable graphic application technique for glass. (See Figures 6.43 through 6.47.)

Glass sign panels typically need a support structure, which is usually visible due to the transparency of glass. Supports can include a continuous frame that surrounds the sign perimeter, or individual supports at strategic points, although opaque glass panels can be supported by hidden structures. Frameless glass signs should always have *eased edges,* which are very slightly beveled at a 45-degree angle to prevent chipping and ease the sharpness of 90-degree cuts.

Other characteristics of glass include: excellent appearance; good to excellent durability; heavy weight; and medium to high expense. It does not require protective coatings, but it must be cleaned periodically to maintain transparency.

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6.45 Sculptural, 1-meter-high cast glass letters evoke icy coolness at the One Raffles Quay office complex in tropical Singapore.

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Wood

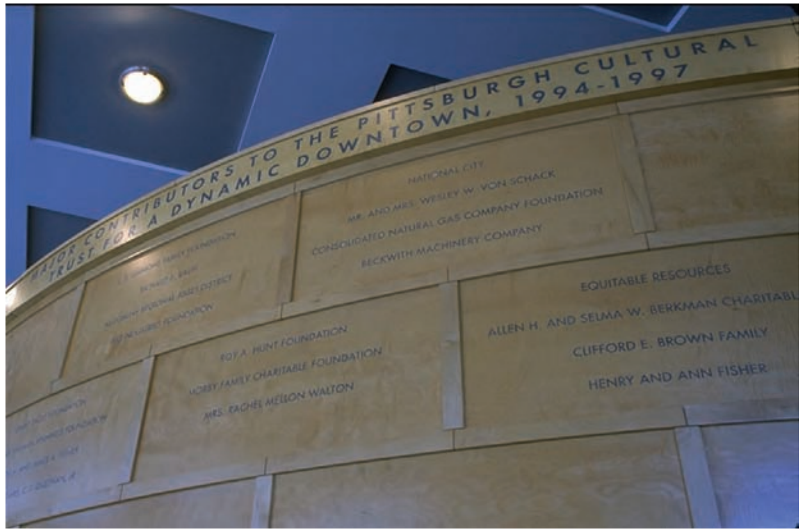
As sign materials, wood and wood products are less commonly used today than they were a few decades ago, having been replaced to a great extent by new materials on the plastics front. Nevertheless, wood and products made from wood, such as particleboard, are still used for some signage, including sign faces and plaques, as well as for lightweight structures.

Wood products come in both structural and sheet forms, from cheap pine 2-by-4s and plywood to fancy lathe-turned posts and exotic solid hardwood or veneered panels. All wood products can be painted or

6.46 Ceramic frit graphics fired onto the glass handrail create an architecturally integrated placemaking statement for this public library in New York.

6.47 Glass donor sign with etched and filled graphics on the first surface and direct digital imaging on the second surface at Mamaroneck Public Library, New York.

6.47



6.48

6.48 Blue-stained curly maple wood veneer letters are inlaid flush with curly maple veneer in the donor recognition wall at the O'Reilly Theater in Pittsburgh.

6.49 Wood sign panels are overlaid with stencil-cut aluminum graphics panels at the Zimmerli Art Museum on the Rutgers University campus in New Brunswick, New Jersey.

clear-coated, and can take a range of surface textures, from smooth to highly textured. Typically, the more lowly and unattractive the wood product, such as medium-density fiberboard (MDF), the more likely it is to be used simply as substrate panel, to be covered up with paint and graphics. On the other hand, richly grained hardwood can be exploited for its attractive appearance in signage design, as it is in fine furniture and cabinetry. In many cases, surfaces of lower-quality wood products are laminated with a veneer, which is a thin layer of high-quality wood, often with unusual graining. (See Figures 6.48 and 6.49.)

Other characteristics of wood products range from poor to excellent appearance; low to high durability; light to medium weight; and low to

6.49

high expense. Wood products, particularly in exterior applications, must be protected with opaque paint or clear sealer.

Fabrics

Fabric is a sign material that has the unique property of flexibility; consequently, it is typically used for exterior signage applications such as awnings, billboards, banners, and flags. In the case of awnings and billboards, the fabric is stretched over a rigid frame; fabric banners and flags are freer to move with the wind, so they can lend animation and a festive quality to a site. (See Figures 6.50 and 6.51.)

Typical sign fabrics are made of natural fibers, such as cotton, or synthetic fibers, and can be opaque, translucent, or open-mesh. Certain sign fabrics are available under trade names in a fairly wide range of colors, including some metallics. Translucent vinyl-coated sign fabrics are commonly used for internally illuminated awnings and sign faces, and opaque vinyl-coated sign fabrics are used for billboards and other large outdoor signs. A reinforcement netting is often woven into these vinyl-coated fabrics, which can be visually objectionable when viewed at close range.

Obviously, sign fabrics cannot be used structurally, and all fabric signs have limited life spans. When necessary they should be coated with UV inhibitors to reduce degradation from sun exposure. Most fabric signs have a good to excellent appearance and low to medium durability; they are lightweight, and their expense is low to medium. Keep in mind, however, that fabrication and installation of structures to hold fabric signs involve additional expense.

Masonry

Masonry is a somewhat uncommon material for signage, but thanks to its inherent monumentality, it can be used to great effect. Masonry materials for signage include stone, brick, and precast concrete varieties that are typically used in architectural applications. Masonry can be used for sign faces and plaques, and masonry signs can be either solid and self-supporting or supported by an internal steel structure.

Stone, the most prestigious of the masonry materials, includes marble, granite, slate, limestone, sandstone, and others; and many textural and color varieties of each of these types of stone are also available. Stone can be used for both exterior and interior signage, although many marble varieties are too soft for exterior use. Stone surface textures can vary, from a mirror polish to a rough natural texture, depending on the type of stone used. Like glass, exposed edges of certain types of stone may require easing to reduce chipping and sharpness. Other characteristics of masonry sign materials are: very good to excellent appearance; very high durability; heavy weight; and high to very high expense. (See Figures 6.52 to 6.54.)

6.50 Banners and flags lend movement, color, and festivity to a site—here, to an event at the Massachusetts Institute of Technology.

6.51 Fabric banners stretched between support arms create a sense of place for a multibuilding medical complex in Manhattan.

6.52 This stone monument sign, cut from a single 15-ton piece of bluestone, has a natural cleft finish and hand-carved graphics. Dramatic external lighting enhances the stone's surface qualities.

6.53 Logotype in cut limestone at ABC Broadcasting's New York City headquarters complex.

6.54 Base of a Woodward Avenue Tribute tower in Detroit shows the excellent graphic detail attainable with cast concrete.

Adhesives and Fasteners

Adhesives and fasteners are literally the glue and tape and nuts and bolts that hold signage hardware units together and signage hardware units to their mounting surfaces. Adhesives used for sign hardware are far more sophisticated than ordinary household glues and tapes, and include liquids, gels, and tapes that can establish extremely powerful bonds between surfaces of sign components without physically penetrating the components. In fact, some of the adhesives used in the sign industry come from the aircraft industry, where they're used to bond aircraft skins to airframes. Indeed some adhesives are considered to create *chemical welds.* Adhesives are typically used to join finish sign materials to each other or to structural components, as well as to secure signs to mounting surfaces.

Fasteners include nuts, bolts, screws, clips, and other devices typically made of metal that penetrate sign components to form strong mechanical connections within sign units, and between sign units and mounting structures or surfaces. Mechanical connections are very strong and are usually necessary for securing sign structures together, for securing sign bodies to their structures, and, in the case of heavier sign units, for securing sign units to mounting surfaces. Unlike adhesives, which form an effectively permanent bond, mechanical fasteners have the advantage of being removable, which allows access to the interiors of sign units for servicing, such as to replace burned-out lamps or to update directory listings.

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Fasteners are manufactured from a variety of metals, including stainless steel, galvanized steel, aluminum, brass, and chrome-plated brass. When attractiveness and corrosion resistance are considerations, stainless steel fasteners are often employed. But because fasteners often join dissimilar metals, such as aluminum and stainless steel, they and the metals they join must be protected against corrosion that results from a weak galvanic or electrical reaction that occurs when dissimilar metals come in contact with one another.

Many mechanical fasteners and connections are not terribly attractive in appearance, but often they can be concealed—sometimes with ease, sometimes with difficulty, depending on the application. But there are times when there's no choice but to leave the fasteners exposed to view. In such situations, the EG designer may choose to minimize the appearance of the exposed fasteners by hiding them in a reveal or painting them the same color as the sign panel; alternatively, the designer may choose to accentuate the appearance of the exposed fasteners, thereby making them a design asset rather than a liability. Fortunately, there are several types of fasteners that are quite attractive and thereby suitable for exploitation as a design feature.

Some designed objects, such as the Eiffel Tower, revel in their exposed mechanics. Others, such as the Statue of Liberty, also engineered by Gustav Eiffel, intentionally hide their nuts and bolts. The choice boils down to what is the appropriate aesthetic for the project at hand. Examples of signs and sign programs with purposefully exposed fasteners can be found throughout this book.

Welding is another form of mechanical connection, in which two pieces of the same metal are essentially melted together along a joint by heat or electricity. Welding forms very strong connections and is often used for connecting hidden structural components. Welding can also join together finish sign components, when the raised bead formed by the welding process is ground smooth.

Regarding sign mounting, lighter sign units such as wall plaques can be readily secured to mounting surfaces with just adhesives, typically double-sided foam tape, which is often used in conjunction with silicone gel adhesive. Adhesive mounting is often combined with mechanical fasteners, such as when a foam tape/silicone bond is augmented with mechanical fasteners for extra mounting support, a combination known as *screw and glue.* And mounting pins for individual cut or fabricated letters, or for heavier sign plaques, are often secured with adhesives or mechanical parts into pockets drilled into a wall. Large and/or heavy sign units often require connection into a building's underlying structural system, which can be inches—or sometimes feet—beyond a ceiling or wall surface.

In cases where ease of changeability is a consideration, there are several methods and products, many proprietary, for attaching signs together or to mounting surfaces while discouraging tampering and allowing relatively easy changeability. These methods and products provide connections that make it possible to remove sign panels or other components; they range from magnetized sheeting to slide-in windows and lenses to hook-and-loop fasteners, commonly known as Velcro, a trademarked product, and more.

In a sustainability note, fasteners are considered more environmentally friendly than adhesives for two primary reasons. First, fasteners don't release noxious solvents or fumes like many adhesives do; second, fasteners allow easier disassembly of materials for reuse or recycling when the signs have ended their useful life. Joining in sustainability efforts, manufacturers of adhesives used in the sign industry are developing more eco-friendly products, which is welcome since adhesives are useful in historical projects, which often prohibit mechanical fastening to historical building materials.

Electronic Digital Display Units

Electronic digital displays, also called dynamic digital displays or variable message systems, draw the human eye like a flame draws a moth. These glowing, often animated devices are digitally controlled screens that display changeable and updatable sign messages, such as the flight information display systems (FIDS) at airports. Other applications of electronic digital displays include menu boards, hotel events, interactive building and campus directories, time and temperature displays, train departure/arrival information, scoreboards, stock tickers, marquees, and countless others. The EGD communication possibilities of electronic digital displays are endless, as is the need for changeable, updatable information.

Chapter 1 has an overview of the relationship of digital communication devices to more traditional EGD media, particularly static signage, and basic definitions of types of digital devices currently in use, these being digital signage, interactive kiosks, and mobile devices. Chapter 1 also distinguishes digital signage and interactive kiosks, which use electronic or dynamic digital display screens deployed in a permanent location to display preprogrammed information, from mobile devices, which have portable screens that the phone or tablet owners carry with them to select any personalized information they want or need. That said, tablet devices are being increasingly deployed in fixed locations to display preprogrammed information, which may or may not be interactive. (See Figure 6.55.)

This section of the chapter provides an overview of the electronic display units that are deployed in fixed positions for the display of dynamic or changeable information on digital signage and interactive kiosks. The

6.55

6.55 Fixed deployment of mobile devices delivers product information at the New York Auto Show.

electronic display units that are used on mobile devices are developed by the phone or tablet manufacturer and then selected by the buyer of the mobile unit; the EG designer—and the mobile device's owner, for that matter—has little or no control over what display screen technology is used on mobile devices. There are situations, however, in which the EG designer may have some control over the display units selected for deployed digital signage and interactive kiosk applications. One of these situations includes the fixed deployment of mobile tablets that deliver preprogrammed information, such as hotel meeting room schedules or product information, in a manner similar to digital signage or interactive kiosks.

There are several hardware and software components used in the process of generating, delivering, and displaying changeable electronic information on digital signage and interactive kiosks. As discussed in Chapter 1, the process and components are complex and expensive, and often involve several areas of technical expertise beyond the EG designer's milieu. As stated previously, this book's focus is on static signage programs, but since digital devices are becoming more a part of an overall environmental communication or branding strategy, an overview of the actual deployed units that display digital information is in order.

Since digital information technology is changing so rapidly, this overview is not intended to be an exhaustive treatise on how to become an expert in all aspects of that technology, but merely to familiarize EG designers with the basic types of display unit technology currently used in deployed scenarios. Since these display units are the physical objects people most

6.56 Monochrome LED displays provide train departure information at station gates along Amtrak's Northeast Corridor.

6.57 Large-scale LED displays with full color and motion are often deployed in public places such as this monumental gateway to CN Tower in Toronto.

6.58 LED and LCD technologies are combined to display images, video, and animated text and graphics in this interactive honorary portal at Northeastern University in Boston.

6.56

associate with deployed digital information displays, they are included in this chapter on the sign hardware system, but keep in mind that other physical components, typically not visible to the sign user, are also part of the digital information delivery system. Nonphysical components such as software and content are also essential for digital information delivery.

At the time of this writing, two of the most common digital display units are light-emitting diode (LED) matrices and liquid crystal display (LCD) screens. With LED and LCD devices, the sign message or image is displayed on the unit itself, and can range from static words or images that update periodically to full motion video. Projection mapping is a different technology that can project spatially mapped images and video onto remote three-dimensional surfaces or objects, such as walls, building facades, bridges, and other large-scale environmental objects.

LEDs are light-emitting diodes that generate their own light and have no need for supplemental lighting to be seen. LED matrices are orderly assemblages of the tiny LEDs into columns and rows, and can consist of a single color, such as the familiar monochrome amber or red LED displays, or they can be combined into RGB groups to display a full color range. LED matrix modules can be seamlessly assembled into very large screens of more or less customary proportions (think rock concert or sporting event screens), or into horizontal linear ribbons (think Times Square "zippers"). The resolution of conventional LED matrices tends to be fairly coarse, but is constantly improving. The rather large depth of conventional LED modules can be a design consideration. (See Figures 6.56 through 6.58.)

6.57

6.58

Organic LEDs (OLEDs) have a much finer resolution than conventional LED matrices, and are much thinner and can even be flexible and transparent. Due to their relatively high expense, OLEDs are currently being adopted primarily for small-scale displays, such as on some mobile phones and tablets. It's likely only a matter of time before OLED technology becomes more cost effective for use in large-scale deployed digital display units.

LCD screen technology is too complex to describe without several paragraphs and even then you'd scratch your head. Suffice to say that they provide full color and good resolution within limited screen proportions, also known as aspect ratios (think the flat screen television or the computer monitor in your home or office). LCD screens do not produce their own light, so are backlit, originally by fluorescent lamps but now primarily by white LED lamps, hence the misnomer "LED screen," which is probably intentional because it sounds ultra-high-tech but actually just describes how the LCD screen is backlit, not how the screen images are generated. Large LCD screens are used as deployed digital display units; small LCD screens are used for mobile phone and tablet displays.

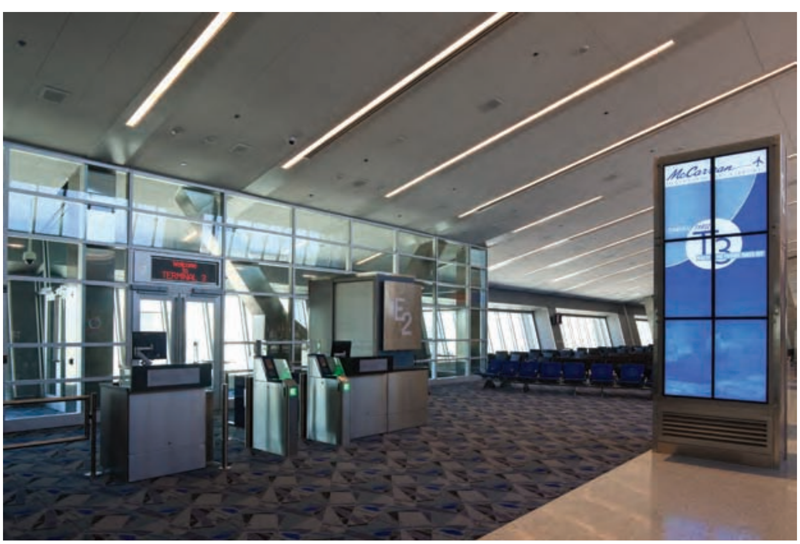
Like everything else in the digital realm, LCD screens are evolving rapidly with bigger sizes, higher resolution, smaller bezels (the enclosing frame surrounding the screen), and thinner depth profiles being developed every day. While LCD screens have fixed aspect ratios, screens can be ganged up into unlimited configurations to create video walls or towers; smaller bezel sizes reduce the "window pane" effects of ganged LCD screens to create an almost seamless digital display surface in large-scale deployments. (See Figures 6.59 through 6.61.)

6.59 LCD flat-screen technology displays train information in branded layouts, typefaces, and colors at Washington Union Station.

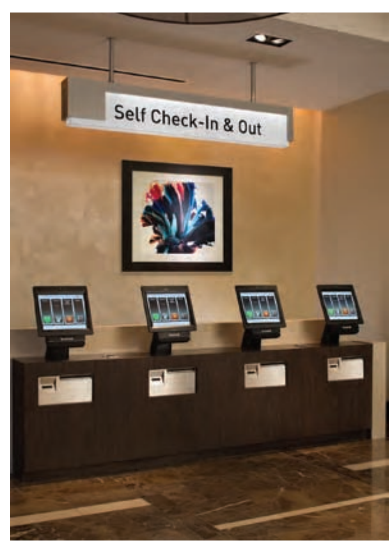
6.60 LCD screens are ganged together to form a larger display surface on a kiosk at McCarran International Airport, Las Vegas.

6.61 Interactive LCD touchscreens for self-checkout at Atlanta's Hyatt Regency hotel.

6.59



6.60



6.61

When considering the use of LED and LCD display components for deployed digital devices, the EG designer should be aware of the following hardware system design considerations for these units:

- Size and proportional limitations of active display area, bezel size, display unit depth, and dimensions of any other associated hardware components that may need to be located adjacent to the display unit
- Resolution and viewing angle limitations
- Need for electrical and datacom feeds; electrical is typically hard wired; data can be delivered via hard-wired or wireless technology
- Venting, heating, cooling, and weather protection constraints
- Brightness of viewing environment, which is increasingly mitigated by sensors that automatically adjust screen brightness to changes in ambient light conditions

In addition to the above, the use of mobile tablets in deployed situations has other considerations for the EG designer:

- Securing the tablet from theft
- Need to recharge tablet batteries
- Prohibiting user selection of non-preprogrammed information, for example using a deployed tablet to surf the Internet or check the weather in Shanghai

Other considerations for dynamic display units are control and content, which are typically beyond the skills base of most EG designers. As discussed in Chapter 1, electronic digital display units are basically empty canvases, waiting to be filled with text, image, and/or video content. How that content is delivered to the display devices is the control component. What that content is composed of and how it's presented is the content component.

All dynamic digital display units are computer-controlled, with varying degrees of scale and sophistication. The display units can be tied into a larger computer or communications network maintained by the client, can be on their own dedicated network, or can be individually controlled—all via wired or wireless connections. The point is, each installation is different, hence requires information technology (IT) experts to create or tailor control software to each specific display application; some basic applications, such as electronic menu boards, are available as packages that require relatively little technical support.

Content for dynamic display devices can range from simple generic text messages to sharp typeface and graphics rendition to full streaming video, depending on the display technology and resolution. Even nonvideo text and image content can be animated with flashes, crawls, dissolves, wipes, zooms, and other simple techniques. Although EG designers don't often have the opportunity to become involved in the actual production of content for deployed dynamic display devices, the appearance and quality of that content are concerns because, more often than not, both are lacking. At our office we always advise our clients to consider carefully the nature of the content that will be displayed, who will generate that content, how that content will be sequenced and presented, who will update and manage the content over time, and other similar concerns. Keep in mind that digital content nature, mix, sequencing, action, and other aspects may be limited by local codes or authorities, particularly in large public deployments where aesthetic, distraction, safety, and other factors are concerns.

The best sources for information about dynamic display units are their manufacturers, as they tend to have the most up-to-date technical information about their display products. Some display manufacturers can also provide control systems, including computer hardware and software, engineered for their units and the client's needs, along with training for the end users on the client side. Some IT consultants and A/V integrators draw from a number of sources to assemble complete turnkey systems for the delivery and display of digital information, which include cabinetry for the display units, content management and sometimes development, all controlling systems and equipment, installation, and end-user training.

Due to the diverse and developing skills set relating to deployed digital information systems, the static signage industry has not been the leading force in this arena, but that is evolving with knowledge expansion, technological development, and client demand. To a certain extent, the same can be said for EG designers. As stated in Chapter 1, the digital information field is changing rapidly, and partnerships and shared knowledge can help clarify and harness this rapid change. Once again, it isn't the point of this book to go into deep technical detail about digital information systems, so designers and sign fabricators can learn more and stay abreast of developments by tapping the resources of the SEGD, the International Sign Association, the Digital Screenmedia Association, the Digital Signage Federation, and DigitalSignageToday.com.

Digital Trends in EGD

Leslie Wolke

Digital screens are our ubiquitous companions, our gateways to information and entertainment, and our window to virtual communities. Neilson tells us that we spend more than a third of our 24-hour days looking at screens: the screens on our smart phones, computers, TVs, and those embedded in the environment.

Manufacturers strive for the slimmest, sharpest, and most immersive—from 5-inch smart phones to 15,000-square-foot digital billboards. But what do these digital canvases and portals mean within the realm of EGD and wayfinding?

Digital Signage

Digital screens can provide ambient architectural cues and enliven interior and exterior spaces. The immense collection of digital screens at LAX Tom Bradley International Airport welcomes arriving passengers, celebrates local culture, and guides passengers down the concourses.

In complicated environments, digital signs can deliver contextual and multilingual wayfinding information to passersby. From hotel conference room identification signs that display the day's meeting schedule to directional signs that show destinations in the visiting population's major languages, digital signs can give EG designers a medium to deliver more relevant, complex, or time-sensitive messages than static signs afford.

When incorporated into traditional sign forms, digital screens add a platform for changeable messaging. A donor recognition installation may feature the names of major donors inscribed in marble with less substantial, but more numerous donors animated on an adjacent digital screen. The most successful digital/static compositions are designed as a single, unified experience.

Digital screens have broken free of the confines of the black rectangle. Fabricators and designers are experimenting with kinetic and engaging use of screen technology. Designers can compose LEDs into sculptural forms such as ribbons, mosaics, and spires.

Resolution is not always a virtue. Not every application of digital technology requires—or even benefits from—the highest resolution display system that money can buy. Flip-dot boards, LED sticks, LCD projection, and digital tickers add engaging and playful vivacity to EGD projects.

Interactive Kiosks

The most successful kiosk systems are built to serve a single, concise function that can be completed in under two minutes. Touch-screen kiosks such as ATMs, airport check-in, and gas station pay-pumps are part of daily life. In most circumstances, people prefer not to linger in front of a kiosk or to enter personal information. Kiosks are tools for quick exchanges, such as getting directions or purchasing tickets.

The most intuitive touch screens work like our smart phones. There is a learning curve associated with every first interaction with a new kiosk. There are no standards in the user interface design for kiosks, so we must look to smart phone interfaces for familiar gestures and interaction models to ensure maximum usability. This means large buttons, short text, and a minimal number of steps to complete a task.

Inside complicated buildings, interactive kiosks are better orientation devices than our

smart phones. Because kiosks can be designed to be location-aware (to "know" where they are stationed), visitors can see their exact location on a map in the context of the building or campus and get directions to their destination. While indoor positioning and mapping is in its early stages, kiosks currently offer more relevant wayfinding tools for the widest audience.

In museums and cultural centers, interactive screens offer the opportunity to further engage with the subject matter. Most museums only offer a bit of wall text to define the object at hand. Companion kiosks present an opportunity for visitors to immerse themselves in the history, context, and significance of the object, making the object—and the visit—more memorable.

Designers can harness the best attributes of interactive kiosks and smart phones to deliver seamless experiences to visitors. As mentioned above, kiosks excel at delivering location-specific information, while smart phones are our personal navigation devices. For example, a visitor can generate directions on a wayfinding kiosk and then send them via text to their smart phone, so they can refer to them on their journey.

Mobile Devices

Mobile has emerged as the primary wayfinding platform. While digital signs and interactive kiosks play important roles in the situations discussed above, the smart phone is our trusty wayfinding companion and the tool most used to explore and comprehend the world around us.

Indoor positioning and mapping are the final frontiers of mobile navigation. Indoor positioning technology offers the ability to locate the position of a user's smart phone indoors and deliver relevant information to that user based on his or her position. While the battle of supporting technology wages (Wi-Fi, beacons, etc.), consumer expectations are growing—and it is critical that EG designers of complicated environments monitor market adoption and experiments in usability.

In most cases, the efforts to develop a specialty wayfinding app outweigh its potential use. There are a number of formidable hurdles: delivering more relevant features than Google Maps (the leading navigation app and the standard on the majority of mobile devices); promoting the app to your intended audience; convincing them to download it; and reminding them to use it. Mobile-optimized websites can offer the same functionality of an app, with less friction for adoption and use.

Navigating by listening to directions—like in-car GPS—is much easier than following step-by-step directions or a map. As indoor positioning matures, the best way to direct visitors will be auditory directions via smart phone. No more squinting at small screens while walking.

Developments in wearable technology have enormous potential for enhanced wayfinding and contextual information. From Google Glass and smart watches to smart clothing, we will discover ways to orient and guide people in unfamiliar places. With their expertise in the physical and visual aspects of wayfinding, EG designers can play a leading role in how this next generation of devices elevates and eases the wayfinding experience.

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Stock Sign Hardware Systems

Back in the static signage realm, there are several manufacturers of proprietary "stock" sign hardware systems in several different styles—some quite attractive—for both interior and exterior use. Each of these stock systems, typically patented, offers a unique hardware system, often with specially interlocking and/or changeable parts. Most stock systems are kits of hardware parts that can be configured in many different ways by the EG designer. Manufacturers of stock systems also offer a range of techniques for applying graphics to their hardware systems, which also provides creative opportunities to the EG designer. (See Figures 6.62 and 6.63.)

Although this book is geared toward custom-designed sign programs, including the hardware system, we mention stock hardware systems because they can sometimes play a useful role in sign programs that are primarily custom-designed. A strategy of adopting stylistically compatible stock systems, or components of them, can make good sense for certain sign types within a custom-designed program. Such situations include when ease of changeability, maintenance, and cost savings are critical factors.

Stock systems have both pros and cons. Pros include:

- **Ease of changeability and maintenance.** This feature is particularly useful for static building or mall directories that feature several strips listing tenant names, which change on an ongoing basis. Many stock directory manufacturers offer convenient strip reorder services

6.62

6.62 This stock sign hardware system, designed by EG designer Roger Whitehouse, features a variety of changeable components common to most stock systems.

6.63

6.63 This stock sign hardware system features curved aluminum panel extrusions with flat end caps. In this example, a flexible plastic insert displays custom-designed graphics.

that provide new strips that match the originals in size, color, and material, as well as in typeface, type size, and type position. This ease of changeability is also useful for employee name and other signs requiring regular updating. Additionally, many stock manufacturers offer software and templates so that end users of their products can print their own new inserts in-house. Other stock sign components are also easily replaced.

- **Design cost savings.** Because the hardware system is already designed in a stock system, EG designers don't need to spend as much time as they would on custom design of the hardware aspect of a sign program. Note, however, that even with stock systems, the EG designer still must spend time researching the various available systems, evaluating and selecting one, and configuring and specifying it for the project at hand. Of course, the EG designer must also develop the graphic system for a stock hardware system, which is important to keep in mind because a unique graphic system can customize the appearance of a stock hardware system.
- **Manufacturing cost savings.** These should accrue due to the fact that sign fabricators don't have to completely reinvent the wheel when using stock systems. However, to make a finished sign, many stock systems still need to be worked by cutting, painting, assembling, applying graphics, and so on, in the manufacturer's or fabricator's shop. Nevertheless, the manufacturing costs for a stock system can be lower than for a custom-designed, custom-built one.

Cons of stock hardware systems include the following:

- **Stylistic limitations.** Because each stock hardware system is predesigned, each has its own three-dimensional appearance, which often doesn't lend itself to much manipulation by the EG designer, thereby locking the designer into a given style that is undistinguishable from that of another project using the same system.
- **Size limitations.** These tend to be more of a problem with exterior stock systems than interior ones, because exterior systems often are not large enough to carry typographic sizes adequate for good readability by drivers, unless they're used in lower-speed environments such as service drives and parking areas. Even interior stock systems may not be available in sizes or proportions that suit the necessary message content or viewing conditions.
- **Quality.** Some stock systems have materials that look downright cheap, and/or have parts that fit together badly. In this regard, be aware that the photos in stock system catalogs can be deceiving, so the EG designer should always obtain actual samples of any stock systems under evaluation to assess their quality and suitability for the project at hand.

Most stock systems are available "to the trade," meaning that they can be purchased by custom sign fabricators for use in larger overall sign programs that are primarily custom. A few stock systems, however, are still available only directly from the system manufacturer, which makes them difficult for the EG designer to incorporate into a larger program involving custom fabrication, as this situation requires two different sources for the program's signs: the stock system manufacturer and the custom sign fabricator.

Sign Materials and Codes

From the preceding discussion of sign materials, it would seem an endless palette of materials is available for the EG designer to manipulate on a formal basis. It's important to know, however, that the use of certain sign materials may be prescribed by both local sign ordinances and building codes. For example, a local sign ordinance for a historical district may require that all exterior signs be made of painted, carved wood, or at least have the appearance of being made of such materials, to maintain the district's historical quality. Sign ordinances for other districts may favor the use of fabric banners, or masonry signs, or metal signs accented with neon; or there may be no restrictions on sign materials. Sign ordinances also may prohibit certain materials, such as metal sign boxes with internally illuminated plastic faces, or electronic digital display units.

Building codes can also prescribe certain sign materials, usually for life safety reasons. These codes typically concern flammability and durability of sign materials, as well as the integrity of structural and electrical systems.

Overview of Sign Coatings and Finishes

Just as there is a wide array of materials used for a signage program's hardware system, there is a wide range of coatings and finishes that provide decorative or protective surface treatments for sign materials. As in the earlier section of this chapter on materials, this section provides an overview of basic coatings and finishes for basic sign materials. And, as with materials, samples and swatches of coatings and finishes under consideration should be obtained whenever possible. Finally, like materials, coatings in particular have characteristics that warrant consideration in sustainability strategies.

The meaning of the term *coating* is fairly clear: It's a dissimilar substance, such as paint, that's applied to the surface of another material, thereby creating a new final, outer surface. The term *finish*, however, can be more confusing because it's often used to refer to two slightly different things. On one hand, it can refer to the gloss level of an applied coating, such as matte finish paint; on the other hand, it can refer to a surface texture created on a material, such as brushed finish aluminum. In both senses, the word *finish* refers to surface treatments, but the former meaning involves a substance applied to the material, while the latter involves the material itself. To minimize this confusion, this chapter will use *gloss level* instead of *finish* when referring to coatings. Note that the SAD requires a "non-glare finish," or low gloss level, on sign surfaces.

Coatings

Coatings for sign hardware components include paints and clear coatings, powder coatings, porcelain enamel, patinas and oxide coatings, and vinyl or other plastic films. Each of these basic coating categories is described in more detail here.

Paints and Clear Coatings

Paints and clear coatings, often referred to as *liquid* or *organic coatings,* are probably the most common and well-known coatings for signs. These coatings are typically applied as liquids and dry to a thin solid film.

Extremely versatile, paints and clear coatings can be applied to virtually any material on the planet, and can easily conform to complex three-dimensional shapes. Not your ordinary roller-applied latex wall paint, exterior sign paints are specifically formulated to withstand the ravages of continuous exposure to the elements—sun, rain, ice, snow, and sand—just as automotive paints are.

Manufacturers of sign paints offer a wide range of colors, including metallics and pearlescents, and gloss levels, from high gloss to dead matte. Each sign paint manufacturer offers its own range of colors, and most sign paint systems can provide custom matching of colors from

6.64

6.64 Paint swatch books from two sign paint manufacturers. Manufacturers are continually adding new colors, finishes, and formulas, including low VOC formulas.

another color system, providing the EG designer with a virtually unlimited palette of colors from which to choose. (See Figure 6.64.)

Sign paints typically require a primer or base coat that's applied directly to the sign material before application of the topcoat, which contains the selected color. Sign paints are usually applied by spray gun to achieve a smooth, even surface, and are baked in a large oven after application to "cure" the paint, which dries and hardens it.

In addition to opaque sign paints, there are also liquid clear coatings, which typically perform a protective function while allowing the base material to show through, just as clear polyurethane varnish protects a wood floor while allowing the beauty of the wood's grain to show. In signage, clear coats are commonly used to prevent the darkening and discoloring that oxidation causes on the "yellow" and "red" metals, such as brass or copper. Aluminum is also often clear-coated to reduce oxidation, although this is not strictly required since oxidation doesn't substantially affect the appearance or strength of aluminum. In addition to their use on unpainted materials, clear coats are often applied over painted sign materials, just as they are on many of today's automotive body components. As with opaque paints, clear coats are available in a wide range of gloss levels.

For many years, sign paints and clear coatings were formulated with a relatively high level of harmful volatile organic compounds (VOCs) as solvents. Sustainability concerns have led many paint manufacturers to develop low or zero VOC coatings suitable for sign industry applications; ongoing research and development continue to expand and improve these more eco-friendly choices. Most full-service sign fabricators have in-house equipment for applying conventional and low/no VOC paints and clear coats to signs.

Powder Coatings

Powder coatings, like paints, are dissimilar coatings applied over sign materials, and are generally considered more durable than paint coatings. Also like paints, powder coatings can easily conform to complex shapes. But unlike liquid paints, powder coatings are finely ground, electrically charged particles that are sprayed dry onto the sign material; the particles are held in place by an electrostatic charge until the coated material is heated in a curing oven to fuse the particles together into a uniform coating. Due to the relatively high heat involved in powder coat curing, it was originally used only on metals, but technological developments are making it increasingly possible to use powder coats on plastic and wood materials.

Powder coating is a newer process than liquid coating, so it’s not as widely used as other coatings in the sign or other industries, particularly in the United States, but it is gaining ground and becoming more widely available as a coating option. However, because it’s not as widely used as liquid coating, color palettes for powder coating are generally more limited than those of paints, but custom colors can be developed. Powder coats can also be metallic or clear, and can range from high to low gloss. Additionally, powder coat textures can range from smooth to wrinkled to rough. And, since powder coating doesn’t involve use of VOC solvents, it’s considered a more sustainable coating process than painting. Few sign fabricators have in-house powder coating equipment, so most powder coating is subcontracted to outside suppliers.

Porcelain Enamel

Porcelain enamel is an extremely durable coating in which finely ground glass particles are applied to a metal base (typically, aluminum or steel in the sign industry) and heated to a very high temperature to fuse the particles into a smooth glass coating, which is noticeably thicker and richer than most other coatings used in the sign industry. Porcelain enameling has ancient roots in both Eastern and Western cultures, as can be seen on jewelry and other decorative objects, such as intricate Chinese cloisonné vases and lavish French Fabergé eggs.

In signs with porcelain enamel coatings, the graphics are typically fused into the coating, rather than being applied later by a different process, resulting in very durable, surface-integrated graphics. For this reason, porcelain enameling is an ideal coating for signs in high-wear environments such as subway stations and exterior exhibits. In fact, the porcelain enamel signs of the London Underground are so emblematic of that system that miniature enameled signs are sold as souvenirs of London.

Recent developments in signage applications of porcelain enameling allow graphics with an improved degree of resolution and tonal range, as well as wider color ranges—although exact color matching isn’t always possible.

Porcelain enamel coatings can range from transparent to opaque, but opaque colors are typically used for signage. The gloss level of porcelain coatings can range from high to low. Porcelain enamel coatings are generally used on flat sign panels, as these coatings don't readily conform to complex three-dimensional shapes. Few sign fabricators have porcelain-enameling equipment, so most porcelain work is subcontracted to specialty suppliers. A porcelain enameled sign is shown in Figure 5.68 of Chapter 5.

Patinas and Oxide Coatings

Patinas and oxide coatings occur only on metals and are the result of corrosion, a chemical reaction between metals and elements, such as oxygen or sulfur, in the environment. The term *patina* refers to the coatings that form on the yellow and red metals, such as bronze, brass, and copper. When exposed to weather, these metals will naturally turn brown, and then greenish, just as a copper penny does over time. This process can be hastened, and the resulting colors somewhat controlled, by the application of different chemicals to the copper alloy metals, and then sealing the surface to prevent further oxidation. (See Figure 6.65.) Verdigris, a green or greenish-blue coating, such as that on the Statue of Liberty, is a common patina, as is a dark brown patina.

Anodizing is a process by which the oxide layer that naturally forms on the surface of aluminum is thickened by an electrochemical process, forming a very hard, integral, almost glasslike surface coating. The resulting aluminum oxide coating is effectively clear, although slightly cloudy, making clear anodized aluminum slightly less shiny than unanodized aluminum. Anodized aluminum can be colored in bright or subtle tones using various dyes, and relatively new processes allow full-color, photographic-quality graphics to be integral to a clear anodized coating.

6.65

6.65 Metal patina coatings can occur naturally over time or can be applied, as with this chemically accelerated green patina on an oxidized bronze sign at Rockefeller University in New York.

Aluminum sheet can be anodized by the sheet manufacturer, or aluminum components can be anodized on a batch basis after assembly. Most sign fabricators don't have anodizing facilities so they either use pre-anodized sheets or send aluminum sign components to an outside anodizing supplier.

Rust is an oxide layer that develops on the surface of all iron and steel, except for stainless steel. Unlike the aluminum oxide coating that strengthens the surface of anodized aluminum, the iron oxide or rust that forms on steel typically weakens it and detracts from its appearance. For this reason, steel used in signage is almost always painted to prevent rust. That said, an iron oxide coating can lend a certain rustic appearance, and Cor-Ten and other weathering steels are specifically manufactured to oxidize to a reddish brown naturally over time in exterior environments without losing their strength and without extensive surface flaking.

All patinas and oxide coatings conform to complex shapes, particularly if applied under controlled versus natural conditions. Gloss levels vary with the base material, process, and any additional top-coating used over the oxidized coating.

Plastic and Vinyl Films

Plastic and vinyl films are thin, flexible self-adhesive sheets that can be applied to a range of sign materials. There are clear protective films, including antigraffiti films, that are applied to materials with or without other coatings, as well as translucent and opaque films in a fairly limited range of integral colors. Other plastic films simulate metal, wood, and stone surfaces with varying degrees of success—some are very realistic, others aren't. High resolutions and unlimited colors and tonal ranges are available when white vinyl films are digitally imaged with graphics. Several examples of signs with plastic and vinyl firms are pictured throughout this book.

Vinyl and plastic films with a high gloss level are widely available, and some films have semigloss or matte surfaces. The self-adhesive films used in signage are suitable for application to primarily flat surfaces, as they typically don't conform to complex shapes, although stretchable films have been developed to wrap objects with complex curves, such as automobile bodies and train car interiors.

Finishes

In an effort to reduce the confusion between the terms *finishes* and *coatings,* as used in this book, the term *finishes* refers to textures created directly on the surfaces of certain sign materials. Finish textures can be imparted to the material's surface either during the material manufacturing process or after manufacturing, typically in the sign fabricator's shop after the sign material has been worked or assembled by the shop personnel.

6.66 Random finish applied to aluminum panels provides visual interest and hides scratches on exterior signs at the University of Pennsylvania in Philadelphia.

Most post-manufacturing-imparted finishes are created by mechanical devices using abrasives such as belt sanders and sandblasting guns, although some are created by chemical etching. The texture of mechanical finishes varies with the texture of the abrasive used—the smaller the abrasive particles, the smoother the finish, and vice versa. Although there is a wide range of both manufacturing-imparted and post-manufacturing-imparted finishes, this section will focus on the basic finishes for most of the essential sign materials.

Metal Finishes

Metal finishes can range from a completely smooth, mirrorlike polish to coarser textures consisting of scratches to the metal surface. One of the most common examples of the latter is a grained, directional texture, often called a *brushed* or *satin* finish. Another type of scratched finish is a nondirectional, or random, finish, in which the scratches have no discernable grain direction. (See Figure 6.66.)

Other mechanical finishes for metals include sandblasting and bead blasting, which produce a uniform blanket of pits rather than scratches in the metal surface, giving the surface a more frosted look than scratch finishes. Metal surfaces are also sometimes acid-etched, which creates a finely frosted surface. Some metals are available with unique manufacturing-imparted finishes, such as embossed textures; but in the sign industry, most metal finishes are imparted in the sign fabricator's shop. (See Figures 6.67 through 6.69.)

6.67

6.67 Decorative letterform bead blasted into satin finished, oxidized bronze identification sign at Scotts Square residential tower in Singapore.

6.68

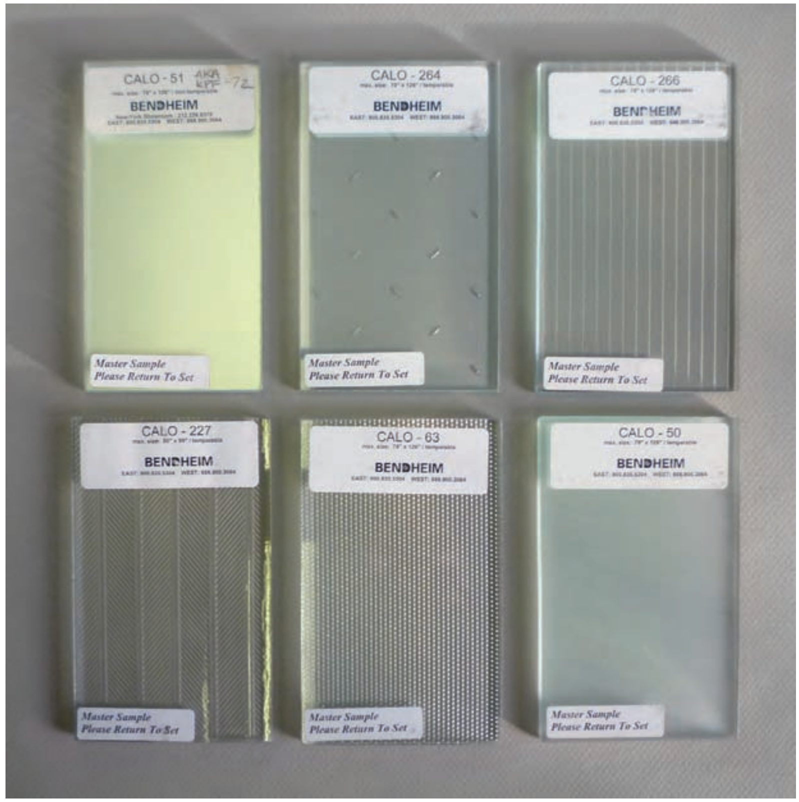
Plastic Finishes

Plastic finishes are typically imparted in the manufacturing process and are rarely altered in the sign fabricator's shop. The most common factory-imparted finish for acrylic and polycarbonate sheet is a completely smooth, mirrorlike polish, although some frosted and other textured finishes are available for these commonly used sign plastics. Other

6.68 Examples of various finishes on various metals. Top to bottom: aluminum, stainless steel, and brass. From left to right: mirror polished, non-directional, satin, and sandblasted.

6.69 Horizontal and vertical grain satin finishes reflect light differently, creating contrast to distinguish letterforms.

6.69



6.70

6.70 Numerous finishes and patterns are available from glass manufacturers and suppliers.

plastics used in the sign industry have factory-imparted finishes that range from completely mirrorlike smooth to pebbled to directionally grained.

Glass Finishes

Glass finishes can be imparted by the glass manufacturer or a glass supplier (see Figure 6.70); the most common is the typical completely smooth polish. A wide range of glass surface textures and patterns can be created in the manufacturing process, while others are imparted by mechanical or chemical processes after manufacturing. Chemical etching and sandblasting are used to create frosted-glass finishes, with chemical etching producing a finer frosted texture than sandblasting; note that there are some considerations in applying frosted finishes to tempered glass. Mechanically produced scratch finishes are not typical for glass.

Stone Finishes

Stone finishes are typically created by the stone quarry or stone supplier. Stone finishes range from completely smooth, mirror-like polishes to rough-hewn textures. Honed stone finishes are produced mechanically and are smooth, but nonreflective, effectively similar to a frosted finish on glass or metal. Thermal stone finishes are more roughly textured, created by heating the stone surface, causing it to break along the crystalline

6.71

6.71 Stone finishes: Top, thermal finished granite has a rough surface texture; Bottom, color difference between honed and polished samples of the same granite.

structures inherent to certain granular stones such as granite. Cleft finishes are also rough-textured, imparted along natural layers inherent to certain sedimentary stones such as slate. (See Figure 6.71.)

Chapter Wrap-Up

This chapter has explored the many facets of designing the three-dimensional hardware objects of a sign program. This examination included development of sign shape or form, mounting, and size, as well as an overview of the basic lighting techniques, materials, coatings, and finishes the EG designer manipulates in the design of a sign program's hardware system. A basic overview of digital display units has also been included.

The hardware system, because it is the three-dimensional embodiment of signage, is often considered the most complex design challenge, but it is that inherent complexity that also makes it the richest for creative manipulation. The hardware system is where signs come to life as physical objects in the built environment, and this chapter has provided the EG designer with a sampling of the basic tips and tools for creating those objects. There's a whole world of forms, materials, processes, and techniques for the EG designer to exploit in developing a sign program's hardware system. We encourage you to tap into it!

G

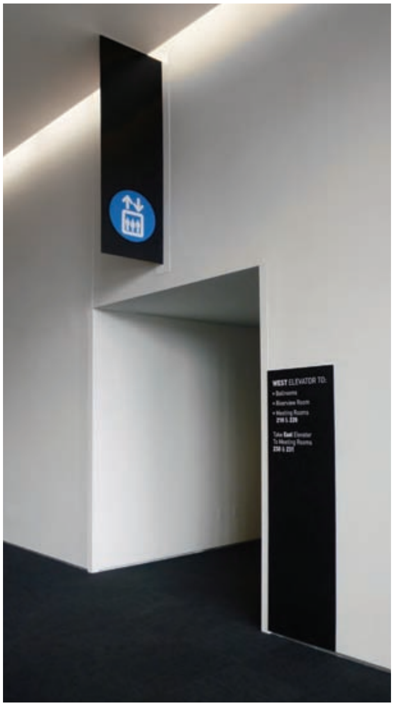
Gallery

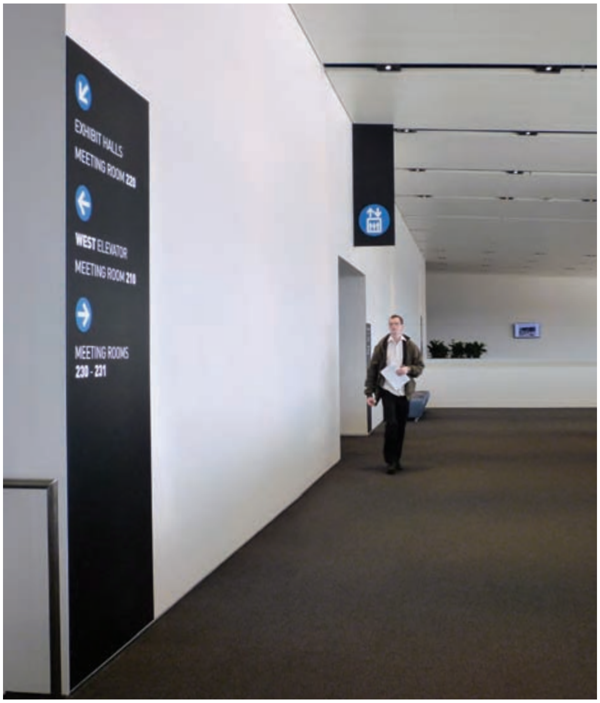
The projects shown in this section are examples of completed, comprehensive signage and wayfinding programs. For each program, you'll see how the various sign types relate to each other visually to form a unified sign family across a range of sign communication functions, sizes, and mounting methods.

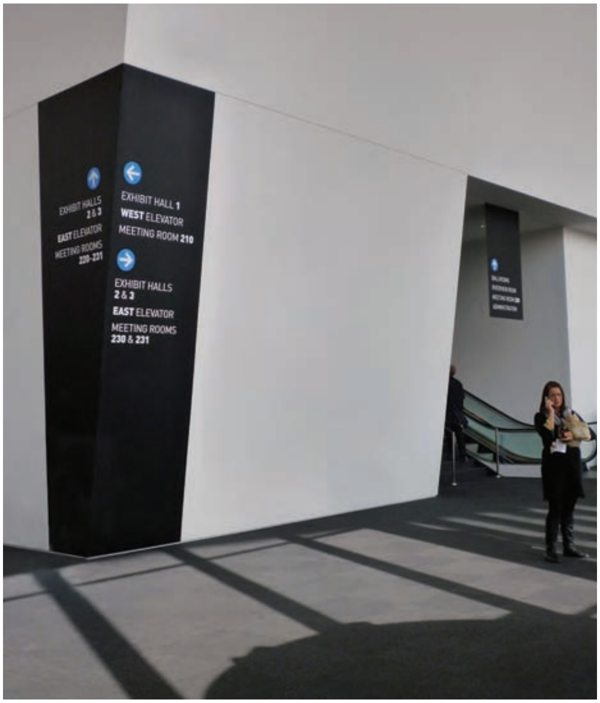
These projects illustrate how a sign program's graphic and hardware systems—the visual expressions of the Signage Pyramid—relate to each other in creating a related series of environmental communication objects. Since the information content system of the Signage Pyramid is an intangible element, it isn't as evident in the selected project photos as the graphic and hardware systems. Keep in mind, however, that the information content system is the foundation of the Signage Pyramid, and that the role of the graphic and hardware systems is to convey and display that information in the physical environment.

The project images in this gallery represent a diversity of signage programs for a wide variety of settings and have been contributed by EG design consulting firms primarily based in the United States, including our office. Some of the projects in this gallery are newer and some are older, illustrating the stylistic longevity—and sustainability—of well-designed signage programs. These projects also show how visually unified signage programs create distinctive, powerful brand statements within the built environment.

Calori & Vanden-Eynden/Design Consultants

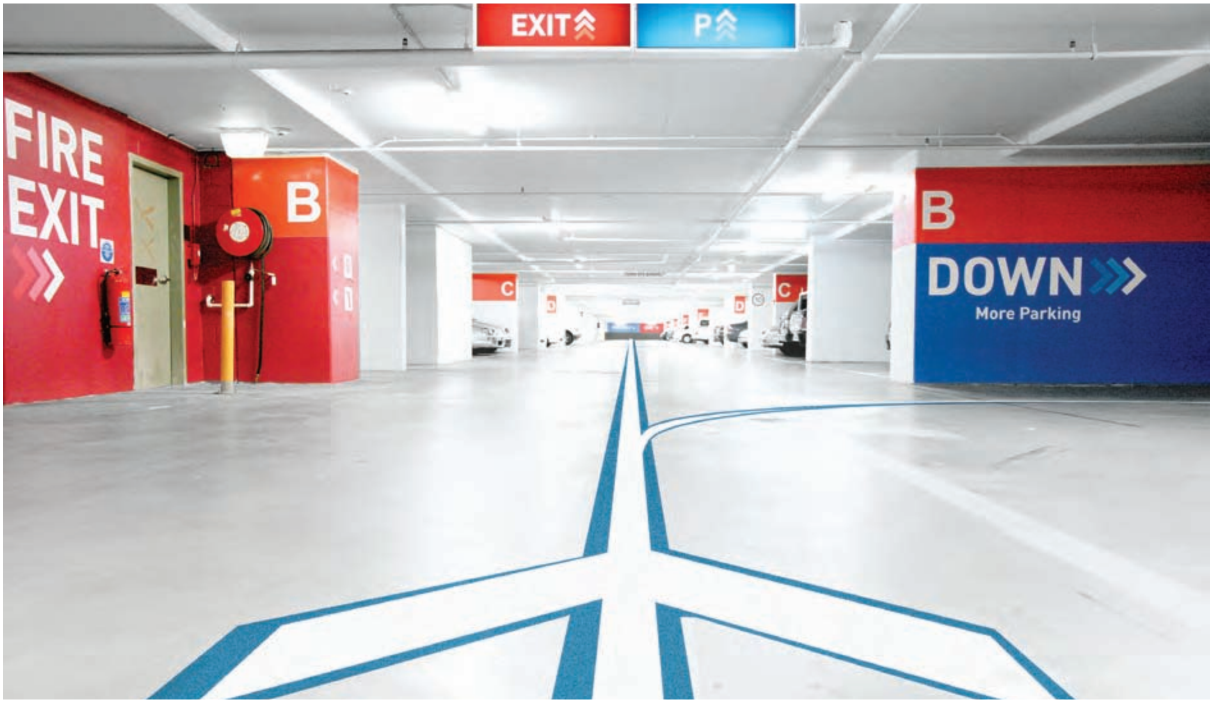






World Square Car Park • Sydney, Australia

BrandCulture Communications



The Research Triangle Park Wayfinding • Raleigh, North Carolina

Cloud Gehshan Associates

Ocean Financial Centre Office Tower • Singapore

Calori & Vanden-Eynden/Design Consultants

New York University School of Social and Cultural Analysis • New York, New York

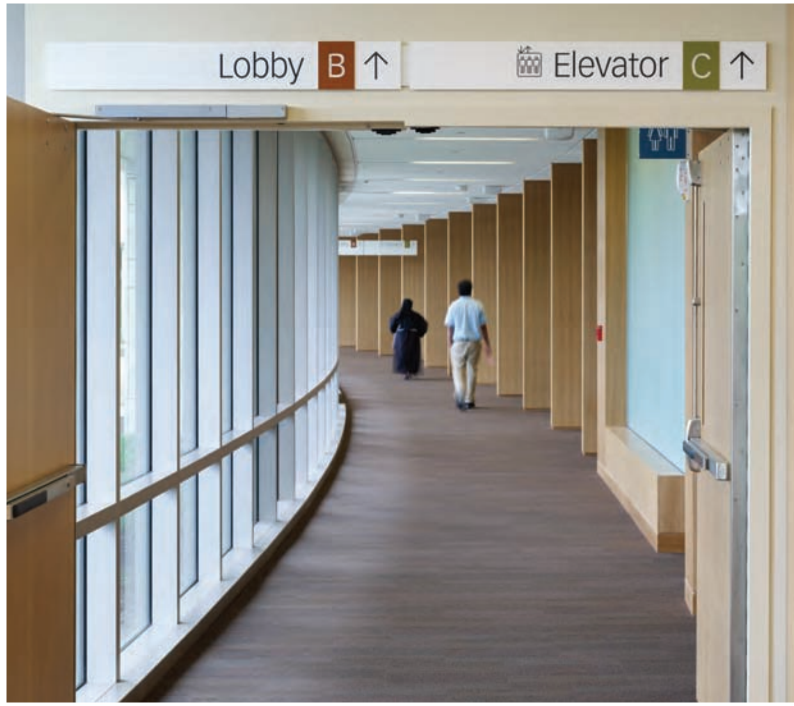
Airspace (formerly Design 360)

The Rockefeller University Campus Wayfinding • New York, New York

Calori & Vanden-Eynden/Design Consultants

ex;it


A
Main Entrance
B
Women & Children's
C
Obstetrics
Outpatient Services


Lobby B
Elevator C


C
Parking Lot


Elevator C
You are in Neighborhood
C
First Floor
1
OB Triage
Lobby C
Maternal Fetal Medicine Center
Children's Emergency
Adult Emergency

Cornell University Stocking Hall Dairy Plant • Ithaca, New York

Calori & Vanden-Eynden/Design Consultants

fd2s


B
5
B
6
B
7


TURN 2


101
SECTION
102
CTION

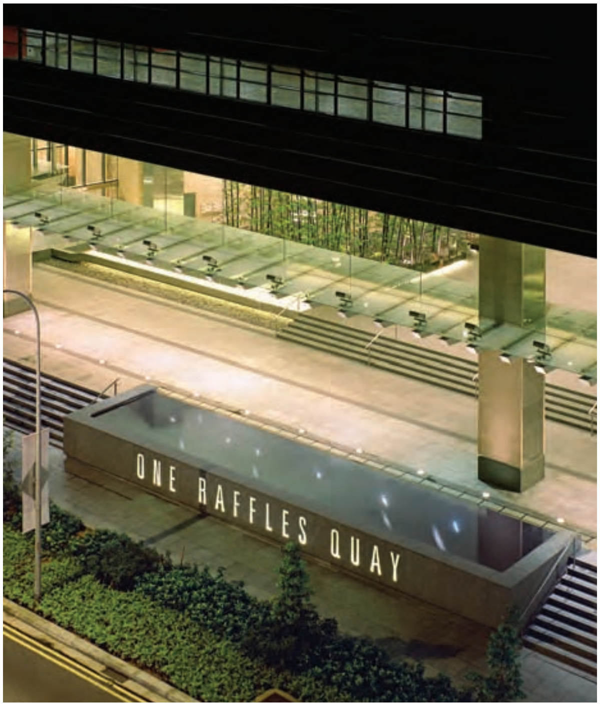

CIRCUIT OF THE AMERICAS
Shuttle Lots | Lots C, F
Concessions | Lot D | Toilets | Tram Stop 12
Lots A, B | Main Grandstand | Tram Stop 19

Mount Buller Village Wayfinding • Victoria, Australia

HeineJones

One Raffles Quay Office Complex • Singapore

Calori & Vanden-Eynden/Design Consultants



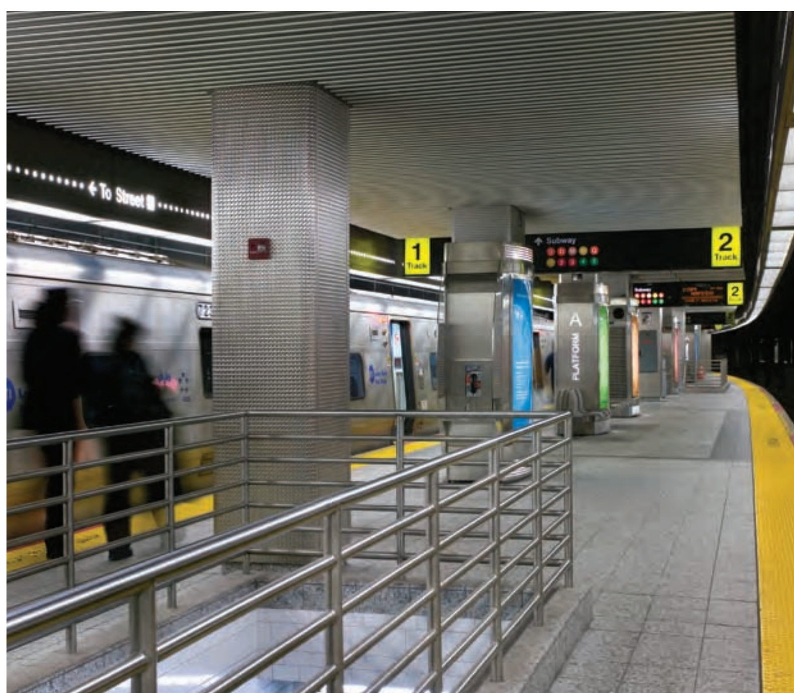
National Mall and Memorial Parks Wayfinding • Washington, DC

Hunt Design

Joel Katz Design Associates

Atlantic Terminal • Brooklyn, New York

Calori & Vanden-Eynden/Design Consultants



Wojciechowski Design

Fish in the Garden Resort Property • Guangzhou, China

Lorenc+Yoo Design

New York University Student Health Center • New York, New York

Calori & Vanden-Eynden/Design Consultants

Sanofi Pasteur Corporate Campus • Swiftwater, Pennsylvania

Calori & Vanden-Eynden/Design Consultants

Meeker & Associates, Inc.

Gallery

Amtrak Acela Station Signage • Northeast Rail Corridor, Boston to Washington, DC

Calori & Vanden-Eynden/Design Consultants

Selbert Perkins Design

Scotts Square Residential Towers and Retail Mall • Singapore

Calori & Vanden-Eynden/Design Consultants

Subte Metro System Signage • Buenos Aires, Argentina

Diseño Shakespear

Virginia Beach Convention Center • Virginia Beach, Virginia

Calori & Vanden-Eynden/Design Consultants

Studio SC


Nintendo
Nintendo of America Inc.
4600


Nintendo
DO NOT ENTER
DROP-OFF
VISITOR PARKING


Nintendo
4600 BUILDING ENTRANCE
PARKING GARAGE

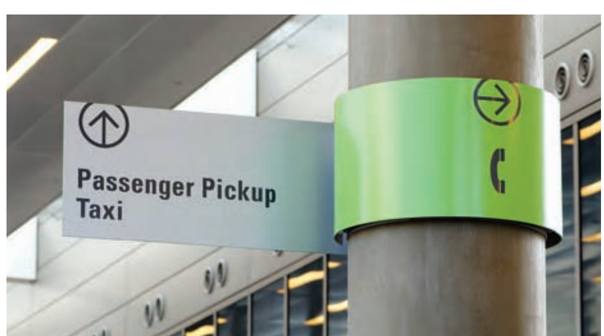

VP
VISITORS PARKING

Washington, DC Citywide Wayfinding Signage • Washington, DC

Calori & Vanden-Eynden/Design Consultants

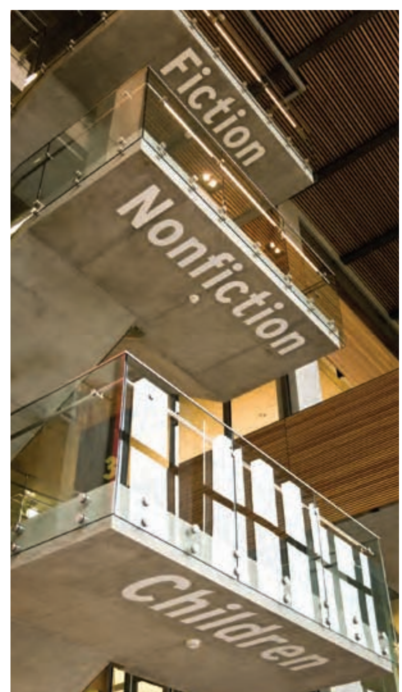
Van Nuys FlyAway • Van Nuys, California

Sussman/Prejza & Company, Inc.



Vancouver Community Library • Vancouver, Washington

Mayer/Reed



Calori & Vanden-Eynden/Design Consultants

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Figure 1.24 Courtesy of W&Co.

Chapter 2

Figure 2.3 Courtesy of Calori & Vanden-Eynden. Rendering: KPF Associates.

Chapter 3

Figure 3.6 – 3.7 Courtesy of Calori & Vanden-Eynden. Photos: John Reis.

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Figure 5.70 Courtesy of Calori & Vanden-Eynden. Photo: Shen Zhonghai.

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