TRANSIT COOPERATIVE RESEARCH PROGRAM

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TCRP Report 12

Guidelines for Transit Facility Signing and Graphics

Transportation Research Board
National Research Council

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Report 12

Guidelines for Transit Facility Signing and Graphics

KRW, Inc.
Alexandria, VA

Subject Area

Public Transit

Research Sponsored by the Federal Transit Administration in Cooperation with the Transit Development Corporation

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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213—Research for Public Transit: New Directions*, published in 1987 and based on a study sponsored by the Urban Mass Transportation Administration—now the Federal Transit Administration (FTA). A report by the American Public Transit Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, the National Academy of Sciences, acting through the Transportation Research Board (TRB), and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

Research problem statements for TCRP are solicited periodically but may be submitted to TRB by anyone at any time. It is the responsibility of the TOPS Committee to formulate the research program by identifying the highest priority projects. As part of the evaluation, the TOPS Committee defines funding levels and expected products.

Once selected, each project is assigned to an expert panel, appointed by the Transportation Research Board. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

Because research cannot have the desired impact if products fail to reach the intended audience, special emphasis is placed on disseminating TCRP results to the intended end users of the research: transit agencies, service providers, and suppliers. TRB provides a series of research reports, syntheses of transit practice, and other supporting material developed by TCRP research. APTA will arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by urban and rural transit industry practitioners.

The TCRP provides a forum where transit agencies can cooperatively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

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NOTICE

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The members of the technical advisory panel selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and while they have been accepted as appropriate by the technical panel, they are not necessarily those of the Transportation Research Board, the National Research Council, the Transit Development Corporation, or the Federal Transit Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical panel according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

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FOREWORD

By Staff
Transportation Research Board

This report will assist transit operators in the use of appropriate signs and symbols for their facilities. The guidelines describe the use of signs and symbols that provide for the safe and efficient movement of passengers to and through transit facilities. These guidelines will also assist transit operators in providing passenger information systems that encourage the use of transit by new users, infrequent riders, and individuals with disabilities.

Transit facilities and signage systems must be designed with the overall objective of creating a concise and informative series of nonverbal messages, consisting of environmental clues and signs that are understandable by the full range of travelers who use the systems. A national survey of transit agencies and airports showed that there was not a comprehensive set of guidelines outlining how to design and implement an effective signage system. Under TCRP Project A-9, KRW, Inc., was responsible for developing guidelines to assist transit agencies in the appropriate use of signs and symbols in transit facilities.

The project was performed in two phases, with Phase I structured to review and document the state of the practice of signage in the transit industry. More than 30 properties nationwide, representing a broad cross section of the industry, were surveyed and their signage practices documented. Signage information from both international and domestic transit providers was reviewed, and the information needs of transit users that could be satisfied by signs and symbols were identified. Phase II efforts involved the design of candidate symbols and signs and their evaluation by a broad cross section of transit riders and nonriders, graphic designers, and transit personnel. The evaluation findings were factored into the development of the guidelines, resulting in a set of guidelines that incorporate the best of those signs, symbols, and graphics design standards for the transit industry.

These guidelines provide an understanding of the three principal elements for signage system design: (1) defining and understanding the needs of users; (2) applying the principles of wayfinding design; and (3) providing basic guidelines for copy style and size, terminology, uniform symbols, colors and shapes, and placement of signs. Thus these guidelines will assist transit operators in moving passengers safely from their origin to destination along the most efficient route available, using a concise and comprehensible system of directional, informational, regulatory, and identification messages.

The unpublished final report as submitted by KRW, Inc., summarizes the research effort and findings. Copies of the report are available on a loan basis or for purchase ($10.00) on request to TCRP, Transportation Research Board, Box 289, Washington, DC 20055.

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We would also like to acknowledge the assistance provided by the transit industry and disability organizations and the critical role they played in the evaluation and guideline development process. We are grateful to the more than 30 transit properties that allowed us to survey and document their signage practices, many of which also provided us with samples of their graphics and copies of their signage standards. We greatly appreciate the time and effort given by Natalia Luchanko, Jon Roth, and participating staff of the Southeastern Pennsylvania Transportation Authority in Philadelphia, who coordinated the signing and field testing conducted at the Fern Rock Transportation Center by project staff.

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Several individuals in the sign industry made technical contributions that have added greatly to the technical content of the manual. Mr. Joseph Erhart of Apple Designs, Inc. and Mr. Duke Zimmerman of Globe Screen Print, Baltimore, MD contributed much of the material provided in Chapter 9, *Material Selection and Preparation.* Ms. Sharon Toji, of Access Communications, provided insight into proposed revisions to signage guidelines under consideration by the ANSI Signage Task Force Committee. Dr. Katharine Hunter-Zaworski provided valuable input on electronic sign technology. KALTECH Industries Group, Inc. New York, NY fabricated the signs used for the field testing.

Staff members contributing to this report were Jose Luis Ortiz and Andy Brenits, Graphic Designers; George W. Leonard, Project Coordinator; Francis Geiser Jr., Senior Engineer; James D. Flemming, Focus Group Coordinator; H. Patricia Ohleger, Research Associate; and Andrea Earnhart, Research Assistant. The work was done under the general supervision of Mr. Earnhart.

GUIDELINES FOR TRANSIT FACILITY SIGNING AND GRAPHICS

SUMMARY

Signs and symbols are important elements in the operation of transit systems because of the role they play in conveying vital information needed by riders to successfully use the systems. The design, content, and placement of signs and symbols critically affect the passenger's ability to use a transit system successfully. Recent research conducted in the United States, Canada, and Europe has indicated a need for consistency in design, content, and placement of signs and symbols. Additionally, transit providers have expressed a need for guidelines to assist in the design and placement of passenger information systems that provide concise and accurate information. A major benefit of these information systems is to make transit more user friendly, particularly among new and infrequent riders and people with disabilities.

The variability in content and placement of signs and symbols among today's transit systems creates difficulties for passengers using these systems. Frequently, passengers are bombarded with many different signs—some with complicated or unclear information—which they must decipher at critical decision points during the transit trip. Misleading or ambiguous information can misdirect passengers using the systems. Moreover, the Americans with Disabilities Act (ADA) requires transit operators to make their systems accessible to persons with disabilities. With the consistent use of signs and symbols and their placement in standard locations, travel trainers could instruct their clients with disabilities, particularly those with cognitive and sensory disabilities, in the effective use of transit information systems.

In developing these guidelines under funding provided by the Transportation Research Board's (TRB) Transit Cooperative Research Program (TCRP), the project team performed an extensive review of signage research, existing transit standards and guidelines, and current transit signage practices. They surveyed firsthand more than 30 transit facilities nationwide and in Canada, identifying a wealth of current practices for the use of signs and symbols. The site surveys included properties in all regions of the country, all modes and sizes of operations.

The focus of the team in preparing these guidelines was to distill from numerous sources the "best practices" in the use of effective signs and symbols for their facilities and include them in a set of comprehensive guidelines for transit providers. The technique used in this distillation process was to review and evaluate current signing practices by survey-

ing the practices at transit properties nationwide, assessing user needs through interaction with the full range of transit riders, and testing the signs, symbols and the process used to design and install them in actual transit facilities. From this process, tested guidelines have been developed that provide transit operators with the information needed for consistent design, fabrication and placement of signs.

The general format for the guidelines was developed to lead transit providers through the entire process from wayfinding design to actual installation of the signs. The researchers relied upon studies and reports on signage prepared by established experts such as Paul Arthur and Romedi Passini and associations such as the American Institute of Graphic Arts (AIGA) (from which many of the standard symbols originated), the Society for Environmental Graphic Design (SEGD), and the National Electric Sign Association (NESA). In addition, materials were provided by many disability organizations that have been active in developing specific signage techniques and technologies that permit greater access to their constituencies.

The researchers have been particularly sensitive to the impact of the ADA on the use of signs and symbols in transit facilities. Although the project plan did not call for basic research or technical evaluation of alternative techniques offered to comply with the ADA Accessibility Guidelines (ADAAG), nor have the researchers recommended or endorsed any one technique over another, they did evaluate many of the techniques described using focus groups to confirm their utility in the transit environment. The axiom "improving access for individuals with disabilities also improves the overall facility access for all individuals" was found to be particularly applicable for transit signage. Most transit organizations now have accessibility committees made up of representatives from community organizations, which can provide insight into techniques for providing accessible signing for their constituencies. The National Easter Seal Society's Project For Accessible Community Transportation In Our Nation (ACTION) maintains an extensive library of transit accessibility studies and reports, as does the U.S. Department of Education's National Institute on Disability and Rehabilitation Research. Transport Canada's Transportation Development Centre is also very active in studying various aspects of electronic signage.

The guidelines have been presented in a format that can be easily updated and new information added. The researchers cannot overemphasize the importance of "staying in touch" with those organizations that develop local or Federal signing regulations. The U.S. Department of Transportation's Federal Transit Administration (US DOT FTA) and the U.S. Architectural and Transportation Barriers Compliance Board are happy to provide interpretations of specific regulations and accessibility guidelines. Industry associations such as the American Public Transit Association (APTA) and the Community Transportation Association of America (CTAA) are also excellent sources of signage information, particularly where new regulations or compliance with the ADA are concerned.

The researchers would appreciate constructive feedback and suggestions for revision or enhancement of the guidelines. Because much of the technology used in the signage industry is evolving so rapidly, particularly in the areas of materials and electronic signs, periodic revision and updating of the guidelines will be needed to keep them current. Further, periodic changes and refinements in the ADAAG and the American National Standards Institute (ANSI) signage guidelines, to allow for revisions reflecting new designs and technologies that provide greater accessibility to people with disabilities, may require future revisions to these guidelines.

CHAPTER **1**

SIGNIG PHINLOSOPHY AND PRINCIPLES OF WAYFINDING

SIGNING PHILOSOPHY

The primary purpose of signage throughout a transit system is to move the riders safely from their origin to their destination along the most efficient route available, using a concise and comprehensible system of directional, informational, regulatory and identification messages. Understanding the needs of the broad range of transit riders and how these riders, when viewed as distinct groups, will react to a system of graphic displays is as much a study of human behavior as it is a study of graphic design. The riders or user groups must be identified and their needs understood before the signage system can be truly effective.

The interface between the user and the environment is the focal point of an effective signage system. Transit system designers and operators often forget that transit riders are a captive audience in an unfamiliar environment. Riders from a variety of groups with different needs must often negotiate unfamiliar, complex environments when taking their transit trip. The designers generally do not focus on wayfinding as they design a specific station, mistakenly thinking that the signage for the entire system will address wayfinding problems.

When signage is specifically included in a transit facility design, the designers often a) attempt to create unique sign systems by incorporating colors that do not allow maximum legibility; b) use unique customized symbols that are not universally recognizable; or c) select decorative letter styles that may be unreadable by some. Unfortunately, the use of decorative or unique graphic components only serves to further frustrate riders who eventually disregard the signs.

A signage and graphics system is not a separate entity from the facility. To be effective, the signage system must function as an integral part of its environment. To ensure that the signage and graphics system complements and strengthens the surrounding environment, designers must understand the principles of wayfinding and employ wayfinding design steps early in the design process. This early application of wayfinding design and an understanding of the needs of the various user groups provide the framework for an effective signage system.

The final ingredient needed for an effective user-friendly signage system is a set of graphic standards that will ensure adherence to basic guidelines, which address copy style and size of characters; standard terminology; recognizable and universally accepted symbols; uniform colors and shapes for standard functions; and consistent placement of signs throughout the transit environment.

Transit facilities and signage systems must be designed with the overall objective of creating a concise and informative series of nonverbal messages, consisting of environmental clues and signs that are understandable by the full range of travelers who use the systems.

These guidelines have been developed to provide an understanding of the three principal elements of a signage system design, namely:

- Defining and understanding the needs of users;
- Applying the principles of wayfinding design; and
- Providing basic guidelines for copy style and size, terminology, uniform symbols, colors and shapes, and placement of signs.

An introduction to the principles of wayfinding is presented next to demonstrate their importance in understanding the needs of the users, using the systematic wayfinding design process, and following fundamental and proven graphic standards when designing a system of signs.

PRINCIPLES OF WAYFINDING

Introduction

The term *wayfinding* is used to describe the process of reaching a destination, whether in a familiar or unfamiliar environment. Wayfinding can be thought of as spatial problem solving. Within this framework, wayfinding comprises three specific interrelated processes:

- Decision making. This leads to a plan of action or a decision plan to reach a given destination.
- Decision execution. This transforms the plan of action into appropriate behavior and movement at the right place in space.
- Information processing. This comprises environmental perception and cognition, which permits the above decision-related processes to occur. Perception is the process of obtaining information through the senses. Cognition is understanding and being able to manipulate information.

Most settings are laid out in a plan or shape that allows people to (1) determine their location within the setting, (2) determine that their destination is within that setting, and (3) form a plan of action that will take them from their location to their desired destination.

If people are denied the ability to do any of the above, they cannot form a cognitive map, which prevents them from forming an action plan. Without a plan of action or a cognitive map, they must rely on other information sources, such as signage or asking directions, until they can develop an appropriate plan to reach their desired destination.

Decision Making and Development of a Plan of Action

For wayfinding, the interest is in the decisions that have to be made to reach a specific destination, once the original decision to take a trip has been made. In order to reach a destination, many decisions will have to be made along the way. The plan of action maps out these decisions. If all the decisions that compose a plan of action are looked at, it can be seen that the plan of action is hierarchically structured. At the low end of the hierarchy are decisions leading directly to behavioral actions such as turning left, following a corridor, going up the stairs, and so on. The higher order decisions are equivalent to tasks such as going to the bus stop or going to the entrance of the rail station. All decisions are based on information including the higher order decisions, a fact that is often overlooked when signing a facility.

Decision plans are generally formulated by breaking the total trip into trip segments and then addressing each trip segment in its spatial setting. In this way, the more complex trips become manageable and individuals are able to formulate cognitive maps of each trip segment to better understand the total trip.

Decision Execution from Decisions to Behavior

The plan of action is a mental solution to a wayfinding problem, but it does not, in itself, take you physically to the desired destination. Decisions must be executed, they have to be transformed into behavior. More importantly, each decision has to be transformed into the correct behavior at the right place. It is not enough to simply turn left, you must turn left at the appropriate intersection.

Each decision contains a behavioral unit and a place identification unit in the form of an image. "Turning right" is an example of a behavioral unit; "at the bottom of the escalator" is a place identification unit. If a person identifies the bottom of the escalator, this allows the behavior (turn right) to be executed. If the person does not find the bottom of the escalator, he or she is confronted with a new problem and must develop another plan of action.

When executing a decision, a mental image or idea of something specific in the environment is matched with what is perceived or seen in the environment. If one is able to match this mental image with the real environment, the behavioral part of the decision can be executed. If the corresponding part in the real environment cannot be found, a wayfinding problem exists.

To avoid these wayfinding problems, environmental information must be provided in order for people to make and execute their decisions. Providing this environmental information at the correct time and place is the most important aspect of wayfinding design.

Information Processing: Perception and Cognition

Information is the all-important basis for making and executing decisions. Information has to have adequate content, be located within the perceptual range from the decision-making and decision-executing points, and be in a form that facilitates its perception and understanding. The information can be presented in many forms; to be effective, it is important that information is obtained from the total environment and not only from signs. Architectural features such as entrances, exits, elevators, and escalators should be sufficiently expressed so as not to require signs.

Perception or obtaining information through the senses is most commonly accomplished by visual scanning and glancing. Hearing and touch are also used to collect wayfinding information. Thus the architectural features and the signage in a facility or throughout a transit system must consider the following three senses: sight, hearing, and touch.

Cognition or understanding and manipulating the information generally falls within two categories. The first category records topographical relationships between major functions similar to a survey map with coordinates. An example of this "coordinate mapping" is an overview of a transit station, which shows the relative positions of the entrance to the fareprocessing area and to the boarding platforms. The second category structures the wayfinding trip in terms of routes or trips. Each trip is mapped by showing the distance from one point to the next and the change in direction at each point. This category of cognition is commonly referred to as "sequential mapping." These two types of cognitive maps provide the foundation for the wayfinding design process.

This introduction to the principles of wayfinding has been presented to show how important it is to introduce wayfinding design into the site planning and architectural/engineering design processes. If the three interrelated processes of decision making, decision execution, and information processing are considered early in the design of a transit system, information cues can be designed into the facilities so that the signage system need only supplement the critical wayfinding information.

CHAPTER **2**

USER GROUPS

INTRODUCTION

In the past, facilities have been designed and signed with a stereotyped user in mind. The stereotyped user was a physically fit, attentive individual, with one preoccupation—to explore, use and enjoy the setting or facility that had been designed. The reality of today's facilities is quite different. Many users have impairments with respect to perception, cognition, and mobility, which affect their abilities to find their way through a facility. Some of the impairments are temporary, some are slight, and some are profound.

For persons with motor disabilities, for example, the search for information may be limited by lowered lines of sight or physical barriers that block their access to the information. For persons with sensory disabilities, a whole class of information may be unavailable such as text, symbols, or audio announcement. Some people may have more than one disability, which compounds the wayfinding problems. Because users are not a single homogeneous group, designs must focus on a much broader and more realistic view of the ultimate consumers of the services provided. All factors must be considered when planning and signing an accessible transportation facility.

This chapter provides an overview of user groups and examples of the major impairments that affect wayfinding. Nine user groups are identified and defined and eight of the nine groups are classified as being disability-related. It must be stressed that the focus is not on the disabilities themselves, but on the effects such disabilities have on these user groups to obtain, assimilate, and use the information provided by the signage system.

UNIMPAIRED

The category of unimpaired presons is difficult to define. For instance, some elderly people who have reduced vision and hearing may be on the borderline of this category. A person who is angry, distraught, or confused may show signs of cognitive impairment. The user who is pushing a baby stroller or carrying luggage may be mobility (situationally) impaired. Thus, anyone may experience a situation in which their wayfinding abilities are impaired.

SIGHT IMPAIRED

Persons with sight impairments are those who have poor eyesight, partial vision, or abnormalities of vision such as color deficiency and reduced field of vision. Legal blindness is defined as a visual acuity with the best corrective lenses of 20/200 vision or less. A person with 20/200 vision would have to be within 20 ft (or less) of a particular scene to see what a person with normal vision can see at 200 ft away. Tunnel vision is an angle of vision of 20 deg or less, as compared with the 55 deg for normally, sighted people. Color vision defects are caused by a lack of sensitivity or a lack of pigment in certain cone receptors of the eye. There are various levels of color sensitivity in the human eye. As a person passes from higher to lower light levels, blue objects appear brighter than equally pigmented red objects (the reverse is true as the light levels increase).

BLIND

Persons without useful vision are in this category. Travelers who are blind have to rely on auditory and tactile cues. Only in rare circumstances can they use olfactory or heat perception. All of the senses compensating for sight are generally less informative, less reliable and less efficient. Nothing replaces sight in gaining a global understanding of the environment or in perceiving distance cues which are so important for wayfinding.

HEARING IMPAIRED

Persons who have a moderate to severe hearing loss and may have to rely on hearing aids are in this category. Persons who have difficulty understanding conversation without relying on visual support (facial expression or gestures) and without asking the speaker to repeat what was said are also in this category. People with hearing impairments have two types of problems in public settings. The first is due to magnetic interference caused by motors or transformers, which can adversely affect hearing aids. The second problem is the difficulty in separating background noise from the desired message.

DEAF

This category includes persons who have profound hearing loss. A person who is deaf may not hear some very loud sounds without the use of a hearing aid. They will be able to understand ordinary speech with lip reading, sign language, or written messages. Very few people who are deaf benefit from a hearing aid at all. The vocabulary of people who are deaf tends to be more action oriented. Abstractions and words describing concepts may not be readily understood.

COGNITIVE IMPAIRED

Cognitive impairment can be situational and developmental. Persons who are situationally impaired are in a temporary state of anger, apprehension, confusion, or distress caused by a particular situation or environment. A person overloaded with information is situationally impaired. Included in the category of developmentally impaired are learning disabled, mentally retarded, or mentally disturbed persons. Elderly persons who have reduced cognitive abilities and people with dyslexia, dyscalculia (inability to do math), dysgraphia (inability to write), or the inability to learn left from right are also developmentally impaired.

LITERACY IMPAIRED

Persons who are functionally illiterate in the language in which the message is expressed can be categorized as literacy impaired. A person is considered functionally illiterate if he or she cannot fill out a job application. Illiteracy can include an inability to read a written message in a given language (multilingual illiteracy). People visiting or living in this country who cannot read or speak English are considered multilingually illiterate.

MOBILITY IMPAIRED

Not in Wheelchairs

Persons who have impaired strength, endurance, dexterity, balance, or coordination or those using crutches or other walking aids but not using wheelchairs are in this category. Persons with strollers or carts and those with heart or other conditions that reduce mobility (but are not apparent to others) are also in this category.

In Wheelchairs

Persons who are permanently or temporarily restricted to the use of a wheelchair or a scooter are in this category

CHAPTER **3**

THE WAYFINDING DESIGN PROCESS AND THE TRANSIT TRIP MODEL

OVERVIEW

In this chapter, the wayfinding design process is presented, which includes discussions on system identity and environmental communication. The concepts of signage design are discussed including content and location, and legibility and readability as major elements. The transit trip model is also presented, which describes how a typical transit trip can be broken down into discrete trip segments that can be used as the foundation for the wayfinding design process.

WAYFINDING DESIGN PROCESS

Wayfinding design has discrete linkages to the principles of wayfinding through the processes of decision planning, decision execution, and information processing. Wayfinding design can be simplified by viewing it as a series of hierarchical steps that are linked to these three processes. Wayfinding design for a transit system begins with the system identity. System identity, the highest order decision, must be defined for each system and carried forward into each site and facility that is served by that specific system. When a system is a part of a regional transportation system, the identities of the systems operating within the region can be used throughout the wayfinding design process at the regional level and at the site and facility specific levels to provide cohesive, understandable signage for the entire regional transportation system.

The hierarchical steps of the wayfinding design process for a regional transportation system comprising multiple transit systems are graphically displayed in Table 1. Linkages to the three processes that were defined in Chapter 1 under the principles of wayfinding are shown. Examples are provided to illustrate the various hierarchical levels, from system identity to the design of a specific sign used in a transit facility.

Transit agencies can provide a more user-friendly environment in their facilities by identifying the paths of travel and the decision points within each facility and using this information to provide the customer needed information at the right time and placed at the proper location. This process is called the wayfinding design process.

Additional structure can be given to the wayfinding design process for a transit system by linking these hierarchical steps to a transit trip model. This transit trip model defines a total transit trip using a series of trip segments that are common to most trips taken on a transit system or on several systems within a region.

TRANSIT TRIP MODEL

Wayfinding decisions are those related to accomplishing the total trip taken on a transit system or systems. This total trip can be taken on one mode, such as a bus, or it can involve multisystem or multimodal trips, such as bus to rapid rail, commuter rail to light rail, or automobile to bus or rail. The decisions at the system or total trip level address questions such as: How do I travel from my home to my work place? Which modes of transit will take me to my desired destination? Can I use one system or do I have to change between systems?

The basic framework for wayfinding design can be defined with the transit trip model. The total trip is first defined by its origin and destination and then broken down into a series of trip segments that map out the systems, facilities, and vehicles that must be used to travel from the origin to the desired destination.

The transit trip model focuses on the decision points users encounter in each segment of the total transit trip. The Transit Trip Model illustrated in Figure 1 defines the trip segments which, regardless of transportation mode, compose a total trip. Travelers first plan their trip and, if a planned trip is feasible for them, proceed from origin to destination through well-defined trip segments. The nomenclature for the various trip segments is as follows:

S0: Trip Planning
S1: Origin to Transit Facility Entrance
S2: Transit Facility Entrance to Boarding Platform
S3: Boarding Platform to Vehicle
S4: Vehicle Enroute
S5: Vehicle to Boarding Platform
S6: Boarding Platform to Transit Facility Exit
S7: Transit Facility Exit to Destination
S8: Boarding Platform to Boarding Platform

This nomenclature identifies each trip segment by its beginning and endpoint of travel. Each trip segment is displayed as a rectangle in Figure 1. The path of travel during

TABLE 1 Wayfinding design process

Principles of Wayfinding	Wayfinding Design Steps	Examples
Decision Plan High Order Decisions	• Transit system identity • Origin to destination • Total trip	Planning the total trip on the system or between systems
Decision Plan Mid-Level Decisions	• Trip segment to trip segment • Site to site/facility to facility • Regional route planning • Decision points between sites and facilities	Locate sites/facilities Locate entrances/exits to sites
Decision Plan Low Order Decisions	Trip segments within a site or facility - Spatial planning - Define the circulation system of site/facility	Locate entrances/exits to facilities Locate primary functions within facilities Connect entrances, primary functions and exits
Decision Execution	• Decision points between and within trip segments on the site/facility • Environmental communication - Visual - Audible - Tactile	Identify and locate architectural features Identify and locate signs
Information Processing	• Architectural (natural signing) • Signage content/location • Legibility/readability • Character size/spacing • Contrast/color	Design architectural features Design sign message

each trip segment is shown just below each rectangle. For example, the path of travel for segment S1 is the route taken between home and the transit facility entrance. If the transportation mode happens to be a fixed-route bus system, the transit facility would be the point where the person passes the property line of the bus stop area. If the same point of property-line passage definition of entrance applies to rail systems, however, the corresponding S2 segment would be considerably different. For example, for a bus mode, the S2 path of travel is a short path within the bus pad area. However, for a rail mode, the S2 path of travel is a much longer path, possibly multilevel, within the rail system transit facility. The paths of travel shown in the figure for each of the remaining trip segments are self explanatory. Most trip segments start and end with a decision that must be made by the user; thus, the trip segment model makes an excellent foundation for the design of an effective signage system.

Trip Planning, S0, is perhaps the most critical trip segment. In this segment, the traveler must rely on information obtained over the telephone, from system maps and system schedules or from advice provided by more frequent users of the system. It is in this trip segment that the "identities" of the various systems that make-up the regional system are so important. By using the "identities" of the systems effectively to represent the total regional system while at the same time employing system identities in the specific transit sites and facilities, the traveler will be able to plan trips with little concern for the system interfaces throughout the region.

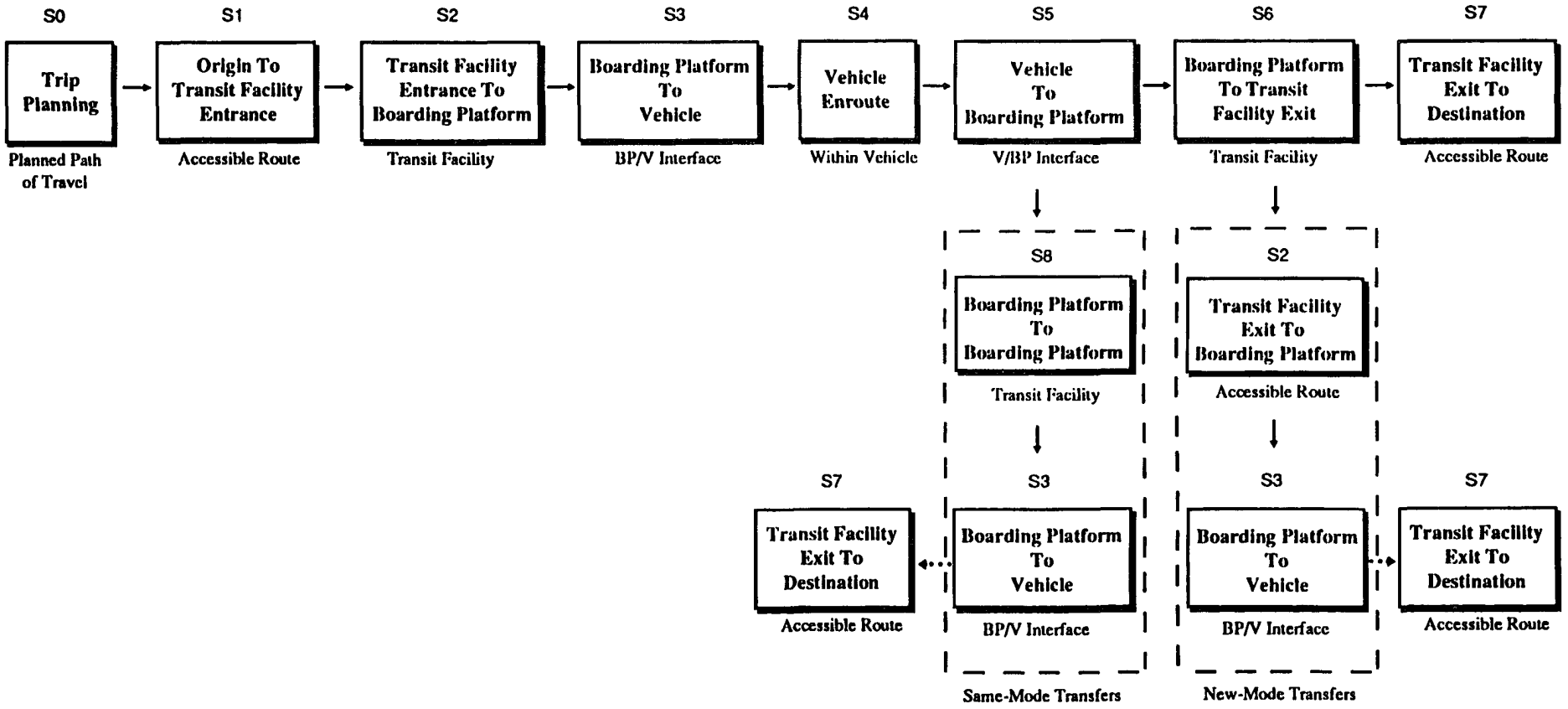


Figure 1. Transit trip model with segments.

Referring to the transit trip model again, it can be seen that trip segments S1 through S7 are taken by travellers on any same-mode trips not involving transfers to other vehicles or other modes. As outlined with dotted lines in the figure, same-mode transfers are initiated by trip segment S8, wherein the path of travel is within the transit facility and proceeds from one boarding platform to another. Thereafter, the single-mode trip is completed via trip segments S3 through S7. If other transfers were required, they would be initiated by a trip segment S8 at the transfer point. Use of trip segments S1 through S8, as illustrated by this single-mode with-transfer trip, can be used to describe and plan in detail all transit trips. This example also illustrates the generic nature of the trip segments and the straightforward building block approach to transit trip planning that travelers must complete.

This building block approach applies equally well to multimode transfers, also outlined with dotted lines in the figure. These transfers are initiated after trip segment S6 and proceed with segment S2 followed by segment S3 to complete the transfer. Therefore, the traveller would continue via segment S3 through S7 to complete the trip on the new mode. Should other transfers be required before trip end, they would be initiated either by a same-mode segment, S8, or a new-mode segment, S2, and proceed as explained above.

To reduce the trip segment model to a more manageable form, the number of basic trip segments can be narrowed to the following:

S0: Trip Planning
S1: Origin to Transit Facility Entrance
S2: Transit Facility Entrance to Boarding Platform
S3: Boarding Platform to Vehicle
S4: Vehicle Enroute

The five basic trip segments can also be used to define any total trip without loss of functionality provided by the full set of segments. These basic trip segments were arrived at by equating mirror image trip segments. Specifically, trip segment S1, Origin to Transit Facility Entrance, contains the same types of decisions as trip segment S7, Transit Facility Exit to Destination. Trip segment S2, Transit Facility Entrance to Boarding Platform, contains the same types of decisions as trip segment S6, Boarding Platform to Transit Facility Exit, and trip segment S3, Boarding Platform to Vehicle, contains the same types of decisions as trip segment S5, Vehicle to Boarding Platform.

This commonality of trip segments and corresponding decisions reduces a complex analytic problem to the more manageable level of five distinct trip segments. This simplification permits the designer to focus on standardizing the signs, which makes the overall signage system more understandable to all users.

All transit trips, regardless of mode or system, can be defined by using the Transit Trip Model and the trip segment methodology. The wayfinding design process can then be applied to each trip, from trip segment to trip segment and within each trip segment, in a systematic fashion to ensure that the total trip can be completed confidently and effectively by system travelers.

By using the transit trip model as the foundation for the wayfinding design process the sign designer is provided a structure that can be followed from the highest level, the system identity, to the lowest level, the layout and design of individual signs.

System Identity

In many of the larger metropolitan areas there are multiple transit agencies. Different agencies may operate the bus, commuter rail, and rapid rail or subway systems. With passage of the Americans with Disabilities Act (ADA), an additional form of transit has been initiated for those individuals with disabilities who are not able to ride fixed-route transit. This "paratransit service" has been initiated in most metropolitan areas and is an additional service that requires a system identity.

To ensure that the public understands how all of these "systems" interface, it is important that each system has its own identity within a regional area so that the "system interfaces" can be explained and displayed on regional transit maps and schedules.

Each system is also responsible for carrying its "system identity" into the sites and facilities where it operates as well as coordinating service with other systems operating in the region or metropolitan area. If transit operators design and implement their system identity properly, users will be able to understand how the various systems connect and be able to take full advantage of all the modes that make up the total metropolitan regional transportation system.

Spatial Planning

Wayfinding occurs in space. The spatial characteristics of a site or a facility all contribute in one way or another to the wayfinding difficulties that confront the users.

Spatial planning focuses on a site or facility. It is the process the designer uses to define the circulation system. This circulation system must connect the entrance of the site or facility with the primary functions within the site or facility. It must also address the mirror images, connecting the primary functions to the exit from the facility or site.

This spatial planning or layout of the circulation system can be linked directly to a decision plan, which addresses mid-level decisions like locating the entrances and exits and major destination points within a specific transportation site or facility.

Spatial planning can be accomplished by defining the trip segments that an individual must take in using a facility, for example, from the entrance to the fare collection area, from the fare collection area to the boarding platform and from the boarding platform to the vehicle. By defining the desired trip segments, a circulation system for the facility emerges. The circulation system can then be identified with a coordinate map of the entire facility or site, which can then serve as the framework for the signing of the site and facility.

Environmental Communication

Once the circulation system has been defined and properly connects the entrance with all of the primary functions within the site and facility, each trip segment can then be studied and instructions can be developed for negotiating from one trip segment to the next and within each trip segment. This is the environmental communication process, where visual, tactile, and audible cues are developed between and along trip segments so that the user can identify decision points and execute the proper decisions based on the cues presented. These cues can be architectural in nature, and they can be in the form of signage.

The architectural features that identify the way to the primary functions within the facility should be designed so that they provide "natural signing" to the primary functions whenever possible. For example, if the fare collection mezzanine is one level below the street, the entrances to the elevators, escalators or stairways, which are the architectural features that represent a level change, should be placed prominently on the street, not hidden between or within the building facades. Within the facility, the elevators, stairs, or escalators up to street level should be visible from the platform or mezzanine so that users can form a cognitive map of the route exiting the facility. To supplement these architectural cues or the natural signing, signage cues should be used to provide additional direction to users as they move into, through and out of the transportation facility. The proper design and placement of these signage cues is critical if the system is to work effectively for travelers.

Content and Location

Many signage projects involve existing facilities. In existing facilities it is difficult to use natural signing because the architectural features are in place and are often difficult to use as part of the signage system. Thus the content and location of each sign that makes up the total signage system must be relied upon to provide proper direction.

When designers are only concerned with installing signs at intersections, they are ignoring the information that is needed for decisions that do not directly lead to behavior. Information must be perceived at or shortly before a decision point otherwise it may not be noticed. In order to establish an acceptable location for the required information, the designer must take note of the physical characteristics of the setting, for example, the light levels, density of people using the facility, ceiling heights and corridor widths. The use of the trip segment approach facilitates the design of sign content and location because the trip segments between each primary function can be mapped throughout the facility, and each decision point or intersection can be identified along the trip. Once identified, the designer can focus on each decision point to determine size, message, and placement of the specific signs.

Legibility and Readability

In wayfinding design, legibility and readability are not interchangeable terms. Legibility is the ease with which information is able to be perceived by the senses. Readability or comprehension is the ease with which information can be understood.

Typically, one of two flaws exist when information cannot be understood: a) the information is not legible—it is obstructed, poorly located, too small, garbled, or too busy to be perceived or b) the information is not readable—it can be perceived but the message is not understandable.

To avoid these flaws, the designer must understand and apply accepted graphic standards and be aware of the importance of placement, sight lines, sight distances, lighting levels, and message content. These factors that are so critical for an effective signage system are addressed in Chapter 4.

CHAPTER **4**

STANDARD TERMINOLOGY AND MESSAGE HIERARCHY

STANDARD TERMINOLOGY

Two aspects of signage terminology are discussed in the following sections. The first presents the standard transit terminology that is recommended for use on signs in transit facilities. The second presents and defines the various words and terms used in these guidelines. Interchangeable words are also listed to avoid confusion with other graphic standards and guidelines.

Use of Standard Terminology

In most instances, the language and words used to describe elements of signage that vary by local custom, culture, or accepted usage on the sign boards should be determined by the local authorities. Symbols should be used and supplemented by the words, because pictorial representation provides the user with quick orientation and avoids language difficulties. Use of local terminology can also be applied to a universally accepted set of symbols. For example, if the local terminology for the commuter rail system is "trains" the word "TRAIN" can be inscribed below the commuter rail symbol. Or, if the local terminology for the rapid rail system is "subway" the word "SUBWAY" can be used below the standard symbol.

There are various forms of rail transportation available for use in many metropolitan areas. Oftentimes these forms are not operated by the same owner, thus signing is one of the ways to show how connections can be made. The terms describing these forms of rail transportation follow.

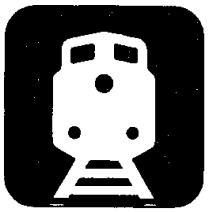
RAPID RAIL—The term used for rail transportation provided in an urbanized area with a high frequency of service, operating on exclusive right-of-way (at grade, elevated, or in tunnels). Generally powered with electricity provided through a third rail. Designated by

Rapid Rail

LIGHT RAIL—The term used for street car or trolleylike service operating at moderate to high frequency of service and at times operating on city streets. Generally powered with overhead electric lines. Designated by

Light Rail

COMMUTER RAIL—The term used for train service between suburban and urban areas. Generally operated during the morning and evening rush hours. Operated on exclusive rights-of-way sometimes shared with freight rail roads. Powered by overhead electricity or diesel engines. Designated by



Commuter Rail

The word "STATION" should be used for rail vehicle/passenger buildings. The word "Transit Center" should be used for bus/passenger buildings or multiroute bus transfer points. "BUS STOP" should be used for a designated location along a roadway served by one or several bus routes. Areas or services within stations or terminals should be denoted by the following terms:

PARKING—This is the general term used until a more specific term can direct patrons to a particular type of parking or a specific parking lot. Designated by

Parking

PARK AND RIDE—Used to designate all-day parking lots. Designated by

Park & Ride

DROP-OFF/PICK-UP or Kiss and Ride—Used to designate a short-term parking area where the driver of the automobile can pull through and drop a passenger off or can wait for a short duration to pick-up a transit patron. Designated by

Drop-Off/Pick-Up

SHORT-TERM PARKING—Used to designate a parking area that has limited hours of use. Designated by

Short Term

LOADING ZONE—A designated area for temporary parking to load or unload. Designated by

Loading Zone

TAXI STAND—A designated area for taxi queuing and pick-up. Designated by

Taxi

BUS STOP—stop along the roadway where the bus vehicle stops to load or unload patrons. Designated by

Bus Stop

INFORMATION—Term used for general transit information. Designated by

Information

TELEPHONE—Term used for telephone service available to the public. Designated by

Telephone

TEXT TELEPHONE (TTY)—Term used for telephone services for people who have impaired hearing. Designated by

Text Telephone

RESTROOMS/TOILETS—The direction to both men's and women's toilet facilities. Designated by

Toilets

WOMEN'S RESTROOM—Identifies the location of the public toilet facilities for women. Designated by

Women

MEN'S RESTROOM—Identifies the location of the public toilet facilities for men. Designated by

Men

ACCESSIBLE ROUTE—The term used for the path of travel that can be negotiated by persons with disabilities and persons that use wheelchairs. Designated by

Accessible

AREA OF RESCUE ASSISTANCE—A portion of a stairway landing, an exterior balcony, a corridor or a vestibule that is separated from the main part of the station or terminal by a fire-resistive door and is smokeproof. The area must be large enough to accommodate two wheelchairs and must contain a method of two-way communication with both visible and audible signals. Designated by

Area of Rescue Assistance

ELEVATOR—A mechanical device that transports the public from one vertical level to another. Designated by

Elevator

EMERGENCY COMMUNICATION—A method of two-way communication, which has both visible and audible signals that can be seen and heard by the person transmitting and the person receiving the message. Designated by

Emergency Communication

LIFT—A mechanical device, generally an open platform, which transports one person from one vertical level to another. Lifts are generally located adjacent to stairways to provide an accessible route when there is no elevator. Designated by

Lift

ESCALATOR—Moving steps that transport the public from one vertical level to another. Designated by

Escalator

FARE COLLECTION AREA—The area where tickets or fare media can be purchased and processed. This area generally includes the fare vending machines and fare gates or turnstiles. Designated by

Pay Fare

RAMP—A surface with a slope greater than 1:20, which is at least 36 in. wide and has handrails on each side, which permits the public to move from one vertical level to another. Designated by

Ramp

BUS BAYS OR BUS PLATFORM—An area where the patron waits to board a transit vehicle. A series of bus parking areas where patrons load and unload. Designated by

Bus Bays

Rail platforms are designated by the following:

Light Rail

Commuter Rail

Rapid Rail

Words and Definitions Used in These Guidelines

Specific words and terms are defined so that there is a consistent interpretation of the information presented in these guidelines.

A **pictograph** is a symbolic representation of information through pictures. Pictographs are signs that are not languagebound and which conserve in their form a relative similarity with the object they refer to. A **symbol** is an object pictured in a pictograph that is not in itself the final message of the sign but stands for some other object or circumstance. A **logo** is an identifying statement, usually associated with the name of a company or organization.

Letters, pictographs, and symbols are displayed on the surface of a **sign board**. The sign board is sometimes referred to as a **sign panel.** Letters, pictographs, and symbols may be applied directly to the surface of the sign board or may be placed onto a special sign background. **The sign background or field** on the sign board surrounds the sign and gives it a special visual impact. Generally, pictographs and symbols are surrounded by special background while lettering or text is applied directly to the sign board surface.

Braille is a system of writing for the blind that uses characters made up of raised dots. **Tactile** objects are those that can be perceived using the sense of touch. Braille, raised letters, and tactile maps are information sources for people who are blind and visually impaired.

Text is the main body of printed word or written matter on a page or a sign. **Lettering** refers to the letters used in an inscription. **A character** is the graphic symbol, hieroglyph or alphabet letter, used in writing or printing. **Letter form** is the shape of a letter of an alphabet from the stand point of design or development. **Typography** is the style arrangement or appearance of the typeset matter and **typeface** is the face of printing type, it generally refers to all type of a single design.

Readability or comprehension describes a sign that is able to be read easily or the ease with which information is able to be understood. **Legibility** describes the ease with which information is able to be perceived by the senses. It also describes whether a sign is capable of being read or deciphered.

Hue is the attribute of colors that permits them to be classified as red, yellow, green, blue, or an intermediate color between any contiguous pair of these colors. **Lightness** is the attribute that corresponds to how much light appears to be reflected from a surface, relative to that of nearby surfaces. **Saturation** is the attribute of color intensity in the sense of its perceptual difference from a white, black, or grey of equal lightness. **Contrast** is the degree of difference between the lightest and darkest part of an object.

MESSAGE HIERARCHY

The use of a system to organize the information that is presented to the public is critical to the success of a signing program. Message hierarchy is the keystone to this system.

To ensure that information is organized in a proper hierarchial manner, the major areas of concern when using a transportation facility must first be identified and listed in order of importance to the user. These areas can be identified by using the Transit Trip Model discussed in the previous chapter see Figure 1). By taking an imaginary transit trip from origin to destination the major areas of concern to the user of the facility can be identified, namely:

- Facility entrance,
- Fare processing,
- Gates to platforms,
- Locations served from the platform,
- Vehicle route/destination (on vehicle),
- Facility name (viewed from vehicle),
- Exits to street or transfer points, and
- Schedule information.
-

It should be noted that the above areas are assumed to be fully accessible to persons with disabilities. If they are not, then the accessible route to each of these areas of concern must be addressed in the same order of importance.

Once the areas of concern have been identified, the functional classification of signs can be applied to determine the levels of message hierarchy. The basic functional categories of signs are 1) Information, 2) Warning, and 3) Regulatory. A review of the areas of concern, listed above, indicates that the primary level of importance are information signs. All of the areas identified must have directional/information signs showing how to get to them, and location/information signs telling the user this is the area you were looking for. The fol-

lowing lists illustrate the primary, secondary, and tertiary levels of signs in a transportation facility.

Primary—Information/Directional, Guidance, and Location:

- All Directional/Information Signs
- Entrance Location Sign
- Fare Processing Location Sign
- Information Location Sign
- Platform Signs (destinations served)
- Platform Location Signs (station name)
- Exit Signs

Secondary—Auxiliary Services and Support Functions:

- System Maps/Directories
- Neighborhood Maps/Directories
- Fare Information
- Schedule Information
- Regulatory/Prohibition Information
- Restrooms Directional and Location Signs*
- Telephones Directional and Location Signs*
- Security/Police
- First Aid/Emergency Services
- Services or Concessions

* Depending on the type of facility these may be primary signs.

Tertiary

- Regulatory/Mandatory Employee Information
- Room Numbers
- Equipment Labeling
- Safety and Hazard Related
- Employee Work Areas and Information

In some instances, the same message may fall under a different hierarchy level depending on how and where it is used. For example, a patron that drives an automobile and parks at the station parking lot and then rides the train to work would find "Parking" a primary message for that portion of the trip. As the person returns from work on the train and arrives at the station platform, the "Parking" sign on the platform could be secondary. Once the patron exits the station the "Parking" sign becomes primary.

The purpose of defining a hierarchy for messages is to reduce the number of signs and simplify the sign content as much as possible to promote clear and concise messages for the users of the system. Secondary and tertiary signs must be coordinated with primary signs. They are often distinguished from primary messages by varying the graphic style from one level to the next. The designer of the signage system and the owner or operator of the facility must determine the methods that will be used to differentiate between primary, secondary, and tertiary signs.

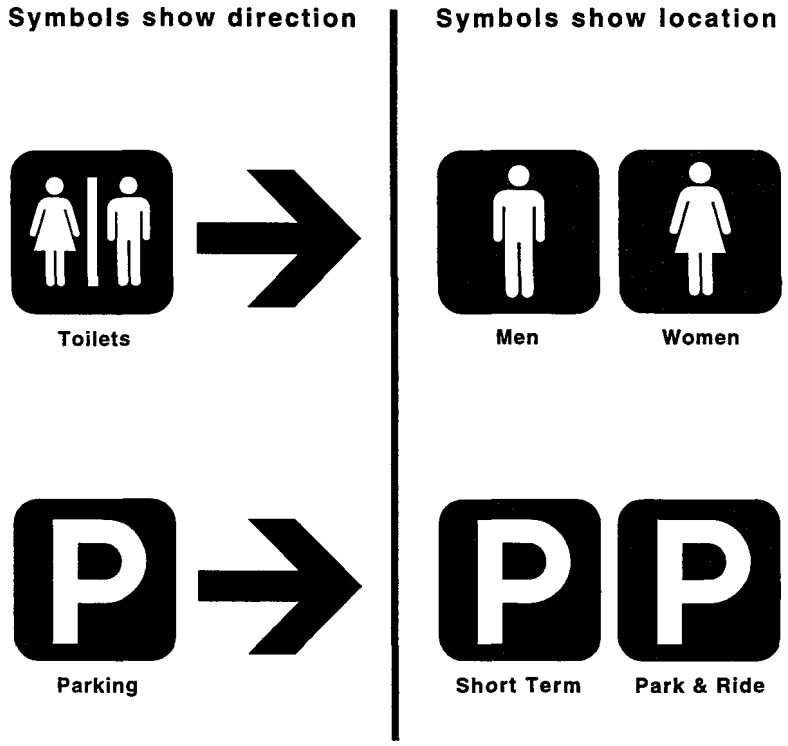


Figure 2. Use of combined symbols or text at secondary and primary levels.

The following are several successful methods for graphically displaying a hierarchy of messages: (1) The use of larger character heights and wider stroke widths or larger symbols for primary messages. (2) A total separation of the type of classification of message from one sign board to the next. (3) The use of combined symbols or text, for example the "Restrooms/Toilets" symbol could be used at the secondary level for directions, whereas "Men" and "Women" symbols can be used at the primary level to show location. As another example, the "Parking" symbol can be used at the secondary level for directions to all of the parking areas. The "Park and Ride" or "Short Term Parking" symbols can be used at the primary level showing the actual location of the entrances to these lots. See Figure 2.

CHAPTER **5**

SIGN CATEGORIES, SHAPES, AND COLORS

SIGN CATEGORIES AND SHAPES

Text and symbol signs are used effectively in transportation terminals throughout the world. The proper uses of symbols and text are critical elements in the design of a comprehensive signage program that can provide an effective signage system for the users of facilities.

The basic functional categories for signs are 1) Regulatory, 2) Warning, and 3) Information. Three distinctive geometric shapes commonly used by the design community to represent the three categories of signs are shown in Figure 3.

These three functional categories are further subdivided into sign types:

- Regulatory signs may be Prohibition or Mandatory signs.
- Warning signs may be Caution or Danger signs.
- Information signs may be Emergency or Guidance/Directional signs.

Certain visual elements must be maintained within a signage program to ensure legibility and recognition of the signs. The design standards that are prescribed to maintain these visual elements address the size relationship of the three basic shapes for regulatory, warning, and information signs. Color, text, image or pictograph content, proportion of borders, and production sizes for each sign are also addressed in these design guidelines.

Size Relationship of the Three Basic Shapes

With respect to the three basic shapes of signs and the outside edge of the border of each sign, there is no requirement that the sign panel or sign board be shaped like the borders differences in the area of the shapes and of the sign. The various shapes may be placed on any size or shape of sign panel or sign board. The shape of the border defines the sign.

A specific size relationship among the three shapes has been established based on the need to compensate for surface on the visual appearance of the three shapes. The sizes are illustrated in like units to demonstrate the relationship (see Figure 4).

Image or Pictograph Content

Characters, images, or pictographs placed within the borders of signs should be sized within the border so there is adequate spacing between the inside edge of the border and the nearest part(s) of the character, image, or pictograph. Recommended spacing between the inside edge of the border to the nearest part(s) of a character, image or pictograph is 3.5 units based on a square shape with a base of 75 units. Thus if a border is 6 in. (152 mm) square the closest part of the pictogram inside the border should be ¼ in. (6 mm) away from the inside edge of the border. Images and pictographs should *not* be presented in a raised format. Generally, characters and images or pictographs should be light on a dark background to obtain the best contrast for persons with visual impairments.

Regulatory/Prohibition—Prohibition signs consist of black characters, images, or pictographs located on a white field, circumscribed by a red ring bisected with a 45-deg red slash. The red slash is printed over the black image or pictograph and is oriented from top left to bottom right. The red slash should be wider than the red circle.

Regulatory/Mandatory—Mandatory signs consist of white characters, images, or pictographs on a black circular disc, surrounded by a white border.

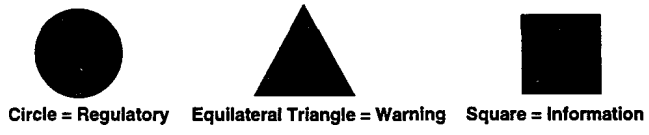


Figure 3. Geometric shapes used by designers to represent the regulatory, warning, and information categories of signs.

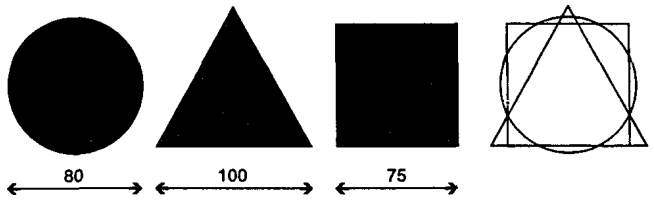


Figure 4. Size relationship among the three shapes.

Warning/Caution—Caution signs consist of black characters, images, or pictographs on a yellow equilateral triangle, surrounded by a black border.

Warning/Danger—Danger signs consist of an equilateral triangle, surmounted on a rectangle of equal width. The triangle contains the characters, images, or pictographs. The word "Danger" is within the rectangle. The background color of the triangle and the rectangle is red. The image, the text "Danger," and the border surrounding the triangle and the rectangle are white.

Information/Emergency—Emergency signs consist of white characters, images, or pictographs on a green background. The border is white.

Information/Guidance and Directional—Guidance and Directional signs should contain a strong dark/light contrast between the background and the characters, images, or pictographs to ensure good legibility. The characters and images or pictographs and the borders should always be the same either dark or light colors.

Proportion of Borders to Shapes

To properly delineate the shape, all symbols should be surrounded by a border 2 units wide based on a square shape with a base of 75 units. Thus the stroke width of the border should be as follows:

- 2 in. (50 mm) for a square with a 6-in. (152-mm) base.
- 2 1/8 in. (45 mm) for a circle with a 6 3/8 -in. (162-mm) diameter.
- 2 2/3 in. (68 mm) for a triangle with an 8-in. (203-mm) base.

The width of the border should never exceed the stroke width of the characters on the sign. Corners of the sign borders should be rounded.

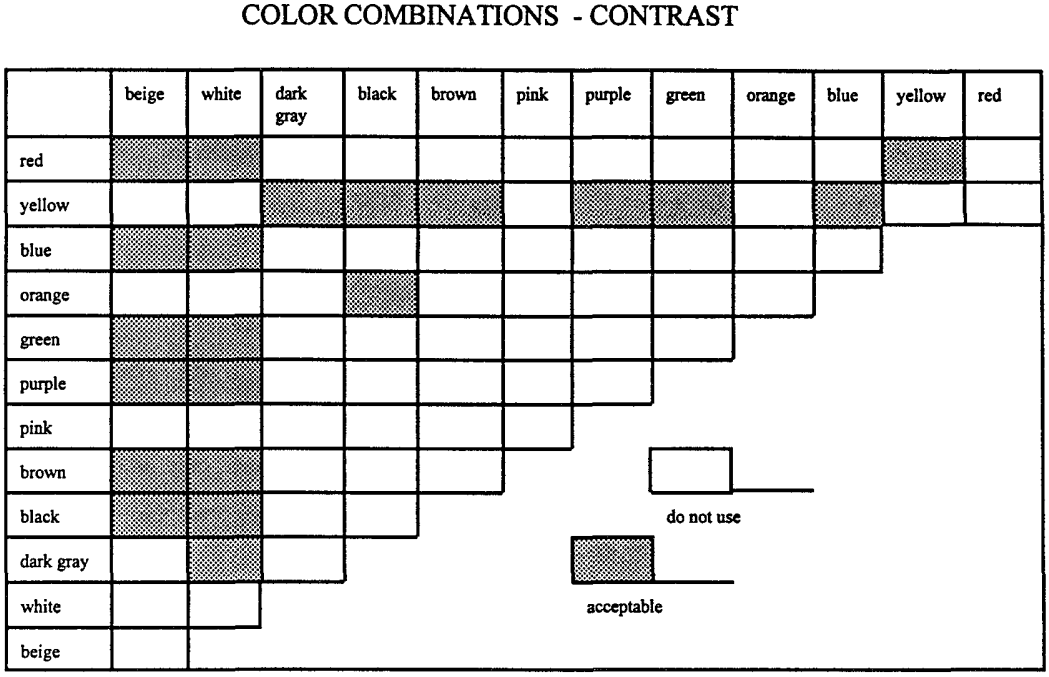
Relative Production Sizes

Symbol sign size is measured on the outside of the border dimension for the square. Relative sizes for the circular and triangular shapes can be determined by using their unit equivalents, namely: the square is 75 units on the base, the triangle is 100 units on the base, and the circle is 80 units on the diameter Thus a 6-in. symbol sign can be:

- A square with a 6-in. (152-mm) base measured to the outside edges of the border.
- An equilateral triangle with an 8-in. (203-mm) base measured to the outside edges of the border.
- A circle with a 6 3/8 -in. (162-mm) diameter measured to the outside edges of the border.

COLOR

The color for the various types of signs should be used consistently within a signage program in all transportation facilities. Specific colors should also be used consistently with the three basic shapes. The combination of color and



Source Wayfinding People, Signs and Architecture, Paul Arthur and Romedi Passini

Figure 5. Acceptable levels of contrast between colors.

shape make the signage system more user friendly for everyone and especially for individuals who are color blind.

Color contrast is of critical importance to persons with visual impairments. Although maximum contrast is obtained by applying white characters, images, or pictographs to a black background, specific colors are associated with the specific functions and should be used even though they may not achieve the maximum contrast. When selecting colors for Information/Guidance and Directional signs, care should be taken to select colors that provide adequate contrast between the background and the characters, images, or pictographs. A chart showing acceptable levels of contrast between various colors is shown is Figure 5.

To encourage standardization of sign colors, Pantone Inc.'s Color Matching System has evolved as a universal standard. The Pantone Matching System (PMS) is an accurate method for specifying or matching colors. It is Pantone, Inc.'s check-standard trademark for color standards and can be purchased at most art supply stores. A listing of the common PMS colors for coated paper stock and 3M colors for vinyl are presented for easy reference.

Color	*Pantone No.*	*3M Scotchcal Film*
Red	032C	Tomato Red
Yellow	Yellow 012C	Bright Yellow
Dark Blue	2935C	Intense Blue
Blue	2925C	Olympic Blue
Orange	021C	Bright Orange
Green	347C	Kelly Green
Purple	Violet C	Royal Purple
Black	Black C	Black
Light Gray	Cool Gray 2 C	Pearl Gray
Dark Gray	Cool 11C	Dark Gray
Beige	453C	Beige
Brown	449C	Deep Mahogany Brown

Table 2 shows how colors should be used for the various categories of signs.

TABLE 2 Standard colors for common sign categories

Regulatory/Prohibition	Field Pictograph/Image Ring Slash Border	White Black Red Red White
Regulatory/Mandatory	Field Pictograph/ImageBorder	Black White White
Warning/Caution	Field Pictograph/Image Border	Yellow Black Black
Warning/Danger	Field Pictograph/Image Border	Red White White
Information/Emergency	Field Pictograph/Image Border	Green White White
Information/Guidance & Directional	 Accessible Elements or Routes Recreation or Cultural Construction and Maintenance	Various colors may be used. Recommended colors for specific uses follow. Blue Brown Orange

CHAPTER **6**

SIGN DESIGN

COLOR CODING

Colors are used to code different meanings for the same shaped sign. For example, a yellow triangle means potential hazard or caution; a red triangle means imminent hazard or danger. The use of color with the various sign shapes was discussed in the previous chapter. Information, guidance, and direction signs can be presented in various colors to direct and identify specific services, lines, or routes within a transit system. This process is called color coding.

When color coding is used to delineate services, lines, or routes, care must be taken to ensure that the color combinations selected will optimize contrast for all viewers, including those with low vision and those with congenital color vision deficits. Some general guidelines in selecting colors for a color-coded system are as follows:

- Select colors that have a generally agreed-upon name such as red, yellow, blue, green, orange, purple, brown, or gray.
- When possible, spell out the name of the color used on the sign to accommodate individuals who are color blind.
- Use white images, characters, or symbols if the background is black or one of following colors:
  - Red
  - Purple
  - Dark Blue
  - Dark Gray
  - Blue
  - Green
  - Brown
- Use black images, characters, or symbols if the background is white, yellow, light gray, orange, or beige.
- Use the following combination of colors to denote various transit lines or routes within a system:
  - Red, Blue, Yellow
  - Orange, Green, Purple
  - Brown, Beige
  - Black, White, Gray
- To promote uniformity, the following colors are recommended for specific uses:
  - Administrative areas—white image on a dark gray background
  - Accessible routes/elements—white image on a blue background
  - Services or public areas—white image on a dark blue or blue background
  - Recreation or cultural—white image on a brown background
  - Access roadways to transit sites—white image on a green background

Sunlight and interior lighting affect different colors in many ways. Some colors fade and others tend to blend with one another in certain environments and under certain interior lighting conditions. Some colors take on a different hue depending on the light source. Therefore, a preliminary selection of the color-coded system should be thoroughly tested in the various interior and exterior conditions before a final decision is made on which colors will be used in the system.

Contrast

Contrast and color are closely associated. Contrast is the degree of difference between the lightest and darkest part of an object. Percent contrast is calculated using the following formula:

$$\text{Contrast} = 100 \times (R_{max} - R_{min}) / R_{max}$$

Where: R_{max} is the light reflectance value of the lighter area.
R_{min} is the light reflectance value of the darker area.

The higher the percentage contrast the more legible the sign. The minimum acceptable percent contrast is 70. It should be noted that percent contrast can never equal 100 because the darker area, no matter how dark, will always reflect some light.

Percent contrast for various color combinations has been calculated and is presented in Figure 6. The number shown in each box is the percent contrast of the two colors, thus only those colors that have a number of 70 or larger should be used with one another.

Because reflectance is simply the proportion of incident light measured after reflection from a surface, contrast may be conveniently computed from luminance values measured

COLOR COMBINATIONS - CONTRAST

	beige	white	dark gray	black	brown	pink	purple	green	orange	blue	yellow	red
red	78	84	32	38	7	57	28	24	62	13	82	0
yellow	14	16	73	89	80	58	75	76	52	79	0	
blue	75	82	21	47	7	50	17	12	56	0		
orange	44	60	44	76	59	12	47	50	0			
green	72	80	11	53	18	43	6	0				
purple	70	79	5	56	22	40	0					
pink	51	65	37	73	53	0						
brown	77	84	26	43	0							
black	89	91	58	0								
dark gray	69	78	0									
white	28	0										
beige	0											

do not use

acceptable

Source: Wayfinding People, Signs and Architecture, Paul Arthur and Romedi Passini

Figure 6. Percent contrast for various color combinations.

by a light meter, assuming the lighter and darker areas of the sign are uniformly illuminated. Thus, if colors that are not shown on the color contrast chart are going to be used, it is recommended that the light reflectance values be measured and the percent contrast calculated prior to final selection to ensure the two colors meet the recommended contrast level.

Finish

Excess light from shiny backgrounds and images can decrease the legibility of the message on the sign. Therefore, glare as well as contrast must be considered during the design process. The image and background of the sign must have an eggshell or matte type texture to reduce the amount of glare. The recommended finish on the sign face should have between an 11- and 19-deg gloss when measured on a 60-deg glossimeter. Glossimeter tests should be required in the signage specifications to determine if actual material samples meet these requirements.

TYPOGRAPHY

Typography as used in these guidelines addresses the following for visual signs, tactile signs, and combined visual/tactile signs:

- Case,
- Style,
- Character width,
- Character stroke thickness,
- Character spacing,
- Character height
- Spacing between words,
- Spacing between lines, and
- Margins.

Visual Sign Typography

Most signage is designed so that the user can see and read the messages. Visual signs should meet the following minimum requirements.

Case (Visual)—Characters shall be uppercase or lowercase or both.

Style (Visual)—Characters shall be conventional in form. Characters shall not be script, highly decorative, ornamental, heavily serifed, too condensed or extended, or of other unusual forms. Some acceptable styles of type that are recognizable, clear, and open in their shape are listed below. Samples are shown in Figure 7.

Bodoni	Futura
Bodoni Book	Futura Book
Century Schoolbook	Futura Condensed Bold
Frutiger	Garamond
Frutiger Light	Garamond Semi Bold
Frutiger Bold	Gills Sans

Gill Sans Bold
Glypha
Glypha Bold
Helvetica Medium
Optima
Palatino
Palatino Bold
Times Roman
Standard Medium
Univers 65
VAG Rounded

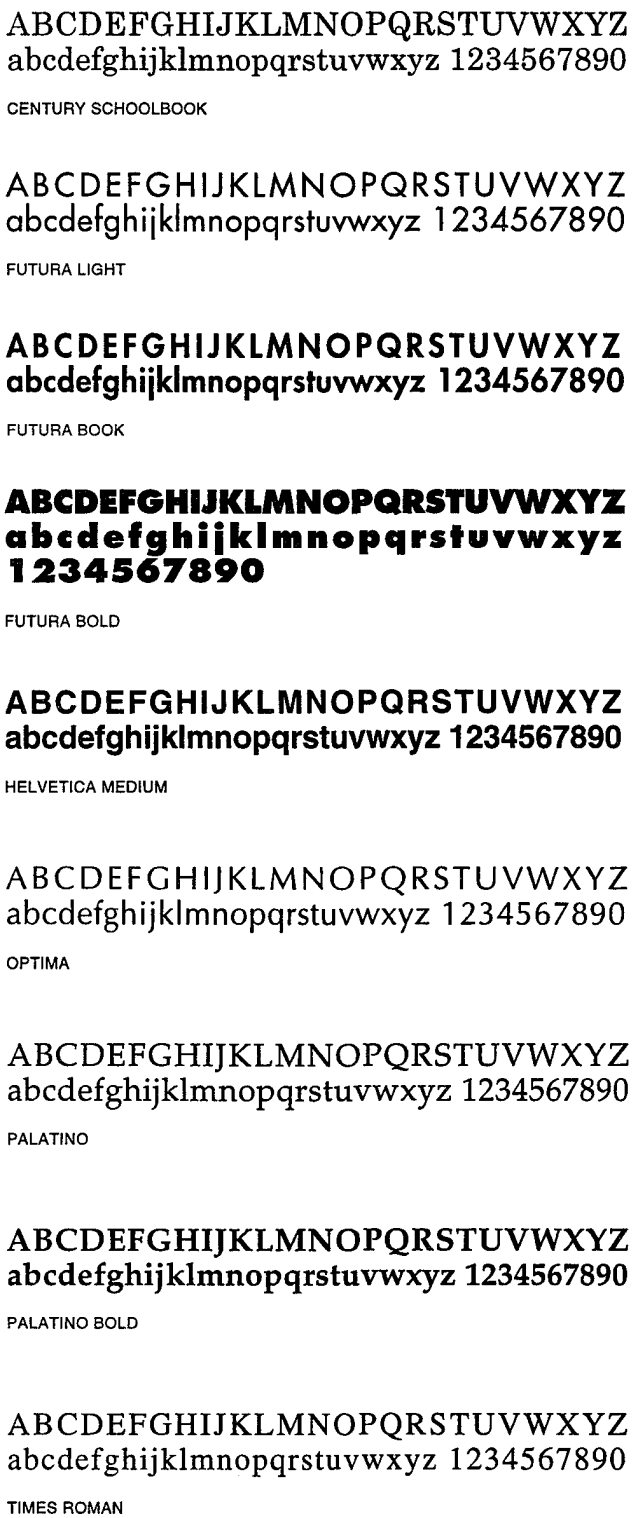


Figure 7. Acceptable typefaces for signage.

Width (Visual)—The width of characters (letters or numbers) shall be between 55 percent and 110 percent of the height of the uppercase letter "O."

Stroke Thickness (Visual)—The stroke thickness of characters shall be between 10 percent and 30 percent of the height of the uppercase letter "I."

Spacing Between Characters (Visual)—Spacing between individual characters shall be between 10 percent and 35 percent of the character height, measured between each adjacent character within a message, excluding word spaces.

Height (Visual)—Minimum character height shall be determined by the viewing distance from which characters are to be read. This includes the height above the finished floor at the viewing location and the line-of-sight distance from the sign. Character height shall be based on the uppercase letter "I." Character height and viewing distance are discussed later in this chapter.

Spacing Between Words (Visual)—Word spacing should be between 35 percent and 75 percent of the height of the uppercase letter "I."

Spacing Between Lines (Visual)—If the lines are related to the same message, line spacing should be between 10 and 35 percent of the height of the uppercase letter "I." Spacing between lines of unrelated massages should be between 75 percent and 100 percent of the height of the uppercase letter "I."

Margins (Visual)—The distance from the text or image to the inside of the border at the top, bottom, right and left sides of the sign should be 75 percent of the height of the uppercase letter "I." If there are space limitations, margins can be no less than 50 percent of the height of the uppercase letter "I."

Tactile Sign Typography

When tactile signs are required, they shall contain raised characters and should be accompanied with Grade 2 Braille. The entire message should be presented in raised letters. The Grade 2 Braille translation of the message should be placed below the raised letter message. The finish on tactile signs should be architecturally consistent with the finish on visual signs. The Braille on the tactile sign can be the same color as the background. There is no requirement that the raised letters contrast with the background, but contrast is recommended to help people with low vision learn to read raised letters. Raised or tactile pictographs and symbols shall not be used.

Case (Tactile)—Raised letters shall be all uppercase.

Style (Tactile)—Characters shall be sans serif or simple serif type. Characters shall not be italic, oblique, script, highly decorative, or of any unusual form. Research with the visually impaired shows the following styles to be ac-

ceptable: Helvetica Regular, Futura Regular, Gill Sans Regular, Avant Grande Book, Universe Regular, and Optima Regular.

Tactile Characters—Characters shall be raised 1/32 in. (0.8 mm) minimum above their background. Raised elements that are not required as part of the message of the sign such as borders should be avoided.

Width (Tactile)—Raised character width shall be between 55 percent and 110 percent of the height of the uppercase letter "O."

Stroke Thickness (Tactile)—Tactile characters shall have a stroke thickness which is between 10 percent and 15 percent of the height of the uppercase letter "I."

Spacing Between Characters (Tactile)—The spacing between individual tactile characters shall be between 30 percent and 40 percent of the character height. Spacing shall be measured from the two closest points between each adjacent character within a message, excluding spaces between words.

Height (Tactile) —Tactile character height shall be no less than 5/8 in. (16 mm) and no more than 2 in. (50 mm), based on the height of the uppercase letter "I."

Spacing Between Words (Tactile)—Word spacing should be between 35 percent and 75 percent of the height of the uppercase letter "I."

Spacing Between Lines (Tactile)—If the lines are related to the same message, line spacing should be between 20 percent and 40 percent of the height of the uppercase "I." Spacing between lines of unrelated messages should be between 75 percent and 100 percent of the height of the uppercase letter "I."

Spacing Between Raised Letter and Braille Messages—Spacing between the raised letter message and the Grade 2 Braille translation should be at least ¼ in. (6 mm).

Margins—Raised borders at the top, bottom and sides of tactile signs should be avoided. If a raised border is required, the distance from the raised letters or Grade 2 Braille to the inside edge of the raised border should be at least 3/8 in. (10 mm).

Combined Visual and Tactile Sign Typography

To reduce the number of signs in a facility, it is appropriate to use combined visual and tactile signs. The typography requirements for visual and tactile signs have been combined to permit this usage.

Combined visual and tactile signs provide assistance to patrons who have poor vision and do not know how to read tactilely. These signs help patrons with low vision find their way through the facility and also permit them to learn how to read raised letters. Pictographs and symbols should not be raised or tactile, thus care must be taken to explain the visual pictograph or symbol with raised letters and Grade 2 Braille.

Finish and contrast for combined visual and tactile signs must follow the guidelines addressed at the beginning of this chapter for visual signs.

Combined visual and tactile signs can utilize a trapezoidalshaped cross section for the raised characters, with a wide base tapering to a narrow top. Visually, the top and sides of the trapezoid are a contrasting color from the sign background. Thus the visual width of the character is the width of the base of the trapezoid. The tactile width is the width of the top of the trapezoid. A sketch of the cross section is shown in Figure 8.

Combined visual and tactile signs must be accompanied with Grade 2 Braille. As with tactile signs these combined signs should present the entire message in visual/raised letters, with the Grade 2 Braille translation of the message placed below the visual/raised letter message.

Case (Combined)—All characters (letters) shall be uppercase.

Style (Combined)—Characters shall be sans serif or simple serif. Characters shall not be oblique, script, highly decorative or of other unusual forms. The following styles are acceptable: Helvetica Regular, Futura Regular, Gill Sans Regular, Avant Grande Book, Universe Regular, and Optima Regular.

Width (Combined)—Character width shall be between 55 percent and 110 percent of the height of the uppercase letter "O."

Stroke Thickness (Combined)—Characters with rectangular cross-sections shall have a stroke thickness which is between 10 percent and 15 percent of the height of the uppercase letter "I." Characters with other cross sections shall have a stroke thickness at the base of the cross section which is between 10 percent and 30 percent of the height of the uppercase letter "I"; and a stroke thickness at the top of the cross section which is between 10 percent and 15 percent of the height of the uppercase letter "I."

Spacing Between Characters (Combined)—Spacing shall be measured between the two closest points of adjacent characters within a message, excluding words spaces. The spacing between individual visual/tactile characters shall be between 10 percent and 35 percent of the character height measured at the base of the cross section of the characters.

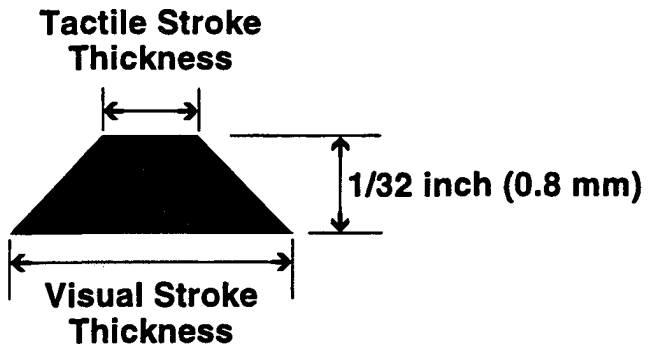


Figure 8. Trapezoidal-shaped cross section.

Height (Combined)—Character height shall be no less than $\frac{5}{8}$ in.(16 mm) and no more than 2 in. (50 mm) based on the height of the uppercase letter "I."

Spacing Between Words (Combined)—Word spacing should be 75 percent of the height of the uppercase letter "I."

Spacing Between Lines (Combined)—If the lines are related to the same message, line spacing should be between 10 percent and 35 percent of the height of the uppercase letter "I." Spacing between lines of unrelated messages should be between 75 percent and 100 percent of the uppercase letter "I."

Spacing Between Raised Letter and Braille Messages—Spacing between the raised letter visual/tactile message and the Grade 2 Braille should be at least $\frac{3}{8}$ in. (10 mm).

Margins (Combined)—Raised borders at the top bottom and sides of visual/tactile signs should be avoided. If a raised border is required, the distance from the raised letters or Grade 2 Braille to the inside edge of the raised border should be at least $\frac{3}{8}$ in. (10 mm).

PICTOGRAPHS AND SYMBOLS

Pictographs and symbols shall be accompanied by the equivalent text description placed directly below the pictograph or symbol. The character height of the text description should be sized so it can be read at the same approximate viewing distance where all of the elements that make up the pictograph or symbol can be distinguished. Elements within a pictograph or symbol, such as the telephone handset shown in the Area of Rescue Assistance symbol should never be smaller than the height of the characters used in the text description of the symbol. Raised or tactile pictographs and symbols shall not be used.

Borders—If borders are used around the pictograph or symbol, the distance between the inside edge of the border to the nearest part(s) of the pictograph or symbol should be at least 4 units in relation to a square border with a base of 75 units. This means that for a symbol with a 6 in. (152 mm) inside border dimension, the distance between the inside edge of the border to the nearest part of the pictograph should be $\frac{1}{3}$ in. (8 mm).

Function—The same pictograph or symbol can be used for multiple purposes. The text description below the pictograph determines its function. For example, the symbol for parking can be used to describe a park and ride lot or a short term parking lot.

Multilingual Pictographs and Symbols—Pictographs and symbols can be used in many languages. By simply translating the text description and developing an index of symbols, the local authority can communicate the meaning of the symbols in different languages.

Nonsymmetrical Pictographs and Symbols—Nonsymmetrical pictographs should be placed on the sign board according to the direction indicated by the pictograph or symbol. For example, if the accessible route is to the right, the International Symbol of Accessibility should be positioned as if it were traveling in that direction. If bike lockers are to the left, the bicycle symbol should be positioned so the front of the bicycle is on the left.

Local Terminology—The meaning of standard pictographs or symbols can be adopted to local custom or terminology. For example, if the local area calls their rapid rail system the "Subway" the symbol for rapid rail can be inscribed with the text "Subway" or if commuter rail is called "Train" the commuter rail symbol can be inscribed with "Train."

Size—Pictographs or symbols used on informational, direction, or guidance sign boards shall be a minimum of 6 in. (152 mm) in height. The size of pictographs and symbols is a function of the distance from which they are to be viewed. General guidance on pictograph/symbol size and viewing distance follows.

SIGN BOARD LOCATION AND PLACEMENT

Location and placement of the sign board, for visual and tactile signs, is critical to the success of a signing program. Direction signs are located at crossings or other important places to sustain and guide the patrons in the continuation of their way to the final destination. Location signs are posted, if necessary, when the goal presented in the direction sign is reached. Regulatory signs are posted in locations where patrons should be informed of the regulations. For example, at the entrance to the paid area of a rail station, patrons should be informed that smoking, eating, and drinking are prohibited. Warning signs are posted to caution patrons of a potential hazard. For example, a "Slippery When Wet" sign should be placed at the perimeter of an area that is being cleaned.

In all of the above instances, the placement or mounting of the sign board is important to ensure that the sighted patrons have an unobstructed line of sight to the sign and the sign is readable from a distance and to ensure that patrons who are blind or visually impaired can locate, approach and reach (touch) the tactile signs.

General guidelines for locating and placing visual, tactile and combined visual/tactile signs are presented to assist the designers, fabricators, and installers in the implementation of an effective signage program.

Mounting Locations—Visual, tactile and combined visual and tactile signs should be located at intersections, decision points and other places along the trip at sufficient intervals to ensure that patrons can continue on their way to the desired destination. Visual signs must be located so there is a clear line of sight as the patrons progress on their trip. Tactile and combined visual/tactile signs must also be placed conspicuously so that the visually impaired patrons can easily approach and reach the sign board for tactile reading. Care

should be taken to locate tactile signs out of the traffic flow because the tactile reader must stand directly in front of the sign to read it.

The location of tactile signs should be researched thoroughly during the design process. Locations should be as consistent as possible in each station or terminal and throughout the system. For example, a decision should be made that all tactile signs will be located to the right of the path of travel and approximately 10 ft before the start of stairways or escalators and 10 ft beyond the end of stairways or the end of the escalators. Once general rules are developed for tactile sign location, they can be published and disseminated to the visually impaired community.

When a sign containing tactile characters provides directions at a single doorway, the sign shall be mounted on the wall adjacent to the latch side of the door. Where a tactile sign provides directions at a double doorway, the sign shall be mounted on the door to the right. If there is no space available to mount the sign as stipulated above, the sign should be mounted on the nearest wall adjacent to the doorway.

Clear Floor Space for Tactile Signs—Tactile signs shall be located so that there is a clear floor area in front of the sign that will allow a person to approach to within 3 in. (76 mm) of the sign.

The swing of the door should be considered when addressing this clear floor area. The recommend clear floor area for wheelchair users is 48 in. (1,220 mm) parallel to the sign face, centered on the sign, and 30 in. (762 mm) perpendicular to the sign face.

Mounting Heights for Visual Signs—For wall-mounted signs, the top of the highest character should be no higher than 68 in. (1,727 mm) from the finished floor and the bottom of the lowest character should be no lower than 42 in. (1,067 mm) from the finished floor. For overhead and "flagmounted" signs, the bottom of the sign shall be a minimum of 80 in. (2,030 mm) from the finished floor.

Mounting Height for Tactile and Combined Tactile/Visual Signs—The top of the highest characters should be no higher than 54 in. (1,372 mm) from the finished floor and the bottom of the lowest character or Braille cell should be no lower than 40 in. (1,016 mm) from the finished floor.

Consistency in mounting height is critically important to the visually impaired. All tactile signs in a facility or throughout a system should be mounted so that the top line of tactile characters on the signs are at the same height from the finished floor. The reach range of wheelchair users should be taken into consideration when mounting tactile signs. The maximum reach range for a person in a wheelchair using a parallel approach is 54 in. (1,372 mm).

If it is necessary to mount a tactile sign lower than 40 in. (1,016 mm), the sign can be mounted upside down on a railing or post so that a person who is visually impaired can reach over the railing to reach (touch) the tactile sign. Figure 9 illustrates this mounting technique. If this application is used, it should be used consistently throughout the system and the sign should be mounted so that the sign is between

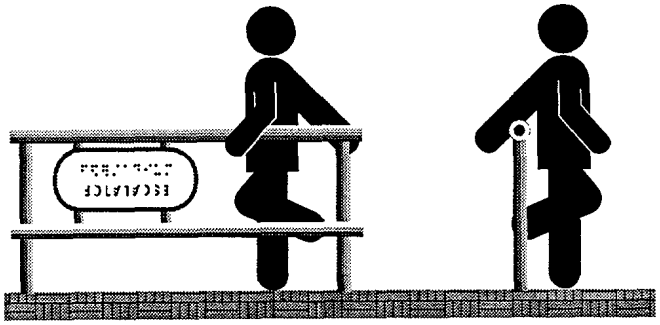


Figure 9. Low-mounting height tactile signs.

30 in. (762 mm) and 40 in. (1,016 mm) from the finished floor.

Mounting Angle Tactile and Combined Visual/Tactile Signs—Tactile signs shall be mounted perpendicular, parallel, or at any angle to the floor surface.

If the message on a tactile sign that is mounted on a wall is too lengthy to fit within the recommended 54 in. (1,372 mm) to 40 in. (1,016 mm) upper/lower limits, the sign can be mounted on an angle that can provide additional message space. To ensure that the sign does not protrude into the path of travel more than 4 in. (100 mm) it can be mounted on an enclosed base. Figure 10 illustrates this mounting technique.

Viewing Distance and Viewing Angle (Visual Signs)—One of the most important aspects of signing is placement of the sign. The closer the sign is to the user's natural line of vision, the better. The viewing angle affects the viewing distance. Viewing angles are larger for people who are in wheelchairs and for small people, and the line of sight between those users and the sign can be obstructed by other users. Thus, care must be taken to locate the sign in a place where it can be seen clearly by all users.

- Viewing distance is the straight line distance between the user's eyes and the center of the sign message. The shortest viewing distance is obtained when the center of the sign message is at eye level.

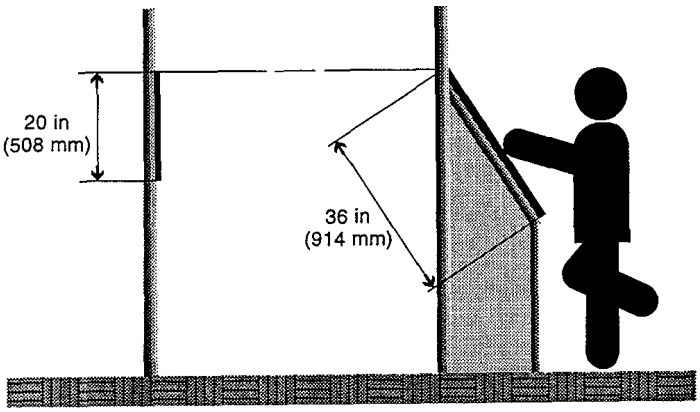


Figure 10. Mounting angle tactile surface.

- Viewing angle is the angle between the level line of sight and the line of sight to the center of the sign message. A rule of thumb is not to exceed a 10-deg angle from the user's natural line of vision.

The eye level heights can be determined by averaging the eye levels for the 5th percentile of the U.S. adult female population with the eye level for the 95th percentile of the U.S. adult male population. In order to determine this eye height for the average U.S. adult, an antroprometric model was used. Heights were measured in the standing position and in the sitting position to replicate a person sitting in a mobility device. The eye level height at a standing position for the average U.S. adult is 67 in. (1,702 mm) above the floor. The eye level height in a sitting position for the average U.S. adult is 50 in. (1,270 mm) above the floor.

These eye level heights should be taken into consideration when locating signs. The viewing angle and the clear height between the bottom of the sign board and the floor are factors that must also be considered.

Care must be taken to ensure that people who use wheelchairs and scooters can see the signs. Many people who have mobility impairments have a difficult time looking up at signs. The maximum viewing angle of 10 deg from the horizontal line of sight should be maintained. This means if a clear height of 80 in. (2,032 mm) is to be maintained, a 12 in. x 12 in. (305 mm x 305 mm) overhead sign must be mounted at least 16 ft (4.8 m) from the seated viewer. If a 96-in. (2,438 m) clear height must be maintained, the overhead 12 in. x 12 in. (305 mm x 305 mm) sign must be mounted at least 24 ft (7.3 m) from the seated viewer.

Sketches in Figure 11 show how the viewing angle for a standing person and a person in a wheelchair can affect the clear height and viewing distance of overhead signs.

If a person is waiting for a bus and a 12 in. x 12 in. (305 mm x 305 mm) bus stop sign is mounted overhead so that there is an 80-inch (2,032 mm) clearance between the bottom of the sign and the ground, the sign should be positioned so that a person who is standing can move 8 ft (2.4 m) away from the sign to view it. A person in a wheelchair must be able to move at least 16 ft (4.8 m) from the sign to keep the sign within the 10-deg viewing angle. Once the viewing angle and viewing distance is determined, the size of the characters can be determined.

There is an upper and lower limit on character height. The upper limit provides guidance on signage that can be read by

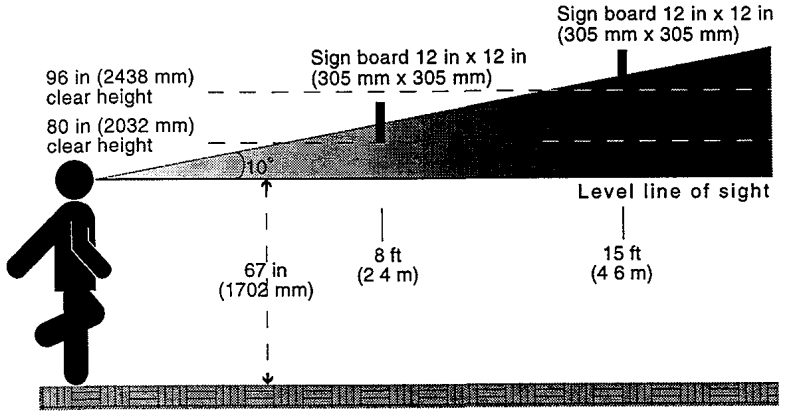


Figure 11. Viewing angles for persons standing or sitting in wheelchairs.

TABLE 3 Character height guidelines

Viewing Distance (feet)	Character Height (Uppercase "I")	
	Normal Sight (inches)	Impaired Sight (inches)
10 (3.1 m)	⅜ (10 mm)	⅝ (16 mm)
15	½	¾
20	⅝	⅞
25 (7.6 mm)	⅝ (16 mm)	1 (25 mm)
30	¾	1⅛
35	¾	1⅜
40	⅞	1⅝
45	⅞	1⅞
50 (15.2 m)	1 (25 mm)	2 (50 mm)
55	1	2⅛
60	1⅛	2⅜
65	1¼	2⅝
70	1⅜	2⅞
75 (22.9 m)	1½ (38 mm)	3 (76 mm)
80	1½	3⅛
85	1⅝	3⅜
90	1¾	3⅝
95	1⅞	3⅞
100 (30.5 m)	2 (51 mm)	4 (102 mm)

those who have visual impairments, the lower limit is for people who have normal sight. Table 3, "Character Height Guidelines," shows the recommended height of the characters for viewing distances between 10 ft (3.1 m) and 100 ft (30.5 m).

If symbol signs are used, care must be taken to size the symbols according to viewing distance. General guidelines follow.

- 6 in. x 6 in. (152 mm x 152 mm) symbol fields are legible up to 50 ft (15 mm).
- 7 in. x 7 in. (178 mm x 178 mm) symbol fields are legible between 50 ft (15 m) and 100 ft (30 m).
- 8 in. x 8 in. (203 m x 203 m) symbol fields are legible between 100 ft (30 m) and 125 ft (38 m).

Each symbol should be reviewed before the above guidelines are used. The principle design elements that make up the symbol should be studied to determine their height. Using the character height guidelines previously discussed for checking the viewing distance for the symbol, this element height can be checked for acceptability. For example, the stick figure in the 7 in. x 7 in. (178 mm x 178 mm) Area of Res-cue Assistance symbol is 2½ in. (63 mm) tall. This 2½ in. (63 mm) is compared to a 2½ in.-(63-mm) character height on the character height guidelines table, which shows a viewing distance of 60 ft (18 m) to 70 ft (21 m) for a person with impaired vision. These results compare favorably with the general viewing distance guidelines shown above for a 7 in. x 7 in. (178 mm x 178 mm) symbol that is 50 ft (15 m) to 100 ft (30 m).

CHAPTER 7

TRANSIT FACILITY SYMBOLS, ARROWS, AND GRAPHIC APPLICATIONS

STANDARD SYMBOLS

The following pages contain the set of graphic symbols that are recommended for use in transit facilities (see Figure 12). These standard symbols accomplish the following:

- Provide users of transit facilities with uniform, easily learned and understood directions and information.
- Achieve consistency in design of pictographs and symbols.
- Effect cost savings through standardization.
- Assist individuals with disabilities, non-English speakers, and nonreaders in the use of public transportation.
- Coordinate new symbol designs with those developed by national and international standards organizations.

To ensure legibility and recognition of the symbols, it is important to maintain the following visual elements:

- The proportional relationship of the figures and elements within the symbol or pictogragh must always be maintained.
- The symbol field should always be square with rounded corners.
- White figures should be used on a black field. If white on black cannot be used, a strong light/dark contrast should be maintained.
- If a white symbol field is used on a white sign board, the symbol field should be outlined with a black border.
- If the symbol field is in color, the color should be light and the symbol should be dark.
- Text describing the meaning of the symbol should be placed directly under the symbol field.

MULTILINGUAL TEST FOR SYMBOLS

One of the advantages of using symbols is their ability to communicate meaning in various languages. The symbols can be used throughout the system with English text written below. A symbol key can be located at the entrance to each station or on the vehicles that translates the English text into different languages. The following matrices in Figure 13 contain the equivalent text for the symbols in Spanish, French, German, Italian, Korean and Chinese. It should be noted that some of the symbol descriptions in English do not have exact translations in other languages, thus a word or words that have similar meanings have been used. Also, depending on the region, some translations may not be appropriate, thus it is recommended that the local community be consulted before using these translations.

Directional Arrows

The arrow is one of the most commonly used symbols in the signage system. Designs for arrows vary greatly and research shows that many of the presently used designs are confusing and ineffective. To ensure that this critical symbol is used to its maximum effectiveness, the following guidelines are suggested.

Standard Arrow Design—A standard arrow design is presented in Figure 14. The arrow is drawn on a grid to show proportions. The total length of the arrow is 6 units. The stem or shaft is 1 unit wide and 4 units long. The blade or point is one half of an "X" that is 6½ units wide and 5 units in height.

Arrow Size—The arrow should be sized in relation to the size of the characters or symbols used on the sign board. Arrow size is defined as the height of the blade. Character size is defined as the height of an upper case letter "I." The size of the arrow should be two times the upper case character height that is used in the message. For example, if 3-in. (76-mm) characters are used on the sign board, arrows with a 6-in. (152-mm) blade height should be used.

When arrows are used with pictographs or symbols, the size of the arrow should be 2 units smaller than the size of the symbol. For example, if an 8-in. (203 mm) square symbol is used on a sign board, the arrow should have a blade height of 6 in. (152 mm).

A graphic display of arrow size in relation to character height and symbol size is shown in Figure 15.

Position of the Arrow—Arrows should be positioned next to messages so that the arrow always pulls the message. The arrow should *never* push the message. For example, arrows pointing to the left or up and left should always be the first symbol on the left hand side of the sign board, with the message or other symbols following. Arrows pointing to the right or up and right should always be the last symbol on the right hand side of the sign board.

Arrows should be placed so they are centered on the horizontal centerline of the first line of text of the message or on the horizontal centerline of the other symbols. A graphic display of arrow positioning is shown in Figure 16.

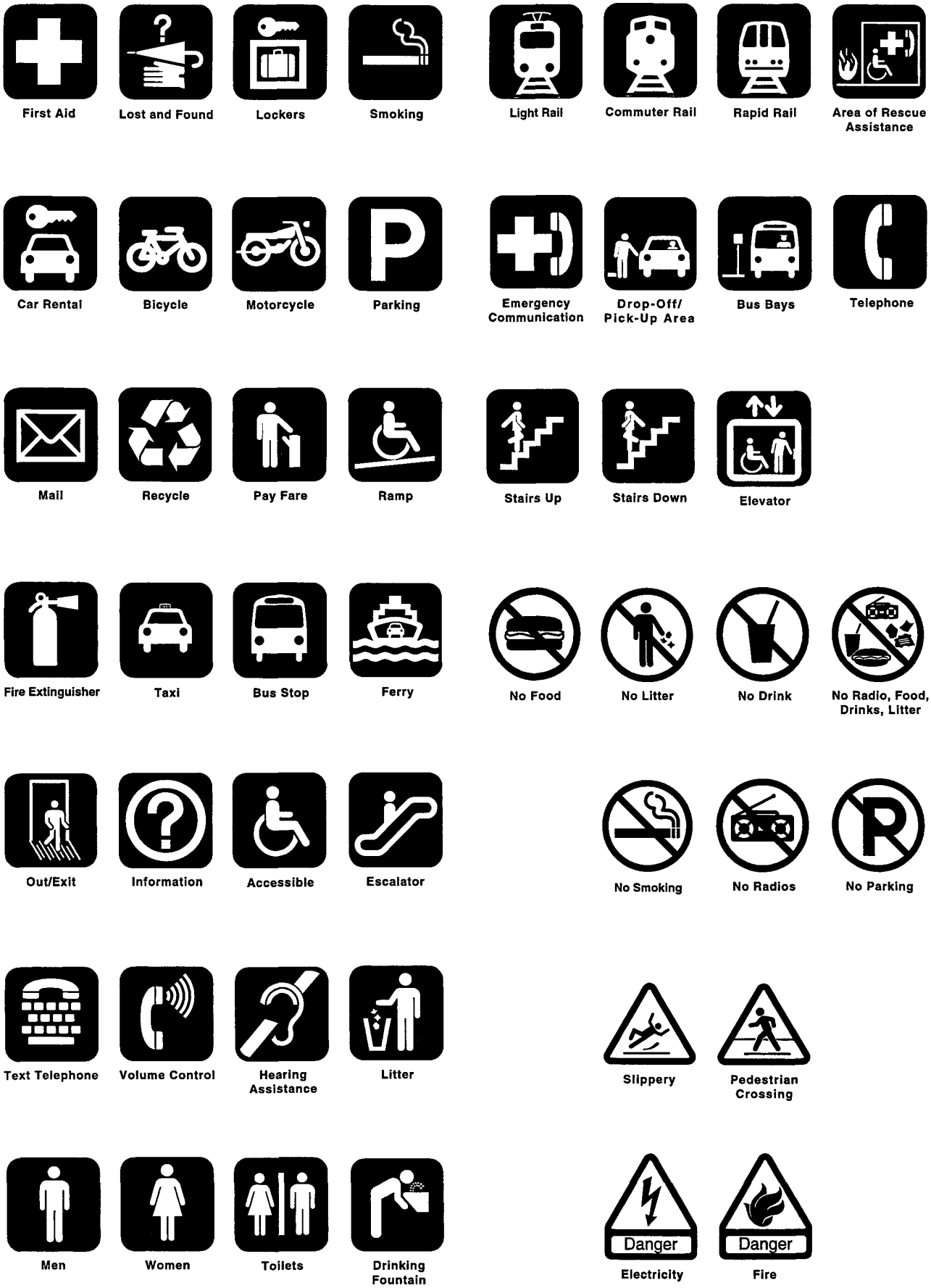


Figure 12. Recommended graphic symbols for use in transit facilities.

English	First Aid	Lost and Found	Lockers/ Storage	Smoking
Español Spanish	Primeros Auxilios	Objetos Perdidos	Gabinetes De Almacenaje	Fumadores
Français French	Premiers Secours	Objets Trouvés	Consigne	Fumeurs
Deutsch German	Erste Hilfe	Fund	Lagerung	Rauchen
Italiano Italian	Pronto Soccorso	Oggetti Smarriti	Ripostiglio Bagagli	Fumatori
Korean	응급치료	분실물 찾는장소	락커	흡연
Chinese	急救	失物所	存物箱	可抽烟

English	Text Telephone (Deaf)	Volume Control	Hearing Assistance	Litter
Español Spanish	Teléfono Visual	Control de Volume	Asistencia Auditiva	Basura
Français French	Téléphone pour Sourd	Volume	Aide au sourd	Poubelles
Deutsch German	Telefon (Taub)	Lautstärke	Hörgerät	Abfall
Italiano Italian	Telefono Visuale	Controllo di Volume	Assistenza Auditiva	Rifiuti
Korean	글자 전화기	소리조정	보청 도움	쓰레기
Chinese	文件電話	音量控制	聽力帮助	垃圾

English	Mail	Recycle	Pay Fare	Ramp
Español Spanish	Correo	Reciclaje	Caja	Rampa
Français French	Courrier	Recyclage	Tarif	Accès handicapé
Deutsch German	Post	Verarbeiten	Fahrgeld	Rampe
Italiano Italian	Posta	Riciclaggio	Cassa	Rampa
Korean	우편	재생	요금 지불	비탈진 통로
Chinese	郵件	回收	買票處	

English	Men	Women	Toilets	Drinking Fountain/Water
Español Spanish	Hombres	Mujeres	Baños	Fuente de Agua
Français French	Hommes	Femmes	Toilettes	Eau Potable
Deutsch German	Männer	Frauen	Toiletten	Wasser
Italiano Italian	Uomo	Donna	Gabinetto	Fontana d'Acqua
Korean	남자	여자	화장실	음료수
Chinese	男厠	女厠	厠所	喝水處

English	Fire Extinguisher	Taxi	Bus Stop	Ferry
Español Spanish	Extinguidor	Taxi	Parada De Autobús	Transbordador
Français French	Extincteur	Taxi	Arrêt d'autobus	Ferry
Deutsch German	Feuerlöscher	Taxi	Bushaltestelle	Fähre
Italiano Italian	Estintore	Taxi	Fermata Autobus	Traghetto
Korean	소방기	택시	버스 정류장	페리
Chinese	滅火筒	的士	巴士站	渡輪

English	Stairs Up	Stairs Down	Elevator	Light Rail
Español Spanish	Escalera/Arriba	Escalera/Abajo	Ascensor	Tren
Français French	Escalier	Escalier	Ascenseur	Tramway
Deutsch German	Hach oben	Hach unten	Aufzug	Leicht Schienenweg
Italiano Italian	Scala/Salita	Scala/Discesa	Ascensore	Strada Ferrata
Korean	올라가는 층계	내려가는 층계	승강기	경전철
Chinese	梯級上	梯級下	升降機	輕鉄

English	Out/Exit	Information	Accessible	Escalator
Español Spanish	Salida	Información	Accesible	Escalera Eléctrica
Français French	Sortie	Renseignements	Accessible	Escalator
Deutsch German	Ausgang	Auskunft	Zugänglich	Rolltreppe
Italiano Italian	Uscita	Informazione	Accesso	Scala Mobile
Korean	출구	안내	통과 가능	에스카레이토
Chinese	出口	詢問處	伤残人士可用	電梯

English	Commuter Rail	Rapid Rail	Area of Rescue Assistance	Emergency Communication
Español Spanish	Tren Local	Tren Expreso	Área de Rescate	Comunicaciones de Emergencias
Français French	Trains de Banlieue	Train Express	Sécours	Téléphone d'urgence
Deutsch German	Nahver-kehrszug	Schnell Zug	Nothilfe Station	Notrufsäule
Italiano Italian	Treno Locale	Treno Espresso	Area di Salvataggio	Comunicazione Di Emergenza
Korean	출퇴근 전철	전철	구조대	비상통신
Chinese	公共鉄路	快速鉄路	急救處	

Figure 13. Text versions of common symbols in English, Italian, Korean, and Chinese languages.

English	Drop-off Pick-up Area	Bus Bays	Telephone	No Food
Español Spanish	Área de Embarque y Desembarque	Parada de Autobús	Teléfono	Prohibido Comer
Français French	Départ/arrivée des passagers	Arrêt d'autobus	Téléphone	Défense de manger
Deutsch German	Halte Bucht	Bushaltestelle	Telefon	Lebensmittel Verboten
Italiano Italian	Area di Imbarco e Disimbarco	Fermata Autobus	Telefono	Vietato Mangiare
Korean	승차장	버스 승차장	공중전화	음식물 금지
Chinese	接人區	巴士總站	電話	不可進食

English	No Litter	No Drink	No Radios	No Smoking
Español Spanish	Prohibido Botar Basura	Prohibido Tomar	Prohibido los Radio	Prohibido Fumar
Français French	Défense de déposer des ordures	Boisson interdite	Appareil bruyant interdit	Défense de Fumer
Deutsch German	Wegwerfen verboten	Getränke verboten	Radios verboten	Rauchen verboten
Italiano Italian	Vietato Gettare Rifiuti	Vietato Bere	Vietato Ascoltare la Radio	Vietato Fumare
Korean	쓰레기 금지	음료 금지	라디오 금지	금연
Chinese	不可掉垃圾	不可飲食	不可用收音機	不准抽煙

English	Slippery	Pedestrian Crossing	Danger - Fire	Danger - Electricity
Español Spanish	Resbaladizo	Cruce de Peatones	Peligro - Fuego	Peligro - Electricidad
Français French	Glissante	Passage Piétons	Danger - Incendie	Danger - Électricité
Deutsch German	Glatt	Zebrastreifen	Gefahr - Feuer	Gefahr - Unterstrom
Italiano Italian	Viscido Scivoloso	Passaggio Pedonale	Pericolo - Fuoco	Pericolo - Elettricità
Korean	미끄럼 주의	횡단보도	화재위험	전기위험
Chinese	小心地濕	行人路	危險火	危險電

English	Car Rental	Bicycle	Motorcycle	Parking
Español Spanish	Alquiler de Automobiles	Bicicleta	Motocicleta	Estacionamiento
Français French	Location de Voitures	Bicyclettes	Motos	Stationnement
Deutsch German	Autovermietung	Fahrrad	Motorrad	Parken
Italiano Italian	Autonoleggio	Bicicletta	Motocicletta	Sosta
Korean	렌탈카	자전거	오토바이	주차장
Chinese	租車	單車	電單車	泊車

Figure 13. (continued)

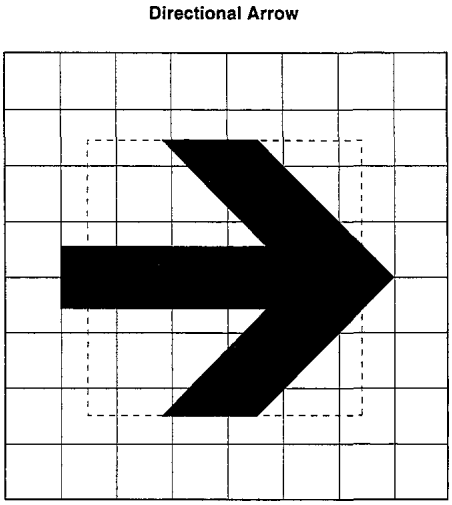


Figure 14. Standard arrow design.

Orientation of the Arrow—The orientation of the arrow is of equal importance to the design and placement. Because there is no special symbol to convey the message "straight ahead", either the "Up" or "Down" arrow can be used. This unfortunately causes confusion for the users who many times interpret the directions as "Up" or "Down" instead of "Straight ahead." The following guidelines should be used to eliminate this misinterpretation.

- The "Up" arrow should be used for "Straight ahead" when the sign board is mounted on a wall or post at below 80 in. (2,032 mm) from the floor.
- The "Down" arrow should be used for "Straight ahead" when the sign board is mounted at or above 80 in. (2,032 mm) from the floor.

Arrows should only be orientated in the eight standard positions that are illustrated in Figure 17.

The Arrow as a Separate Sign

A separate, self-contained arrow sign can be used with separate symbol or text signs by placing the standard arrow at one of the eight previously discussed orientations on a square sign board. The arrow should be centered on the sign board and sized so that there is adequate space between all parts of the arrow and the border of the sign. For example, if the sign board is 8-in. (203-mm) square, the blade height of

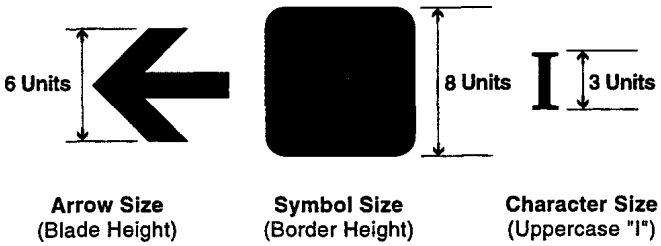


Figure 15. Arrow size in relation to character height and symbol size.

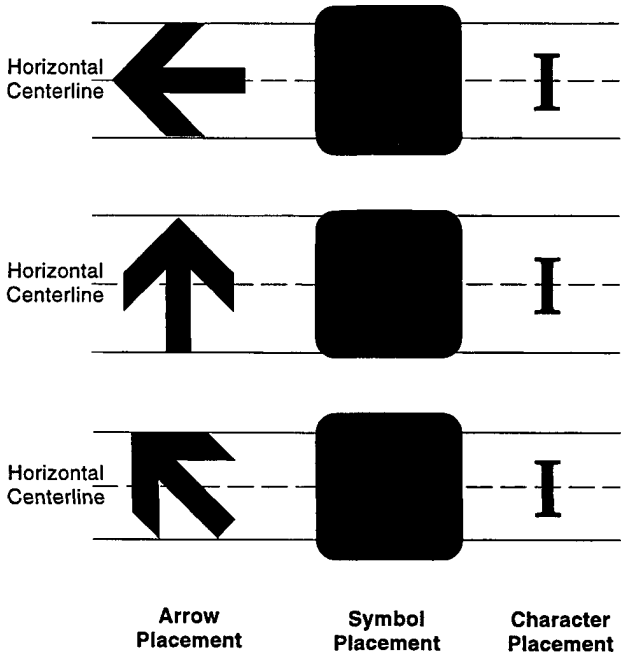


Figure 16. Arrow positioning.

the arrow should be 3¼ in. (83 mm). The separate arrow sign should be placed so it pulls the text message or symbol.

BUS STOPS

General guidelines for the design of bus stop sign boards follow.

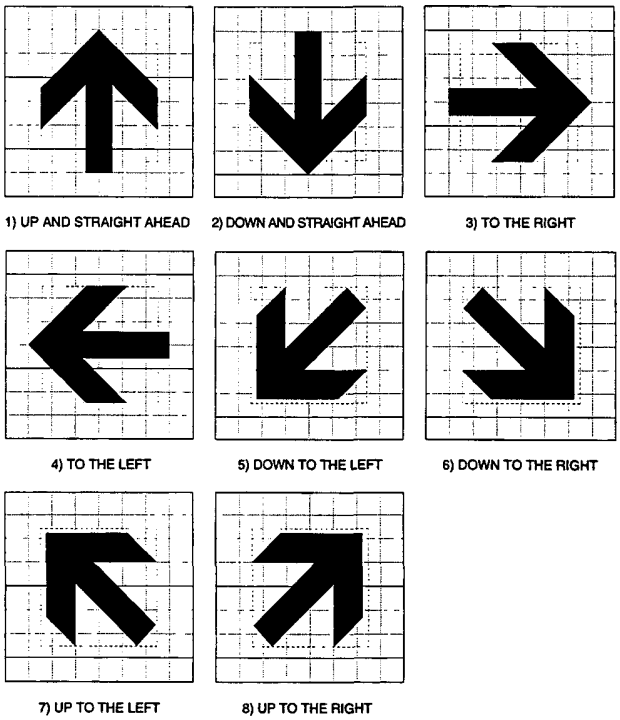


Figure 17. Arrow orientation.

- Use the standard "Bus" symbol in upper left corner and transit system logo in upper right corner.
- List route numbers in ascending numeric order. If route numbers contain letters list in alphabetic order; for example, 74A, 74B.
- Position route numbers consecutively; do not leave cells vacant between route numbers.
- Align route numbers flush left and text flush left to the route numbers.
- Use only one destination for each route number.
- Use 2-in. (50-mm) character height for route numbers. If the sign is mounted higher than 80 in. (2,032 mm) above the ground, the route numbers should be 3 in. (75 mm). Use largest possible text size.
- If more than five routes serve a stop, use two sign boards on one or two posts.

See examples in Figures 18 and 19.

Bus Stop Sign Posts

Various types of posts are available. Common types are steel U-post, wood post, steel pipe post, and square steel post (see Figure 20).

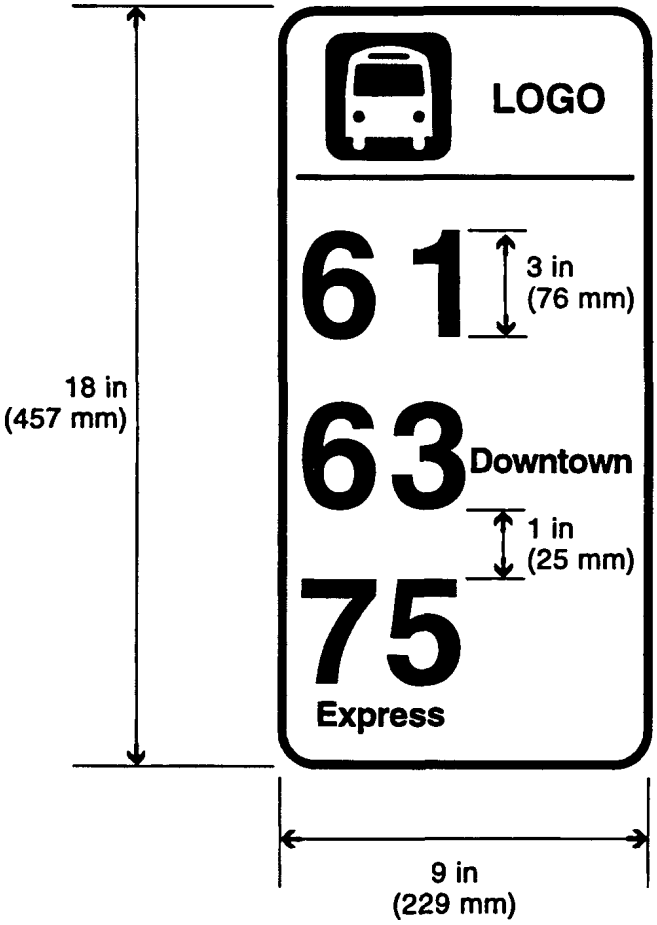


Figure 18. Sign board: one to three route numbers.

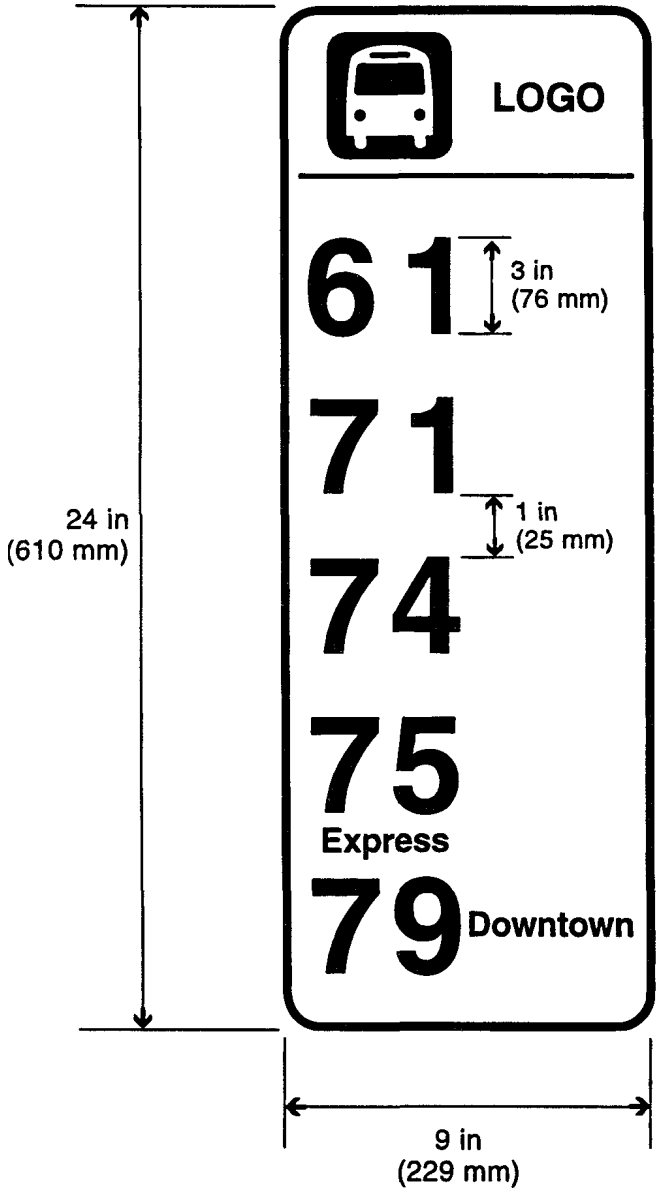


Figure 19. Sign board: more than three route numbers.

To assist persons who have visual impairments, a unique, shaped post, like a square steel post, can be used consistently throughout a service area at all bus stops.

The route number(s) that serves the stop and the street location of the stop can be presented in raised letters and Braille and placed on the post at a standard height above the ground. This height should be between 40 in. (1,016 mm) and 54 in. (1,370 mm).

Information holders can also be attached to the bus stop sign post. When four-sided information holders are used, one panel can be used to mount tactile (raised letter and Braille) information signage. See Figure 21.

Bus Stop Sign Placement

The location of the bus stop sign generally designates the boarding area. Therefore, bus stop signs should be located in safe, accessible areas. Some general guidelines for bus stop sign placement follow.

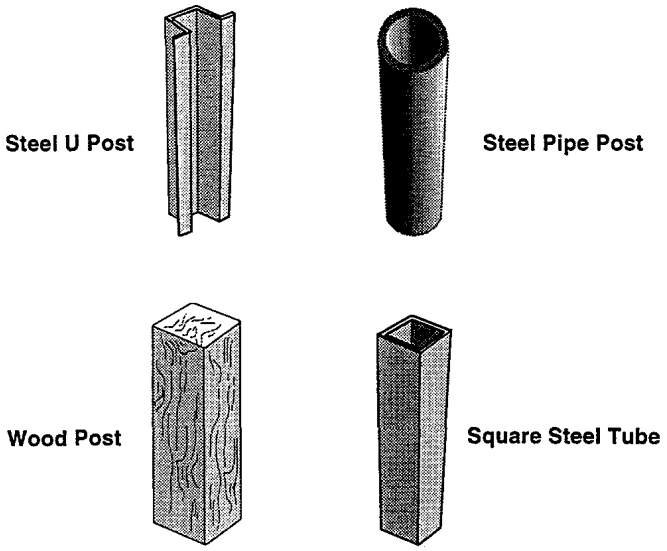


Figure 20. Common types of sign posts.

- Locate where the ground is firm and stable and where there is an accessible route from the walkway and roadway.

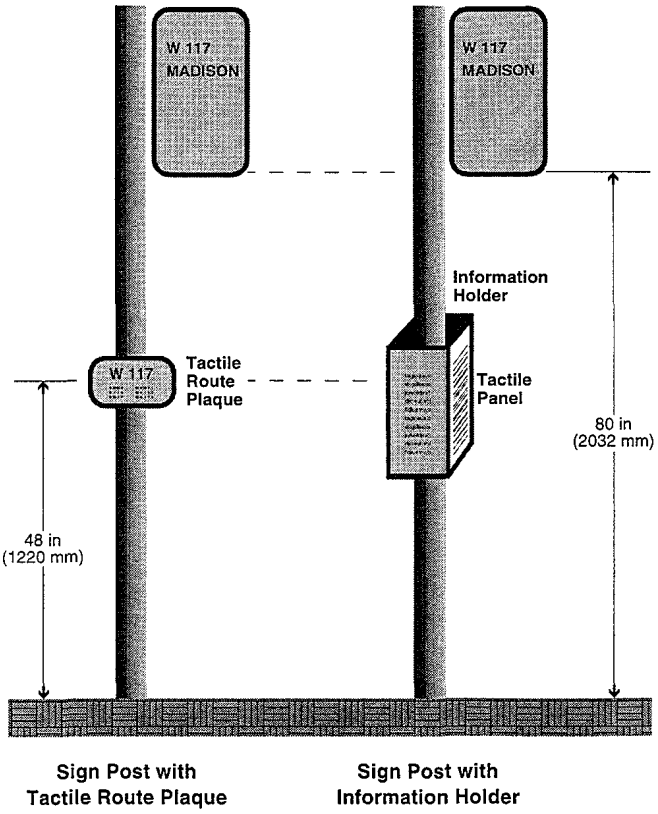


Figure 21. Sign posts with tactile route plaque or information holder.

- Locate so that a standing person can see the sign from a point 8 ft (2.4 m) away from the sign.
- Locate so a person in a wheelchair or on a scooter can see the sign from a point 16 ft (4.9 m) away from the sign.
- Check the viewing distance and viewing angle of bus stop signs placed on passenger shelters if the distance between the bottom of the sign board and the ground is greater than 80 in. (2,032 mm).
- Consider providing a sign post with break away characteristics if sign posts are located near a roadway.

TRANSIT FACILITY ENTRANCE

Entrance Location Sign

A prominent entrance sign should be placed on the street level, near the entrance to all transit facilities. The sign should direct the way to the main entrance of the facility. If the main entrance is not accessible, it should also direct patrons to the accessible entrance. See Figure 22.

Facility Name Sign

The name of the transit facility should be placed at the entrance. Placement of the facility name sign should be consistent at all facilities on the system. It is recommended that this facility name sign be placed to the right of one of the main entrance landmarks, for example, main entrance gate, main entrance elevators, or the main entrance stairway. The facility name sign must be tactile accompanied by Grade 2 Braille. A combined visual/tactile sign can be used; this will reduce the number of signs at the entrance (see Figure 23).

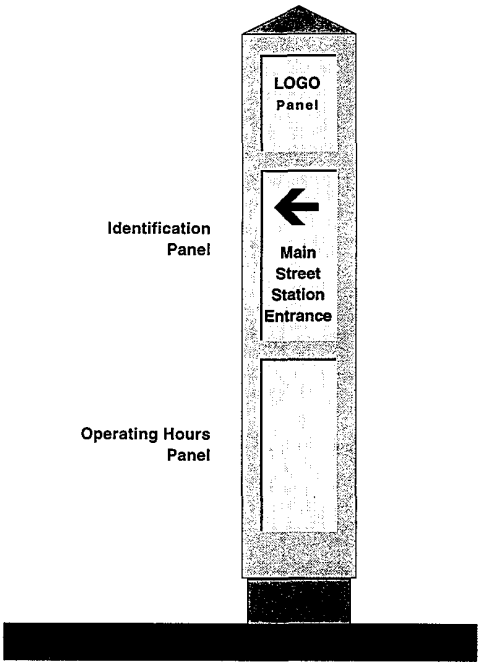


Figure 22. Entrance locator sign.

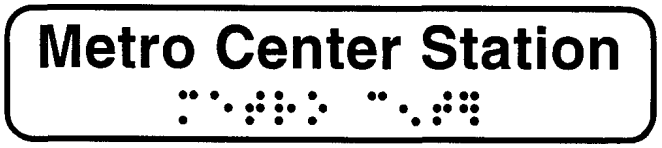


Figure 23. Station name sign.

The entrance sign should be placed at a consistent height, between 40 in. (1,016 mm) and 54 in. (1,370 mm) from the floor. It should be placed in a clear area so that a person can approach within 3 in. (76 mm) of the sign to read it tactilely.

WITHIN THE TRANSIT FACILITY

Symbol signs can be used to direct patrons throughout the transit facility. The symbols that were presented earlier in the chapter, combined with the proper use of the arrow and some limited text, can be combined to produce an effective signage system.

Examples of sign boards using symbols, arrows, and text are presented in Figures 24 through 31. After each sign board, a narrative explanation is given to show how the symbol signs are used to direct patrons within the facility.

The guidelines presented in the previous chapters must be followed to ensure the signs are placed at the proper decision points and that each sign board is designed consistently. Some of the important design considerations are noted in the following examples.

ELEVATORS

Level (Floor) Designations

Elevators are used to transport patrons from one level (floor) to another in a transit facility. Generally, the elevators

Figure 24. Straight ahead, up the stairs, or up the elevator to the commuter rail and Orange Line rapid rail platforms. Note: This sign is mounted on a wall at a height less than 80 in. (2,032 mm), thus the arrow points "up" and means straight ahead.

Figure 25. Straight ahead via an accessible route to the elevator. Note: This sign is also mounted on a wall at a height below 80 in. (2,032 mm), thus the straight ahead arrow is pointing "up."

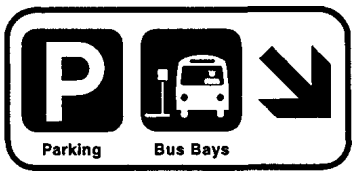


Figure 26. Parking and bus bays down and to the right. Note: The arrow "pulls" the other symbols.

Figure 27. Straight ahead via an accessible ramp to the Orange Line rapid rail platforms. (Note: This sign is mounted overhead higher than 80 in. (2,032 mm) so the straight ahead arrow is pointing "down."

Figure 28. Left for Information, pay your fare, and go on to the Orange Line rapid rail platform. Note: The arrow on the left points left and pulls the symbols.

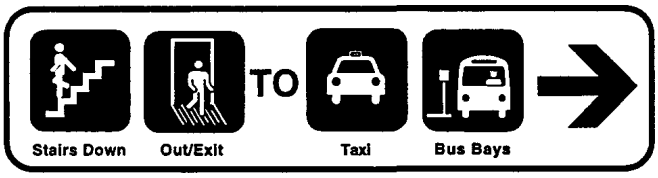


Figure 29. Down the stairs, out of the station to taxi stands and bus bays to the right. Note: The arrow on the right points to the right and pulls the symbols.

in a transit facility serve only one or two levels and those levels do not have specific floor numbers like buildings. Because of this, the operators of the transit facilities designate numbers or letters for each level. These designations vary from one property to another and from one station to the next which tends to confuse the users of the system.

In most transit facilities there are three levels: street, boarding platform, and an intermediate level that is commonly referred to as the mezzanine. In many transit facilities, there can be several "mezzanines". The basic levels in all transit facilities should be designated with the following letters to ensure standardization.

"S" designates Street level
"P" designates Platform level
"M" designates Mezzanine levels

Figure 30. Left to taxis and bus bays on Nedro Avenue.

Figure 31. Left to commuter rail platform to catch the commuter train to Philadelphia. Note: The arrow and the text "To Philadelphia" are centered on the horizontal centerline of the sign board.

If there are other intermediate levels between, above, or below the street or platform levels, these should be designated mezzanines with the closest level to the street designated mezzanine level one (M1) subsequent mezzanine levels would be M2, M3, and so on.

Directional Signs to the Elevator

Signs used to direct patrons to the elevators should include the standard elevator symbol (see Figure 32).

Elevator Location Sign

The elevator should be identified by placing the standard elevator symbol and the text "ELEVATOR" above the elevator hoistway doors at each level (see Figure 33).

Elevator Entrance Signs

Three "signs" are required at the entrance doors of the elevator: the hall call buttons, hall lanterns, and the characters

Figure 32. Directional signs to elevator.

Figure 33. Standard elevator symbol with text.

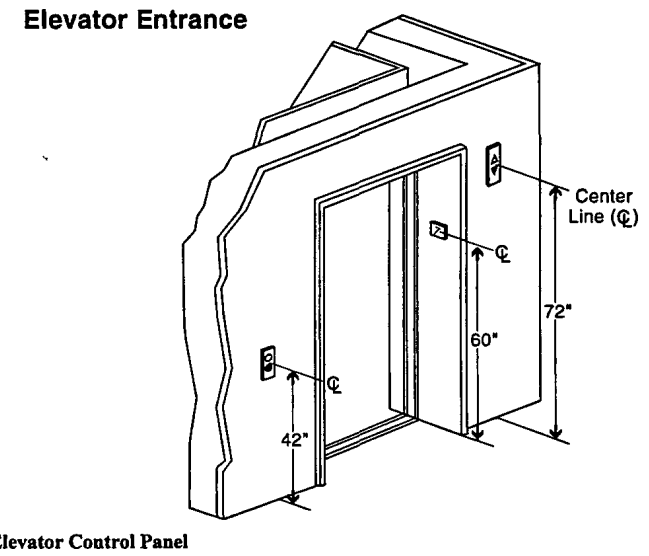


Figure 34. Required signs at elevator entrance doors.

on the hoistway door jambs. A sketch showing the location of these "signs" is shown in Figure 34.

- **Hall Call Buttons**—Shall be centered at 42 in. (1,065 mm) above the floor. Call buttons shall have visual signals to indicate when each call is registered and when each call is answered. Call buttons shall be a minimum of ¾ in. (19 mm) in the smallest dimension. The button designating the up direction shall be on top. Buttons shall be raised or flush.
- **Hall Lanterns**—A visible and audible signal shall be provided at each hoistway entrance. Audible signals shall sound once for the up direction and twice for the down direction or they shall have verbal annunciators that say "up" or "down." Visible signals shall have the following features:
  - Hall lantern fixtures shall be mounted so that the horizontal centerline is at least 72 in. (1,830 mm) above the floor.
  - Visual elements shall be at least 2½ in. (64 mm) in the smallest dimension.
  - Signals shall be visible from the vicinity of the hall call button.
- **Raised and Braille Characters on Hoistway Entrance**—All elevator hoistway entrances shall have raised and Braille floor designations provided on both jambs. The centerline of the characters shall be 60 in. (1,525 mm) above the floor. Characters shall be 2 in. (50 mm) high. Braille should be place directly below the raised character.

Elevator Control Panel

Elevator control panels shall have the following features. A sketch of a typical control panel is shown in Figure 35.

- **Buttons**—All control buttons shall be at least ¾ in. (19 mm) in their smallest dimension. They shall be raised or flush.
- **Tactile, Braille, and Visual Control Indicators**—All control buttons shall be designated by Braille and by raised standard alphabet characters for letters, Arabic characters for numerals, or standard symbols. The call button for the *street* level shall be designated by a raised

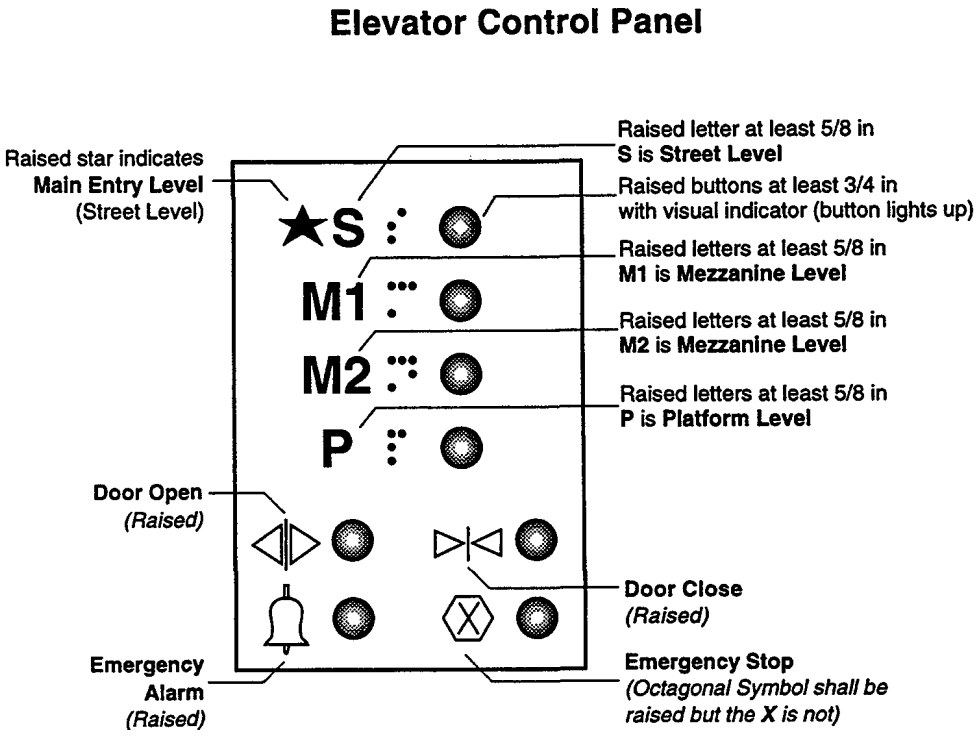


Figure 35. Elevator control panel.

star at the left of the level designation. All raised designations for control buttons shall be placed immediately to the left of the button to which they apply. Level (floor) designations should be "S" for street level, "P" for platform level, and "M1," "M2," etc. for mezzanine or intermediate levels.

- **Floor or Facility Level Buttons**—Shall be provided with visual indicators to show when each is registered. The visual indicators shall be extinguished when each call is answered. Buttons shall be no higher than 54 in. (1,370 mm) above the floor for side approach by a person in a wheelchair and 48 in. (1,220 mm) above the floor for a forward approach.
- **Emergency Controls**—Emergency control buttons, including the emergency alarm and emergency stop, shall be grouped at the bottom of the panel and shall have their horizontal centerlines no less than 35 in. (890 mm) above the floor.

Emergency Two-Way Communication

Two-way communication that does not require voice communication is recommended for all elevators located in transit facilities. If emergency two-way communication is provided, the "Emergency Communication" symbol should be mounted adjacent to the communication device. The text "Emergency Communication" below the symbol should be tactile (see Figure 36).

PLATFORMS

Platforms and boarding areas should be signed to ensure that (1) those waiting on the platform can identify the facility they are in and the facilities or stations that are served from that platform, (2) those arriving on the vehicle can look out of the windows and see the name of the facility or station, (3) those arriving can find their way from the platform to their destination through the facility or station.

Station Identification Signs

Station name signs should be placed at frequent intervals along the boarding platform and should be visible from within the vehicle on both sides. If the station name sign is placed near the vehicle window on the opposite side from the boarding platform, the sign should be mounted so that the top of the text on the sign is below the top of the vehicle window

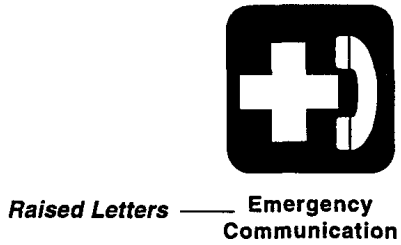


Figure 36. Emergency communication symbol.

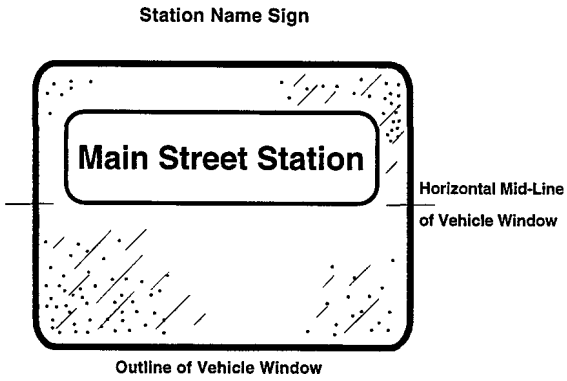


Figure 37. Station name sign as seen from vehicle window.

and the bottom of the text on the sign is above the horizontal mid-line of the vehicle window (see Figure 37).

Station Route and Signs

Signs that show a listing of the station routes or destinations should be placed at frequent intervals along the boarding platform. One of these signs on each platform must be presented in raised letters and Braille. This tactile sign should be located uniformly on all of the platforms in the system. A recommended location is 10 ft beyond each entry point onto a boarding platform. (This may require more than one tactile sign, thus combined visual/tactile signs may be appropriate when there is more than one entry point onto the boarding platform.) See Figure 38.

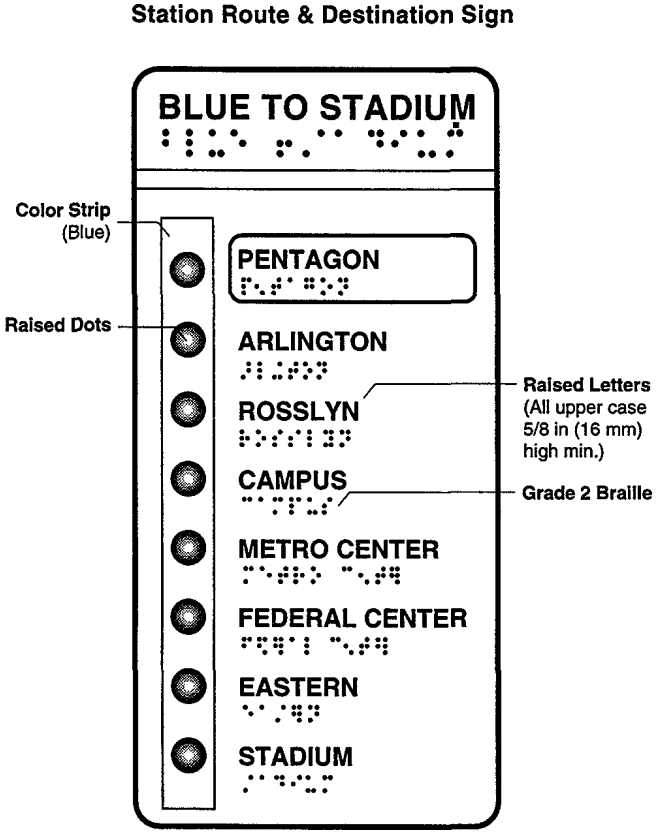


Figure 38. Station route and destination sign.