

Emergency Exiting Information for the Blind and Visually Impaired

By Sharon Toji
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Statistics

From the American Foundation for the Blind:

"...findings from the 2010 National Health Interview Survey (NHIS) Preliminary Report established that an estimated 21.5 million adult Americans reported they either "have trouble" seeing, even when wearing glasses or contact lenses, or that they are blind or unable to see at all."

The National Federation of the Blind says that only 1.3 million people are blind, and we presume they mean functional blindness. About 10 percent of those read any braille.

So we are dealing with a great variety of people who have impaired vision, and only a small percentage of them are people who cannot use their vision to some extent.

Groups we need to reach

First, to understand what we're talking about, we need to understand what a diverse group this is. Here are some possible categories with some explanations:

Functional blindness: This very small group of people has no functionally usable vision, although they may have some light perception. And yes, they do access buildings on their own, especially if that is their only major disability. It comprises a very small percentage of people who are legally blind, and even smaller percentage of those people can read braille. According to the American Foundation for the Blind, only about 10 percent of people who are classified as "blind" cannot see well enough to carry on daily tasks.

Partially blind, partially sighted or legally blind: This includes everyone who does not have visual acuity of 20/200 in their best eye when it is corrected. However, acuity is a somewhat misleading measure, since there is also peripheral vision as well as other conditions that mean the person's vision is completely blocked in some areas of the eye, and not in others. Color deficiency is another condition that may not constitute legal blindness but may render the person functionally blind if two colors with insufficient contrast are being used to give information. Even if people are not certified as legally blind according to the acuity or peripheral vision measurements, they may need some accommodation in signage to access buildings independently.

Deaf-blind: This is obviously one of the most difficult groups to reach. However, it is a very small group, and you would seldom find anyone with no functional vision and hearing unaccompanied in a public building. As long as you have some usable vision, you can be reached visually, and even if you are blind and hard of hearing, you can probably access some kinds of audible information.

Blindness and mobility impairment or other cross disability: If you are a wheelchair user and also functionally blind, you are not apt to access a building unaccompanied, because you would lose some of your ability to navigate safely. You might bump into objects with your chair. Many people in chairs, especially as they get older, may lose some visual function, but they can probably use their vision to read some things and to get around by themselves. The same goes for people who have severe cognitive disabilities and are also completely blind. They are not apt to be accessing a building unaccompanied by a relative or assistant.

So, the majority of people we will be trying to reach will probably have some usable vision, and those who do not will probably be walking and have some useful hearing and cognitive abilities in terms of independent access of facilities. Let's focus on those people.

Forewarned is forearmed

Probably the best thing we can do for people with disabilities is to provide clear, understandable exiting plans that they can read or access easily. We must educate and remind them to look for these plans when they enter a building, and to identify areas of refuge and emergency exits, and even locate them in advance if they are going to be in the building repeatedly or for a long period.

In California, we require that office buildings and hotels with two stories or more locate an evacuation plan at the main entrances of buildings. If the plans are well executed and prominent, people with usable vision can familiarize themselves with emergency exits in case there is an emergency when they are in the building.

Plans are also required, in California and some other states, outside enclosed stairwells and adjacent to elevators on all floors. That means that when the person leaves the first floor, he or she can become familiar with the layout of each floor accessed.

Unfortunately, many fire safety officials do not inspect for these plans, or if they do, they do not require that they meet ADA standards. Even if they are there, they may be unreadable by many people with disabilities.

In addition, hotels and other transient residences are required to provide or post an evacuation plan leading from the specific room to the nearest exits. The plan needs to be accessible by persons with vision impairments. Plans also need to be mounted low enough that people in wheelchairs or with short stature can read them.

- Hallmarks of these plans to make them accessible are that they be high contrast -- dark to light or light to dark -- and that they have non-glare surfaces.
- Red symbols on a dark green or black background are invisible to those with ordinary "color blindness," but any symbols or text that do not have a very high dark/light contrast will be unreadable by people with various kinds of vision loss.
- Plans engraved or screen printed on polished metal, or any reflective surface, even if it is "brushed" or "satin" are virtually invisible to many people.
- Outlines of corridors and evacuation routes need to be outlined in heavy strokes. A clear exiting path, marked with continuous bold arrows, is easiest to see.

Extraneous details should be omitted from plans. For instance, California state code does not require that fire extinguishers be shown on evacuation maps, but many people assume they are required and include them. That really just clutters up the plans. You don't want visitors going in search of a fire extinguisher. If there is a small fire, an employee, who should be trained in what to do, can be alerted. In addition, fire extinguishers and fire pulls should be available at legally required locations and should be clearly marked at their locations.

Detailing individual rooms, furnishings, and doors other than exit or exit route doors is also not necessary. You want the clearest possible plan, and you want it to be the largest part of the sign, and very easy to read. It must be oriented to the viewer, as well. The key should be reasonably large, with distinct symbols that are repeated on the floor plan. The plan should say what the alarm sounds and looks like.

Text size is another issue. Since new federal ADA rules require that all text be a minimum of 5/8 inches high (upper and lower case is allowed, and the measurement is of the uppercase letter "I"), the plan may need to be designed with the floor plan side by side with the key and text. Otherwise, it may become so large, top to bottom, that it will be difficult to read. States may need to rethink the standards for evacuation plans.

Tactile plans are generally useless, unless they are extremely simple, with no extraneous detail at all. The Boston University study mentioned below showed that people had to be instructed in their use before plans could be followed. An on-the-spot tutorial is probably not practical, unless the location is a center for people with vision impairments.

A few years ago, a study was carried out at Boston University under the supervision of Dr Billie Louise (Beezy) Bentzen as to what kind of exiting information is most favored by persons who are legally blind. The most favored means of exiting information was audible, with a sign with "push button" speak out directions preferred, along with "Talking Signs™," an infrared system that requires the use of a receiver carried by the person. It seems as if an easily read map for people with some vision, with a tactile locator, accompanied by

easy to understand audio that would lead people from point to point along an evacuation route, would provide the best combination.

If a button is included, then the device should be hardwired, or some sort of extremely long-lasting battery must be included. The difficulty with devices that require the use of a receiver is that they are still relatively expensive, and even if building management or a desk person is supposed to issue them, they sometimes can't be located. They also require a bit of practice to use correctly.

In hotel rooms, it could be possible to hardwire the sign inside the room fairly easily. A more primitive system would be to provide tape recorders with tapes mapping out an evacuation route from the room. It might be possible in larger hotels to provide evacuation instructions on the hotel welcome site accessed through the television, as long as the program could be easily used by someone with no vision. There have also been some experiments with "smart labels" that require a hand held device.

Most people who are blind create a cognitive map of buildings they access often. As they find their way through a large, unfamiliar site, they may stop and try to commit to memory certain landmarks along the way. Cues may include different floor textures, sounds of fountains or cafeterias, or other prominent building features. They use their canes in a side to side motion to locate doorways.

If audible messages are added to evacuation maps, it may be necessary in large, complex venues to set up a series of "bread crumb" plans and direct people from one to the next, until the final exit discharge is reached. "Talking Signs™" already use this type of system. That would have to be added as a code item, probably for facilities of a specific occupancy and a certain minimum size.

This brings us to the need to find a way to distinguish exit doors and to provide floor level designations in enclosed stairwells. You may have figured out the evacuation route, but how do you know which of the doors that are clustered close together is the exit door? If you must use a stair to exit, can you tell when you have reached the egress floor if egress is through an interior space?

Of course there are visual cues such as large illuminated exit signs and stairwells that have large visual signs when the building is four stories or more. Some people may be able to make those out. There can be problems with red exit signs, particularly when signs are red and black, because there is no dark/light contrast. Many people favor light green or amber for people with color vision problems. Red is not the easiest color to see. There is also a symbolic message. Red means "danger," "stop." Green means "safety," "go."

The use of low level exit signs is increasing, and many of them are photoluminescent. It might be that eye-level photoluminescent signs with very large text at exit doors might be helpful to the many people who are able to use their vision. Some people have suggested painting all emergency exit doors Federal Yellow, (59B - 3338) which has been shown to be

particularly visible to persons with vision impairments, or putting photoluminescent framing around them. Distinctive raised markings on door hardware could be used. We are even exploring the idea of putting raised character and braille exit information on low level signs, but not making it visual at all. That way, if a person who is blind is on the floor to escape smoke, it might be possible to access the low level sign and identify the exit.

Of course there is more than one kind of exit door. In California, we have recognized that by using distinctive raised text and braille to distinguish among grade level exit discharge doors, interior exit doors along the egress route, and doors leading to exit stairs or ramps. However, we have run afoul of designers and plan checkers who think the "Exit Route" signs are directional, and add arrows and place them along corridors. It's extremely important, from a safety point of view, that they be placed adjacent to designated egress doors only.

As far as egress level designators are concerned, each door leading from an enclosed stairwell into the egress level, should have a tactile floor level designator. The egress level is identified with a tactile star, exactly as elevator hoistways require. You do not want a person who is blind to lose count, and enter a floor other than the egress floor when evacuating a building. The sign should be small, uncluttered with extra text, and follow ADA raised character and braille rules. A simple floor number or letter with the star, both translated into braille, is sufficient. (i.e. "main 1" or "main L")

Another helpful way to identify exit doors might be a speak-out system that would alternate with the sound of the alarm. We tried this several years ago with a committee that worked with the California State Fire Marshal. We had several people who were blind, and the rest used blindfolds. Even though the interior of the space was very complex and cluttered with desks and cubicles, everyone located an exit reasonably quickly as a loud clear voice announced "Exit" from each exit location. It was very important, though, to leave enough time between the horn sounds so that the word could be clearly understood.

One problem with such a system might be that it would compete with other announcements being given over the PA system. It would be vital to coordinate all of this, since during emergencies people with various communications disabilities can become particularly confused and even paralyzed from acting when surrounded by all kinds of loud, competing noises.

Of course evacuation announcements could be very helpful to persons who are blind, but my own experience during a small hotel fire, was that the message was so garbled, unclear, and badly formatted that it just caused mass confusion. It was during an event attended by many people with disabilities, and the outcome could have been tragic if the fire had spread from the kitchen where it was contained.

So, we are thinking of various ways that we can improve in giving information to people who have poor vision, and particularly those who may have some combinations of impairments. People who are deaf and hard of hearing will be another large group that will benefit from

improved evacuation plans. Clarity is particularly important, and we have already talked about how evacuation plans can be used to provide some advance information to people so that they are prepared for an emergency.

Right now, the ADA affords us just one way to assist people who are functionally blind in the matter of exiting. From the beginning, exit doors were required to be identified with raised character signs accompanied by braille. Since the only place where that specifically appeared in writing was a letter from the Department of Justice in response to an inquiry by the engraving industry, it was almost impossible to find such signs anywhere in the country. We certainly tried to spread the word through a newsletter sent to the sign industry. However, if architects didn't specify it, and fire safety inspectors didn't require it, it was not going to happen! Finally, in California and a few other states, it was written into the building codes and was added to the model building codes. Now, it is very explicitly included in the 2010 ADA Design Standards.

In the study mentioned above at Boston University, none of the ways of providing the exiting path would have been completely effective had the final egress door not been identified with a tactile exit sign so it could be identified by touch.

We already know that most people who are blind don't read braille. However, the braille is important, and new rules mandate easy to read braille. The word "exit" is short and has no contractions, so anyone with a knowledge of the braille alphabet can spell it out. However, many more people have the ability to read raised characters, if they are well executed.

Execution has been the major problem with raised character signs. We have seen serifs, letters touching each other, letters that are too bold, or with excessively condensed characters. Such signs are unreadable. New rules should eliminate these problems, but it will be necessary for inspectors to require the signs, and to know how to check them for compliance.

Now, we can create the most readable exit identifications by using two-part signs. We are allowed to provide separate visual and tactile characters. We can have a fairly large set of characters -- even the large visual letters on photoluminescent material suggested above -- and place them right on the door. Then, by the side of the door, we can put a tactile sign with no color at all, and with small highly readable characters that are spaced fairly widely apart with the braille below. If we don't want a sign on the door, we can combine the two signs, putting the visual text above the raised characters and braille.

Of course, the Holy Grail for people who are blind will be small GPS type devices they can easily carry with them. The devices will work indoors and will be able to access any venue without downloading special information for that facility in advance.

So, let's recap:

Statistically, there are not a lot of people who have no usable vision. Those people benefit the most from audible wayfinding assistance, supplemented by raised characters and braille that identify egress doors along the way, and final exit discharge locations.

The best audible information, besides being very carefully composed with clear consistent terminology and clear diction, is accessed in some way that does not require the person to use a separate receiver. That can change if advanced technology brings us interior GPS systems.

It may be valuable to consider providing tactile exit information at low level, to accompany required low level exit signs.

Those individuals with visual impairments who have significant usable vision can benefit from instruction in how to find and read emergency exit plans. These plans need to be redesigned so they are more readable and follow ADA requirements. Fire safety officials need to learn the requirements and require them in buildings. It's possible to add speak-out audible instructions to these plans that could benefit those who are functionally blind. In large, complex facilities, an audible "bread crumb" system might be useful.

Other provisions for those with usable vision would include special colors for exit doors, and fairly large visual signs placed at eye level, to supplement high level and low level visual signs, and tactile signs.

We cannot meet the needs of every person with a disability, and certainly we will probably never be able to fully accommodate people with many cross disabilities to become fully independent users of the built environment, but many improvements are available. In most cases, they are not expensive. However, they require our belief that they matter, and that it is important for us to see that they are provided.

Illustrations

Here are some illustrations that demonstrate some of the issues, both negative and positive, raised by the new ADA Standards for signs.

In the representation of an evacuation plan, you can see how the 5/8 inch high text requirement crowds the plan. We have tried to mitigate the problems for people with disabilities by removing some information and putting it in a separate sign, and making the sign in landscape rather than a portrait view, as is usual. That way, people in wheelchairs, or of short stature, or with very poor vision may be able to still see the sign. Remember that some people must stand 3 inches away from the plan to see it.

If we put the information all on one sign, in the normal portrait mode, you can see the sign could be as high as 20 inches, which means it is difficult for many people to get close to. We have used upper and lower case for most of the text, but 5/8 inch is very large for some kinds of information.

This is what we might call the unintended consequences of a code, when all the applications of the code are not taken into account.

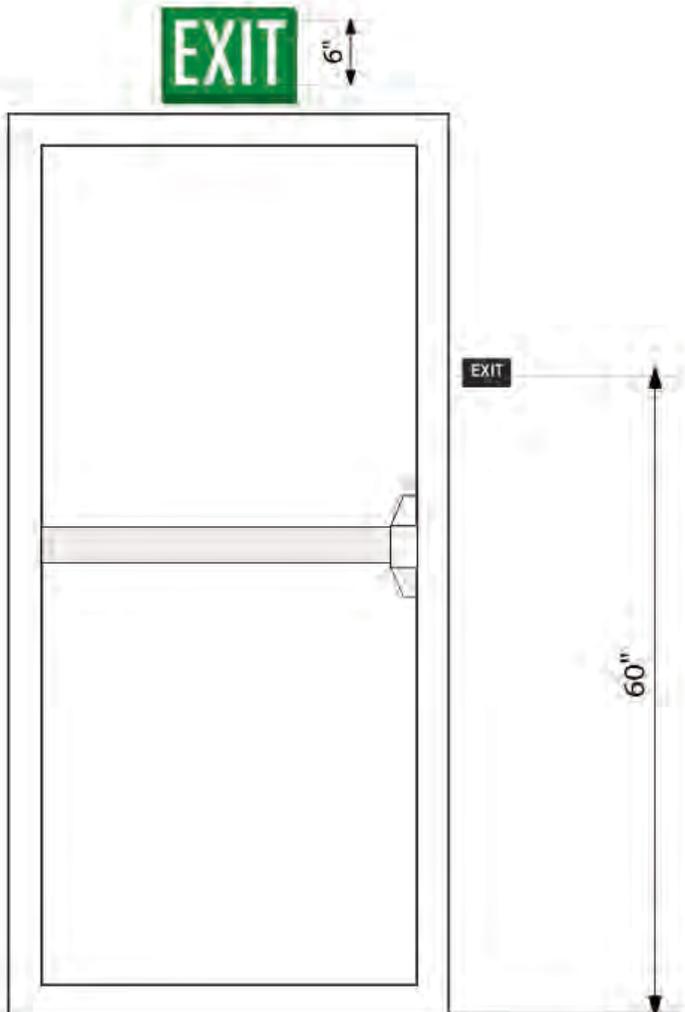
The exit signs show a representation of what is usually supplied: An overhead sign accompanied by a standard tactile sign where the same characters are used by visual and touch readers. That means that characters have to be relatively small.

With the new rules, we can provide a much larger eye-level visual sign, and then accompany it with an "invisible" tactile sign accompanied by braille that will be much easier to read by touch. We could even move the visual sign to the door itself, and the tactile sign could be located adjacent to the door. This could be helpful if you wanted to combine the tactile sign with another sign, such as an evacuation plan, or an "Area of Refuge" sign. It would reduce the clutter.





This is a drawing of a photoluminescent visual exit sign that could be mounted next to a door (or separately, on the door) and it is accompanied by the new “invisible” raised characters and braille that are especially easy for a completely blind person to read. This concept might also be used on a low level sign.



This is the typical configuration right now of an overhead exit sign accompanied by a small exit sign with raised characters and braille. The new ADA Design Standards require that the base of the highest line of tactile characters not be higher than 60 inches above the floor.

It's very important that the word “Exit” in raised characters and braille only be used to identify exit discharge doors, or designated exit doors along the path of egress. Otherwise, a quick reading of the word “Exit” in “Not An Exit” or a directional exit sign, could lead a blind person into a trapped situation during an emergency.