

Architecture for Low Vision

Site, Building and Interior Design

by Stuart L. Knoop, FAIA

Co-Founder, Oudens + Knoop, Architects, PC (Now OKKS Studios, Inc.)

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Abstract

The Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) provide design guidance and requirements in their standards for facilities for persons with disabilities, including the blind. But with more people living longer, there is a growing population afflicted with low vision - “*chronic visual impairments that cause functional limitations or disability*” - that must navigate the built environment. That environment is typically designed for the fully sighted or has some accommodations for the blind as required by ADA and ABA. But in many places, the presence of glare or poor contrast makes the experience for people with low vision uncomfortable at best and unsafe at worst.

Mr. Knoop will discuss some examples of architectural features that are problematic for persons with low vision, and ways in which these can be mitigated through better design. The National Institute of Building Sciences, with the support of the Rothschild Foundation is developing guidelines incorporating these and other measures for the design professions that may be cited by codes and regulations to improve the conditions for persons with low vision in the built environment.

Introduction

A few years ago, I had the pleasure of being one of the team members conducting on-site post-occupancy evaluations of buildings – mostly federal courthouses - built by the General Services Administration in various locations throughout the country and occupied for at least a year. The team, consisting of architects and engineers, reviewed the space program and design rationales, the actual construction contract drawings and other documents, and interviewed users to determine how well the buildings were working and met their objectives.

In all the buildings we visited, the designs were functional, aesthetically appealing and accessible to most persons with disabilities, but they often presented challenges to two of us, Vijay Gupta and I, who suffer from low vision due to macular degeneration rendering a confusing field of glare from windows, lighting fixtures and reflections and poor definition of some aspects of the spaces due to low lighting levels, low contrasts and other problems.

As a result of these and similar experiences, Vijay suggested that there was a need for designers to understand that many people – increasing numbers as the population ages – may find themselves uncomfortable in these situations or even unable to function or get around properly.

Accommodations in design were mandated in the 1990s for persons with many types of disabilities when Congress passed the Americans with Disabilities Act (P.L. 101-336) and then the U.S. Access Board published Accessibility Guidelines.

But while all of these statutes, regulations or guidelines considered persons who are sightless, none considered those of us with low vision – and the problems are different. Little has been done for low-vision design guidance, though in 1995, the Royal National Institute for the Blind (RNIB) in Great Britain published: *Building Sight*, “a handbook of building and interior design solutions to include the needs of visually impaired people”. In 2001, the British Standards Institute (BSI) first published and in 2009 updated BS 8300-: *Design of buildings and their approaches to meet the needs of disabled people – Code of practice*, which addresses means and methods to accommodate partially sighted people.

The NIBS Low Vision Design Committee, described by Dr. Woods in his presentation, is working with the AIA, IES, the U.S. Access Board and eyesight organizations to identify needed new research. They are pursuing development of design guidance for the design professions to incorporate features to ensure the safety of the growing population of people with low vision and their ability to function within all building types.

Under a grant from the Rothschild Foundation, the Committee is developing a *Design Guideline for Health and Safety in the Visual Environment*. As is true for many aspects of accessibility, designing for persons with low vision can create environments that are more universally user-friendly. This is especially true for design for low vision since many fully-sighted people may have or eventually develop some degree of vision limitations as they become older, suffer various medical problems and live longer.

This presentation will outline some issues of site, building and interior design covered in the Guidelines now in development by the Committee.

Light, Glare and Contrast

Although we negotiate our environment using all our senses, for those of us with any vision capability, light is the primary means by which form is defined and we orient ourselves in space. Too little light deprives us of clarity and too much can be painful and obscuring.

Daylight varies in intensity widely depending on the time of day, season, cloud cover and other factors in nature and with the design of buildings to admit and control daylight. Most of us enjoy being able to see daylight when we are indoors, and to have the benefit of daylight for reading, various tasks, and aesthetics. When adequate daylight is not available or sufficient, electric lighting supplements or replaces daylighting. But both daylight and electric light under some conditions can result in glare – too much contrast between the light source and the surroundings. When the forms, surfaces, and colors on which the light falls cannot be interpreted by the eye for lack of adequate contrast or definition, we may be confused.

So, in designing buildings that are universally accessible, including to the wide range of people with low vision, there must be sufficient light coming from sources that are controlled to prevent or minimize glare, and the objects we need to see must be distinguishable through shading, shadows, colors, textures and contrast. The questions are: how much is the right amount of

light for the range of vision capabilities that humans have, and how is light best deployed to our advantage?

Unfortunately, there is relatively little hard data available, so more research is needed to provide verifiable design guidance, but experience suggests some measures are available to improve design with no new technology and at little or no additional cost.

Site and Landscaping

Approaches to the Site and Building

All approaches should be accessible routes as defined by the ADA, but with added precautions. Bollards and other barriers must be easily seen in all lighting conditions; paving and other surfaces must not be glaringly reflective and curbs, steps and other changes in walking surface levels must be made visible – all to avoid tripping the unwary.

Building Orientation

Orientations for buildings that minimize exposures of offices and workspaces to east and west direct sun will reduce the amount and penetration of direct sunlight into the eyes of occupants. Avoiding large expanses of reflective paving or other surfaces which could reflect glare will reduce glare and heat in occupied building spaces. Both of these measures may at the same time reduce cooling loads and energy consumption.

Site Circulation

Walking borders or edges and nosings of steps and stairs should be visually contrasting with the paving and high enough to avoid tripping the walker. At the same time, paving patterns such as alternating light and dark stripes across the direction of travel could be suggestive of level change to the person with low vision, and drains and gratings in the pathway could be hazardous.

Walkways, courtyards and Plazas accessible from the building should have vestibules or other spaces for transition from lower to higher lighting levels, and large glass areas facing onto the courtyards or plazas should be easily distinguished from entrances.

Benches, signs, waste receptacles, pole-mounted signs, lighting and other street furniture should be kept to the sides of the paths of travel and should be designed to contrast with the surroundings and be visible in all lighting conditions – all to avoid collisions.

Landscaping should be designed to avoid hazards such as low-hanging branches over walkways and fruit and nuts that may be a hazard to the walker. Distinctive landscaping and water features can offer visual clues to aid in wayfinding.

Site lighting should illuminate the pedestrian pathways and wayfinding aids such as signs without glare from the lighting fixtures themselves.

Architectural and Interiors

As with exterior design, interior spaces and furnishings must be visible to the person with low vision by having adequate contrasts to delineate various objects and features and minimal glare from natural daylight and electric light.

Circulation spaces such as lobbies, corridors, etc., must be clear of hazardous projections such as drinking fountains and furniture, columns and other objects unless there is adequate contrast and light to distinguish them from the surroundings.

Stairs, steps and ramps are potentially very hazardous unless the tread nosings can be easily seen through contrasting colors and values, and handrails are available at the sides and in the middle of wide sets of steps.

Doors must be distinguishable from surrounding surfaces in color, contrast or form. Where glass doors occur in a glass wall, the user may not be able to see which area is door and which is window – leading to potential safety hazard. The hardware must be easily visible so the user knows which direction the door swings. Push plates can seem to disappear without adequate contrast.

Floor surfaces should not have textures or patterns that obscure level changes or present tripping hazards such as from thresholds, area rugs. Highly polished floor finishes are especially problematic.

Public rest rooms should have plumbing fixtures and accessories such as paper towel dispensers that contrast visually with the surroundings. All white fixtures against white tile can be a problem for people with low vision.

Furnishings likewise should contrast visually with the surrounding surfaces, especially when the seating and other furnishings are placed centrally in the space rather than against a wall.

Glare from window areas must be controlled through window shading devices: blinds, glass tinting and fritting and screening. Rooms should be planned to avoid forcing occupants to look straight into a window or have the window in the field of vision when working at a task.

Conclusion

Although many features of buildings are comfortable for people with low vision, design specifically for this purpose is rarely practiced partly because the design professions are not as sensitized to the need as they are to the needs of other persons with disabilities such as the wheelchair – bound, the blind and the hearing-impaired.

There is also no guidance provided in the U.S. nor any regulatory pressure to provide for this population such as exists for others under the Americans with Disabilities Act (ADA) and related

statutes and guidelines.

The NIBS Low Vision Design Committee's design guidelines are being prepared to fill this void – to raise awareness of the need and provide the design professions with assistance in meeting it.

References

Barker, Peter; Barrick, Jon; and Wilson, Rod. Building Sight. London: HMSO in Association with the Royal National Institute of the Blind, 1995.

British Standards Institute. “ BS 8300-: *Design of buildings and their approaches to meet the needs of disabled people – Code of practice*” 2009: 230 pp.
