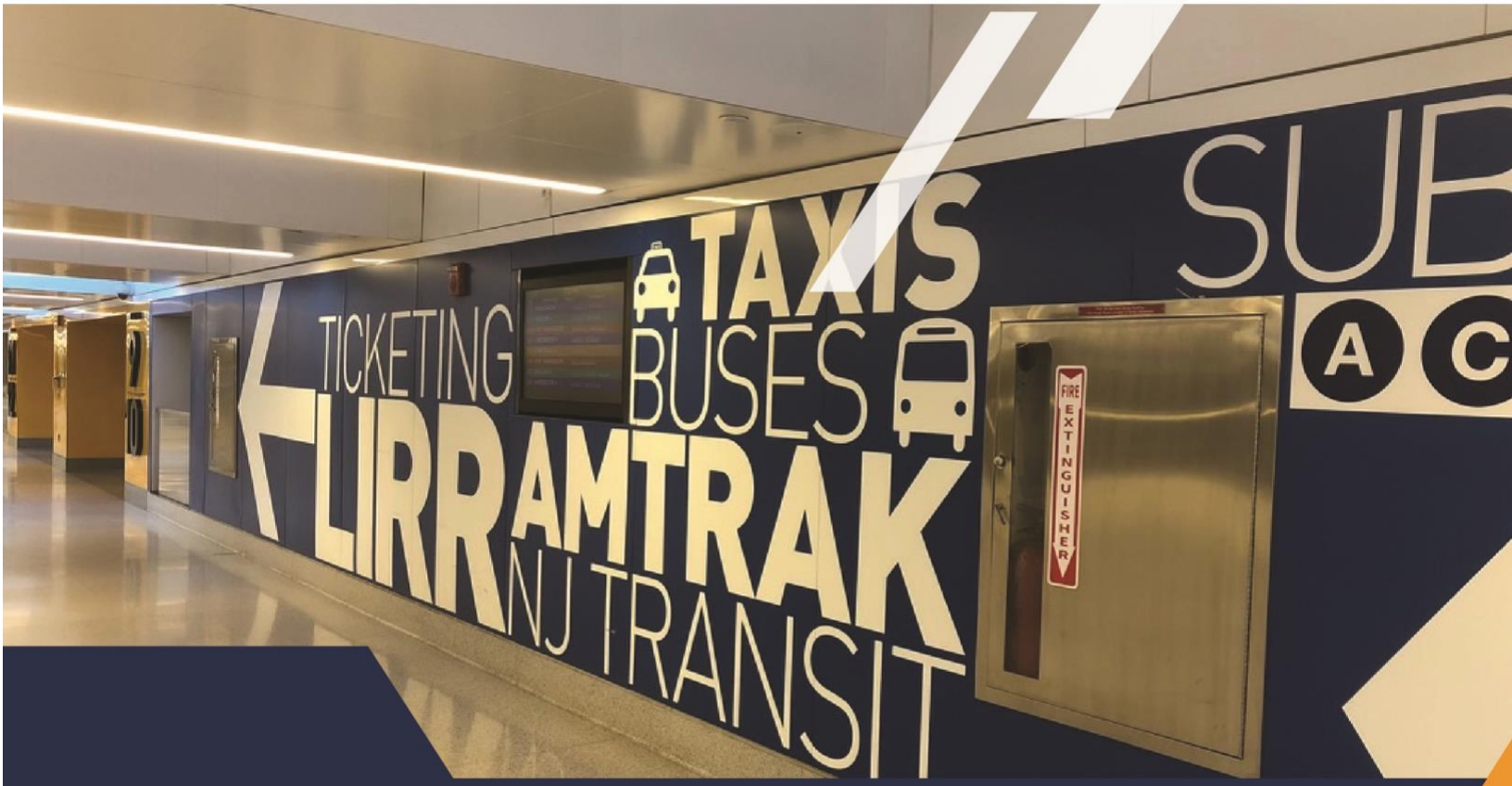
isUD
innovative solutions for Universal Design

DESIGN RESOURCE

3.1



Circulation

3.1 Wayfinding

3.1 Wayfinding

1. Overview

Well-designed wayfinding systems have a positive impact on occupant health as well as long-term building performance. Although all building occupants benefit from good design for wayfinding, for some populations, it is critical for independent use of building and social integration. Understanding the basic principles of wayfinding design, particularly for these groups, is therefore a critical aspect of universal design. This design resource focuses on the architectural aspects of wayfinding design. Signage is another key issue that is addressed in a separate resource.

Good design for wayfinding is vital to universal design because it

- facilitates access
- reduces the need to be dependent on others
- reduces the fear and embarrassment of getting lost
- supports exploration and engagement with others
- enables understanding and awareness of buildings and the activities within them

Legible surroundings promote “emotional satisfaction, the framework for communication and conceptual organization, (and bring) new depths to everyday experience” (Lynch, 1960). By reducing confusion and mistakes in finding locations and understanding the location of key resources, a thoughtful architectural wayfinding system can save time and money in building operations. It can also help prevent accidents while reducing stress and boosting health and productivity (Evans & McCoy, 1998). According to Weisman,-“(t)he ability to find one’s way into, though, and out of a building is clearly a prerequisite for the satisfaction of higher goals.” Weisman argued that “‘legibility of an environment – the extent to which it facilitates the process of way-finding” has significant behavioral consequences (Weisman, 1981). These consequences are predictable and can greatly improve user experience. Recently, the epidemic of violence in schools and other buildings and the increased risk of natural disasters due to climate change have elevated the importance of good wayfinding. Understanding one’s surroundings and knowing escape routes and safe locations in an emergency can make the difference between life or death.

Table 1 in Appendix A, illustrates the building components and characteristics that make the built environment more understandable (Arthur & Passini, 1992).

It is useful to conceptualize wayfinding as three activities when designing buildings:

Orientation - knowing where one is with respect to a whole building and the world around us. You Are Here (YAH) maps are useful for providing support for orientation. Some people are very good at keeping track of their movements with respect to the cardinal points of the compass so they have a good sense of where they are in a building or site at all times. Views and plans that are aligned with the cardinal points are useful to support this type of orientation.

Navigation – getting from place to place. With the development of GPS, we have become increasingly reliant on linear route guidance outdoors. But the GPS does not work indoors. Systems are under development for indoor guidance, and some large buildings like shopping malls have apps that provide guidance. But, for the most part, we must rely on directions provided by others, memory and directional signs to get from

place to place. Memorable features of buildings, like prominent intersections, landmarks like art work or water features, and differentiated pathways (e.g. wide versus narrow corridors) help us remember routes.

Destination verification – checking to determine if one has arrived at the desired destination. We use rooms signs, visible activities, people, furniture and equipment and other features associated with specific uses for verification. For example, we know we have arrived at a radiology department of a hospital if we see a sign that says "X-Ray" but even without a sign, we know we have arrived a hospital cafeteria if we see food service and dining activities. Thus, exposure to activities in a building can be very helpful for this activity.

Many people have difficulty with one or more of these activities. In particular, people with visual impairments who cannot see the typical cues and information used in wayfinding tasks, and people with cognitive impairments that impair long memory. Universal design strategies can address sensory limitations by providing information through multiple information modalities, for example, sight, sound, and tactility. They can also increase "signal strength", for example, by increasing the size and contrast of signs, employing significant differences in walking surface materials, and including unique landmarks like special views, artwork and memorable experiences at key locations. All three activities need to be supported because each one may be the weak link in a chain.

2. Issues to Consider

Plan configuration and visual access: General knowledge of familiar floor plans and building layouts help people to orient themselves in unfamiliar settings (Baskaya, Wilson, & Ozcan, 2004). E.C. Tolman found that using familiar schemas "enabled participants, with limited spatial knowledge, to find their way with few errors, and the participants learned routes relatively well in spite of their low level of experience" (Baskaya et al., 2004).

Typical schemas include:

- Geometrical symmetry (e.g., circular or linear)
- Continuity of floor plans from level to level
- Simple corridor and central atrium systems

These plan configurations are easy to remember and improving users comfort and ability to orient themselves in unfamiliar spaces (Canter, 1975; Goltsman & Iacofano, 2007; Lawton, Liebowitz, & Charon, 1970).

Providing visual access (prospect) is an important element when facilitating spatial orientation (Baskaya et al., 2004). Carpman, Grant, and Simmons found that visitors entering a hospital were influenced more by visual access to a destination than by signs, illustrating the strong influence the physical environment and architectural features have on wayfinding behavior (Baskaya et al., 2004; J.R. Carpman, M.A. Grant, & Simmons, 1986). Geometrically simple floor plans help to improve visual access of one's surroundings, which is difficult to achieve with plans that are complex (many turns and decision points). This same principle can be applied to 3-dimensional space. Overlooks, atria and other volumetric features can increase visual access to places and activities in a building.

Maps and Models: You Are Here (YAH) maps are very useful to help people in any building orient themselves at an entry or central space. They should be provided in prominent locations and aligned with the plan of the building. YAH maps can be tactile as well as visual using raised

line drawings. Scale 3 D models can be even more effective because they are memorable and invite tactile exploration. New technologies exist that can integrate audible and even refreshable Braille output as well as visual and basic tactile information into raised line drawings and models. These devices can provide a lot more information than a traditional visual YAH map or model (Landau, Subryan, & Steinfeld, 2014).

Interior Design: Interior design features that optimize wayfinding (e.g. lighting, color, materiality, artwork, flooring, and furniture layout) should accompany plan configuration and visual access schemes. These features can be easy to implement, cost effective, and can facilitate an "awareness and understanding of path systems, establish interior landmarks, and link interior directions to a larger orientation system" (Steinfeld, Maisel, & Lavine, 2012). By creating "districts" (i.e. identifying a space used for a specific function with a consistent color or floor type), wayfinding becomes more intuitive without the necessity of relying solely on graphics or signs.

Users that have visual impairments or who do not speak the native signage language rely on interior features to "prompt turns or mark distances along path segments," making the placement of notable landmarks at "nodes" (major intersections) an effective strategy for navigation (Golledge, 1999), (Lynch, 1960).

Although texture and pattern can successfully be employed as a means of spatial differentiation, designers should use restraint to avoid causing overstimulation (Steinfeld et al., 2012). Too many features competing for attention make it difficult to distinguish one place from another and remember key locations. For individuals with certain visual impairments or those taking psychotropic medications, these conditions may also cause a false perception of depth or a misinterpretation of cues (Steinfeld et al., 2012). Further, "excessive use of pattern may cause agitation and overstimulation for those with dementia" and other neurological impairments (Steinfeld et al., 2012).

Signs and room numbers: Signs play an important role in wayfinding systems and should serve to compliment and reinforce the interior design and architectural wayfinding elements. All wayfinding signs should follow a consistent graphic format that is readable and legible to all users, and should be placed at consistent locations throughout the facility (Goltsman & Iacofano, 2007), (Steinfeld et al., 2012). The presence of effective sign systems, "significantly reduces perceived crowding, discomfort, anger, and confusion" (Wener & Kaminoff, 1983), (Steinfeld et al., 2012).

Multisensory wayfinding information: Visitors to unfamiliar sites can easily overlook navigational cues. To better communicate information to everyone, especially those with perceptual impairments, "providing more than one 'channel of information' supports more functional wayfinding" (Steinfeld et al., 2012).

As an example of redundant cueing in the vision sense only, a multi-level building could have signs identifying each floor with a large number, a consistent color, and an easily recognizable symbol (Goltsman & Iacofano, 2007). This provides people with varying levels of cognitive and visual abilities "identifiable signs that are recognizable without necessarily understanding the text" (Goltsman & Iacofano, 2007).

Although the most common form of navigational cueing is visual, other means of cueing such as acoustic, olfactory, and tactile (haptic) can help reinforce and enhance navigational information.

- Sound cues can provide information "to more diverse groups than standard graphic signs" (Steinfeld et al., 2012). They can include automated recorded announcements, music, water features, and variations in reverberation and absorption levels (Steinfeld et al.,

2012). To avoid sonic information from being overwhelming, leading to excessive noise, and decreased awareness, Steinfeld et. al. suggests limiting it to the most useful information or providing selective channels of information accessible through headsets for individuals, like staff members, that may require information that isn't relevant to the general public but may be useful to specific individuals (Steinfeld et al., 2012).

- Olfactory cues can be easily implemented with fragrant plantings or gardens, building materials like cedar or odiferous wood or food service and preparation facilities (Steinfeld et al., 2012). These and other features with high olfactory content can reinforce awareness of surroundings, aid in describing routes, and provide strong landmarks for orientation, with relatively low associated costs (Steinfeld et al., 2012). They also tend to have strong related visual features as well.
- Tactile signs are a common means of providing information to people with limited vision, but the space required to communicate information through tactile means using raised letters often exceeds the space available. In these situations, audible signs are more efficient (Steinfeld et al., 2012). Raised characters are required by accessibility codes but only in limited locations, e.g. room numbers, restroom labels. Although Braille is also required, only a small percentage of the population with visual impairments can actually read Braille.
- Tactile cues provide an intimate relationship with the environment in a more passive way than signs. Curbs, railings and guard rails, floor surface changes and vegetation edges are all good examples of tactile cues. Code requirements for tactile cues are minimal but they can be very effective in helping individuals with limited sight understand their surroundings and avoid hazards. Typically, they also serve as visual cues and can also contribute to olfactory and sonic information.

The most functional wayfinding system for the widest range of people will use multi-sensory cues at major nodes, and decision points. For example, a player piano can act as a visual, acoustic, and tactile landmark. Paired with fragrant plantings, the designer can achieve cueing all of the senses used for wayfinding (Steinfeld et al., 2012).

3. Related Standards

2010 ADA Standards for Accessible Design: Section 703 - Signs defines the *minimum* sign regulations for tactile and visual signs in the United States. It addresses character size, stroke thickness, spacing, contrast, finish, tactile characteristics, symbols, and location.

ISO 16069:2004 Graphical Symbols -- Safety signs -- Safety way guidance systems (SWGS) describes the general design and application principles relating to visual components used when creating a safety way guidance system (SWGS). These principles are valid for electrically powered and for phosphorescent components, while providing information relating to environment of use, choice of material, layout, installation, and maintenance.

ISO 17398:2004 Safety colors and safety signs -- Classification, performance and durability of safety signs describes requirements for a performance-based classification system for safety signs in terms of expected service environment, principal materials, photometric properties, means of illumination, fixing methods, and surface.

ISO 23601:2009 Safety identification -- Escape and evacuation plan signs lists design principles for signs identifying emergency escape plans that contain information on fire safety, escape, evacuation, and rescue.

Society for Experiential Graphic Design (SEGD) is an association of design professionals that exists to educate, connect, and inspire a global multidisciplinary community through graphic and informational design. The Society has many best practice examples and resource articles on its website.

4. Measurement and Verification

Post-occupancy Evaluations (POE) can help ensure continued efficiency of wayfinding systems. POEs must target information from a diverse group of people, including people with varying visual, cognitive, and physical abilities. Every facility having undergone substantial renovations or additions should have a policy that mandates POEs at least every five years.

5. Design Considerations

i. *Facility has circulation spaces that adhere to recognizable organizational concepts (e.g. linear, radial, grid, axial, central atrium, etc.).* The use of common floor plans provide recognizable and easy-to-understand structure for the visitor (Steinfeld et al., 2012). Revisions to floor plans at later stages of design can often be difficult and costly, making it important to implement this solution as early as possible in the design process. *See Appendix A, Figure 1*

ii. *Facility has similar plans for most floors and/or similar locations for toilet rooms, drinking fountains, elevator lobbies, and emergency exits on each floor.* Historically, architects have sought to hide service elements and amenities, believing that they distract from a strong aesthetic statement; however; visibility of these elements in a consistent location on each floor can serve as an effective wayfinding tool (Steinfeld et al., 2012). This allows visitors to better orient themselves on each floor as well as well decrease stress when searching for a restroom, drinking fountain, or exit. Good design can make these elements an important part of the aesthetic statement as well as a strong wayfinding element through the use of material, color and graphics. *See Appendix A, Figure 2*

iii. *Wayfinding system provides access to areas of primary function without passing through other spaces and without unnecessary travel to remote areas.* Floor plans with clearly identified corridors and entry and exit at the same point help to avoid unnecessary traffic in non-circulation areas (Goltsman & Iacofano, 2007). Spaces that are likely to see a higher volume of users should be near a primary entrance and highly visible to avoid unnecessary travel through the space. *See Appendix A, Figure 3*

iv. *Wayfinding system differentiates primary routes, zones, or nodes using variations in flooring, lighting, color, ceiling height, and/or other architectural features.* Multimodal cues used to identify specific spaces and pathways serve to highlight these spaces, making them identifiable for individuals with varying levels of perceptual abilities. This makes wayfinding more inclusive and intuitive.

v. Example: All primary circulation routes have a consistent and unique floor material, wall color, lighting system, and ceiling height. Art and decoration can be introduced to create a strong sense of direction.

vi. *Wayfinding system assists in orientation and navigation by providing periodic views to the outside along primary routes.* Particularly effective when paired with an intuitive floor plan, views to the outside along primary routes allow visitors to orient themselves

directionally and relative to large outdoor landmarks.

vii. *Wayfinding system uses a consistent graphic strategy to identify and differentiate routes, rooms, and spaces.* A consistent graphic strategy for identifying routes, rooms, and spaces enables the user to learn the applied strategy, helping them to locate and identify wayfinding signage and graphics throughout the facility.

viii. *Wayfinding system includes tactile guide strips on primary routes that have a different color and texture than the surrounding floor and detectable warnings.* Tactile guide strips are required by codes in some countries. In those locations, they will be familiar and easy to use for many, particularly those that are significantly visually impaired (Steinfeld et al., 2012). The use of varied colors and textures reinforce the tactile cues and make them helpful for all facility users. They should be used sparingly to mark only important routes otherwise they lose their meaning. And they should not lead people with visual impairments into a dangerous location (e.g. edge of boarding platform in a subway system). *See Appendix A, Figure 4*

ix. *Wayfinding system includes visual and tactile and/or audible directional signs, maps, or models at all primary entrances, the primary access point to each floor, and/or corridor intersections.* You-are-there maps and directories are valuable for helping visitors to buildings and sites understand their surroundings. They are especially valuable in complex buildings or campuses. These wayfinding tools help the visitor and even long-term occupants to establish strong “mental maps” of the location that can be used to recall locations and remember how to get from one point to another. To be useful for all visitors, they need to provide information in visual, audible and tactile form. New technologies are emerging that provide inexpensive multisensory displays. Multi-sensory maps and models are also engaging and interesting to people so they invite interaction, promoting a better understanding of a place. *See Appendix A, Figures 5 & 6*

x. *Wayfinding system includes systematic numbering of rooms. See Appendix A, Figure 7*

6. References

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7. Appendix A

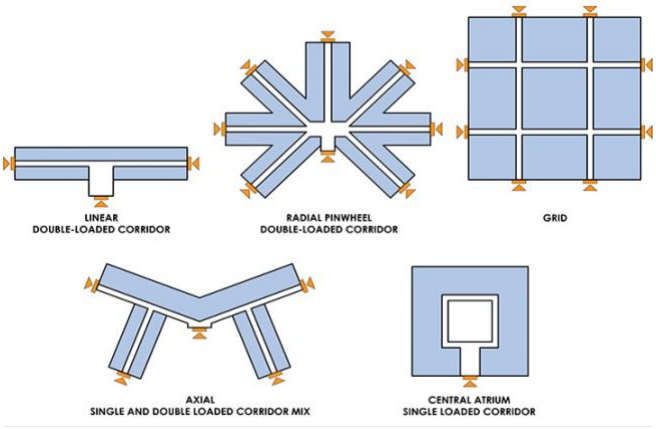

Figure 1: *Conventional organizational concepts*

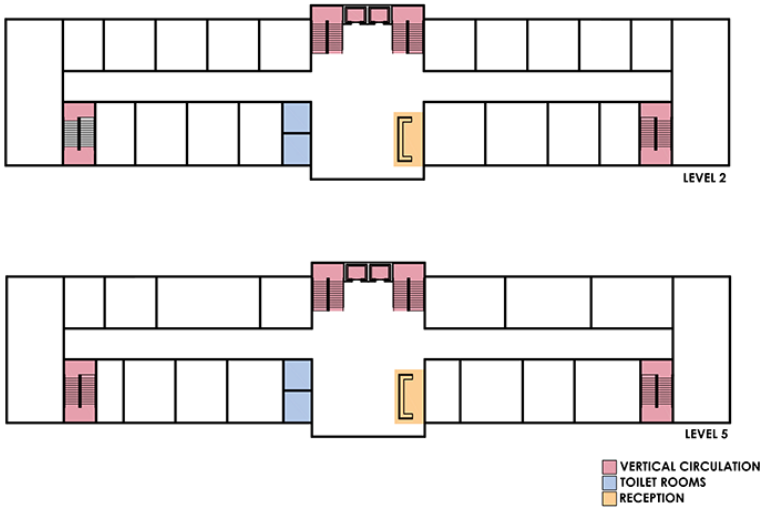

Figure 2: *Similar floor plans on each level*

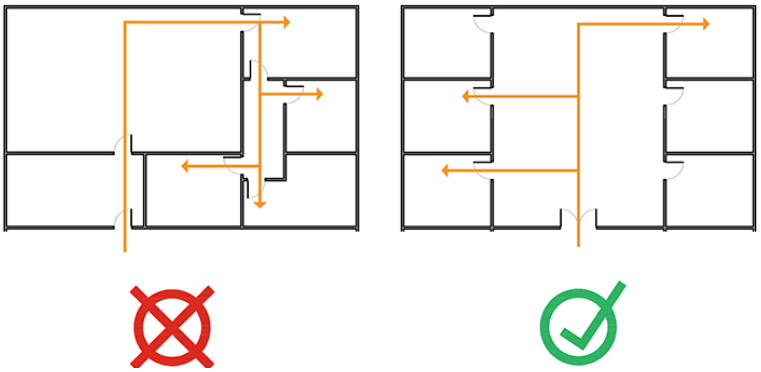

Figure 3: *Circulation routes*

Figure 4: *Tactile ground guides*

Figure 5: *Top Left: Backlit multisensory interactive map that provides tactile map, audible, and visual information.*

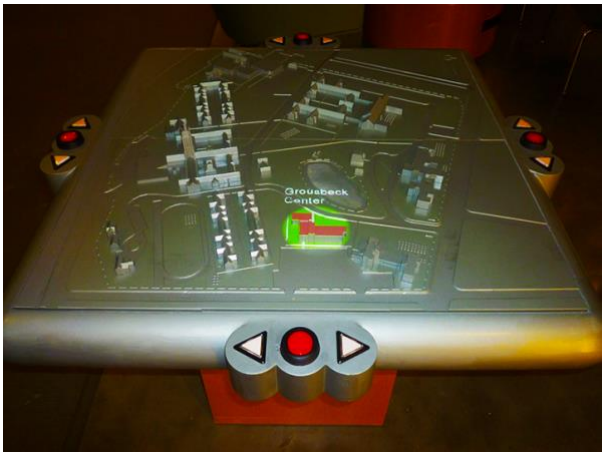

Figure 6: *Multisensory interactive map that provides tactile map, audible, and visual information projected from above.*

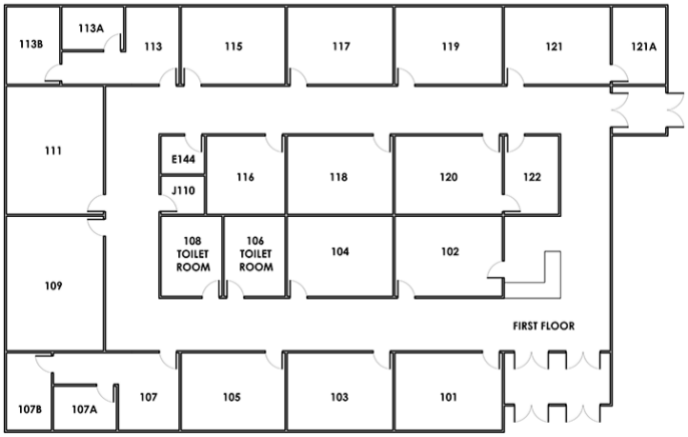

Figure 7: *Systematic numbering of rooms. Notice the rooms are numbered such that odd numbers are on one side of the hallway and even numbers are on the other*

Table 1: *Building components and characteristics for supporting wayfinding*

Objective	Components	Elements
Clear articulation and coherent grouping of exterior and interior spaces	Shaping site and setting	Landscaping, berming Roadways, entrances/exits Pedestrian routes sidewalks, pathways
	Building form and architectural features	Building form Building volumes Physical separation or clustering of components Roof design Placement of openings Cladding (skin) - textures, materials, colors Decoration, ornamentation
	Articulating interior spaces	Programmatic organization Defining spatial units Defining destination zones Interior design
Creating legible circulation systems design	External and internal circulation systems	Design concepts (paths, markers, nodes/Intersections, edges/links) Approach from street Roadways Parking External paths and walkways Entrances and exits Connection to mass transportation
	Level change devices	Elevators Staircases Escalators
	Internal transportation	Mobility aids People movers Fixed rail systems
Integrating Communication Systems	Information wayfinding design	Environmental graphics Sign orientation devices 'You are there' maps Real-time information devices