A PLAYGROUND FOR THE ENTIRE COMMUNITY: THE DESIGN OF MAGICAL BRIDGE PLAYGROUND

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Universal Design is about creating an environment that can be accessed, understood and used to the greatest extent possible by all people, regardless of their age, size, ability or disability.

Disability Act (2005)

INTRODUCTION

Through the use of Universal Design, Magical Bridge Foundation (MBF) has become a pioneer of innovative playgrounds and playground equipment for all individuals. In doing so they have created a national movement to shift playground design from “accessible for people with physical disabilities” to “genuinely inclusive for all people.” While the Playground feels magical to many, it wasn’t created by magic! This white paper articulates the design and development process that was used to create the first Magical Bridge Playground in Palo Alto, CA.

LEGAL DEFINITIONS OF ACCESSIBILITY ARE NECESSARY BUT INSUFFICIENT

Inclusion is a term used to define equal opportunities for interaction by all people. This principle was an outgrowth of the landmark civil rights case Brown v. Board of Education that stated, “separate is not equal” which subsequently led to the end of desegregation of schools based on race. This idea was then applied to the desegregation of schools based on disability status. For both race and disability the case meant that all free individuals must be afforded equal opportunities to participate in community and society inclusively. At that time disability was most often associated with severe disabilities such as limited intellectual capacity, blindness, deafness or one who is mobility impaired and usually with a wheelchair.

Since then, the desire to promote equality for people with disabilities has expanded legal protections. These legal mandates such as the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act are designed, in part, to promote ‘access’ and ‘accessibility’ through architectural design. Like Brown vs. Board of Education, they were originally conceived for people with the most severe disabilities. Over the last two decades the intent has expanded to cover a broader spectrum of disability including invisible disabilities such as dyslexia and autism. Stemming from early concepts of severe disability. However, the terms ‘access’, ‘inclusion’ and ‘disability’ are not necessarily applied to cover the full scope of people with disabilities. Subsequently, the compliance guidelines have been operationalized accordingly. Therefore, a legally compliant and “accessible” playground is considered by law to be one where “everyone” can get to and through the playground.

Legal protections have had a positive impact on the lives of people with mobility and sensory impairments. Until recently they were met with seen and unseen barriers of every kind in the pursuit of a meaningful and productive life. Yet society has also recognized that disability impacts one in five individuals and can occur at any time during the lifespan in a myriad of ways: cognitively, emotionally, psychologically and physically. With an emphasis on architectural access to those with mainly sensory and physical impairment, many people with disabilities are still excluded by what are considered legally accessible and inclusive spaces. Everyone cannot get to and through a structure or participate in the community even when it is designed as legally compliant.

Narrow concepts of disability do not promote access for everyone and fall well below society’s requirements for genuine inclusivity. This is certainly true of those playgrounds that are considered to be compliant according to federal guidelines. This is also true of the play equipment that is considered to be compliant and accessible. The concept of accessibility has led society to retrofit spaces, tools and equipment based on the idea of an average person. Unfortunately, the average person is
a mythical aggregate of all people that does not exist (Rose, 2016). Caesar McDowell (2018) goes further and states, “What we tend to do in society is design for the group in the middle and forget about the margins; when we design for the margins the middle is included as well. It’s counterintuitive and yet makes perfect sense in both social justice and business.” This is precisely how most legally compliant playgrounds are designed. They contain play equipment and structures as well as layout that are designed for what we call typical and are then retrofitted for what is commonly referred to as atypical. When accessible play equipment is alongside inaccessible play equipment even at the same park, children with and without disabilities are still separated and treated unequally. If individuals with and without disabilities are even 10 feet away from one another because they can’t enjoy the same equipment of activities together, they are separated and social engagement is less likely to occur. This defeats the spirit of the mandates that promote access in order to foster inclusivity.

Unless the same equipment and spaces are designed from the beginning to be appealing and available to all individuals, genuine inclusivity cannot occur. Curb cuts and ramps were designed for wheelchair access but are now used by more people with other kinds of wheeled devices. They can replace stairs as a form of entry and exit for a greater portion of people. Speech to text dictation was invented for those with motor and visual impairments but is now used by many instead of typing and no longer considered “for those with disabilities.” Elise Roy, noted attorney and advocate states, “when we design for disability, everyone benefits (TED talk, 2016).” In other words everyone benefits when we design the same tools, the same devices, the same playground and the same playground equipment, as opposed to separate pieces of accessible equipment. McDowell states that disconnections in design stand in the way of democracy and today’s global social movements. This is the precise concept of Universal Design (UD). No one will argue that the requirements of access are a necessity, but the manner in which it is operationalized is insufficient to promote authentic inclusion of all individuals. Authentic inclusion must not only include all aspects of disability, but all people. Playgrounds and public parks hold significant academic, social, emotional and developmental benefits for all individuals. Designs for people without disabilities even when retrofitted to conform to access requirements, are often still exclusive. Universal Design assumes the wide range of human ability is ordinary, not special (Ostroff, 2001). This awareness was powerful enough to launch a new vision of inclusion at playgrounds; one that set the bar high for access and expanded the idea of equality.

**The Hope for Authentic Inclusivity**

Magical Bridge Playground was created when Silicon Valley mom Olenka Villarreal discovered that legally compliant public playgrounds still were smaller and very far apart. A child of 12 years of age and size may need the vestibular stimulation that others needed when their bodies were smaller at perhaps six or seven years old. Playgrounds most often continue to be designed so that individuals fit into the developmental expectations of a certain age group. Therefore, the pieces of equipment that are potentially valuable to physical development such as the swaying allowed in bucket swings, are no longer accessible to older individuals because of physical growth. As a parent of a child with disabilities, Villarreal had learned a great deal about intellectual and physical
development. She recognized that for many adults with disabilities physical, motor and cerebral stages plateau early, but critical movement and stimulation are still needed throughout their entire lifetimes. Where were they to go to get this level of movement and stimulation without use of a healthcare system? It became clearer to her that most playgrounds and spaces are typically designed for very young children or middle teens (e.g., skateboard parks) and are not designed to be used across the lifespan. This limits healthy lifelong development. Villarreal believed that through intentional and mindful playground design, our communities held the potential to promote authentic inclusion, improve access to developmentally appropriate play and advance health equity for all individuals.

The founder envisioned a playground design that was genuinely accessible and inclusive to the largest population of people. A playground that truly “everyone” could reach and that blended individuals seamlessly into the community. This meant the design of a playground, structures and equipment that truly manifested the term “separate is not equal.” In their minds it would not be enough to have one play structure for people with physical disabilities that no one else wanted to play on. Play structures needed to be enjoyed by both individuals with and without disabilities to foster opportunities for engagement with one another. The range of disability needed to include a range of populations such as those on the autism spectrum or profound mental and physical retardation over the lifespan. A playground was imagined that promoted inclusivity for as much of the population as possible and one that created community among people of all ages, sizes and all abilities. Soon this led to the beginning of the iterative design process and visions that paralleled the framework of UD. Villarreal articulated core goals and values for their work. With the support and encouragement of the City of Palo Alto, she mobilized a team of volunteers over the course of seven years with the goal to “create a place so magical that everyone in the community would come together to play.” Searching the internet didn't produce any examples of playgrounds that inspired her so the team shared their initial ideas with landscape architectural firm Royston Hanamoto Alley and Abey. They provided initial drawings of what would ultimately be finalized and brought to the finish line by architect Peter Jensen who is now the lead architect and designer of all Magical Bridge Playground projects.

**The Magical Bridge Founder’s Core Goals and Values**

- This new type of playground would:
- Be fully accessible to all people regardless of ability or disability
- Be fun, beautiful and engaging
- Promote inclusive interaction between people of all abilities and ages
- Provide zones that foster developmental growth and predictability
- Create community

**Iterative Design Process and Universal Design**

**Phase I. Discovery**

The iterative design process is one that begins with deep empathy for the users of the design. In the iterative process, new constraints, ambiguities and contradictions are revealed through a series of activities, which can then lead to revised problem scoping and improved design solutions (Wong & Park, 2010; Bae, Ofiesh, & Blackorby, 2018). Iterative design addresses design problems that are ambiguous with multiple solutions and those which are insufficiently solved by linear problem-solving methodology (Wong & Park, 2010). The iterative design process is particularly important for a project focused on the inclusion of people of all ages and abilities. It allows for new voices and perspectives to be continually added to the process. During the iterative design process, the design team for the Magical Bridge Playground was formed. It comprised inclusive play experts, educators, therapists, families living with various disabilities and leading architects. Through the Discovery Phase and review of research, greater understanding of the problem of authentic inclusion was gained by studying how individuals
engage with one another, as well as individual preferences for engagement at typical playgrounds. Additional information was collected and filtered in a continuous and iterative process of observation and discussions about user experience. All of this information was applied during Phase II while generating and evaluating possible solutions to identified problems and barriers to inclusion and access.

During the Discovery Phase, the team conducted research, interviewed parents of children with and without disabilities, and studied playgrounds of all types in Palo Alto and other California communities. The design team was interested in hearing from individuals of different ages, sizes and abilities about play and engagement at public playgrounds. Discussions arose about a range of playground surfaces (e.g., sand, gravel, bark or mulch). Individuals of varying ages and abilities discussed preferences for shade and sunlight. Others spoke of complications that arise getting in or on play equipment such as those with a raised platform (i.e., not at ground level) or a swing. Safety issues came up for all ages and abilities including perimeter fencing and the use of playground materials that are non-toxic but must be avoided by some who are medically fragile (e.g., sand or bark). Some parents and adults remarked that while playgrounds are a wonderful place to interact with others, they can also be overly stimulating, especially for those who prefer to play alone, quietly or at a slow pace. Caregivers of young adults and adults with physical and developmental disabilities commented on the high cost or limited availability of rehabilitation services or physical therapy, stating that some types of playground equipment could be a valuable replacement of these services if they were designed to accommodate older individuals. All of these voices contributed to the complex ways individuals in the community are left out of opportunities for healthy development. In fact, the team discovered that several common playground features excluded some community members or did not provide them with well-matched options for engagement.

In the Design and Visioning Phase, the team worked toward innovative solutions to issues that came up often in the discussions, in order to promote greater inclusivity for all individuals through the principles of UD.

A review of the available research on accessibility of playgrounds for people with disabilities confirmed these findings. In one study researchers studied 149 caregiver’s perception of accessibility of playgrounds for 2-5 year old children with disabilities. Caregivers indicated that their child with a disability could not fully participate in the playground’s offerings, felt that the playground was not appropriate for their child with a disability and dreamed of a fully inclusive playground that met their child’s needs (Stanton-Chapman, & Schmidt 2017). In another study, researchers investigated the inclusion of children with disabilities in primary school playgrounds and identified a number of barriers that hindered their experience of inclusion and engagement with peers, particularly with organizational and physical issues in the playground. Positively, the one consistent practice was the provision of ramps to increase physical access for wheelchair users (Wolley, Armitage, Bishop Curtis, & Ginsborg, 2005; 2006; Wolley, 2012). In a scoping review, Moore and Lynch found a total of 14 key articles around accessible playgrounds. Findings indicated that numerous environmental barriers can contribute to making playground environments inaccessible and unusable for many children, particularly children with disabilities. For example, while ramps increase physical access for wheelchair users, once to the playground most equipment is not usable for the wheelchair user. Regardless of what these findings tell us is missing, playground design is consistently identified as a significant factor in enabling inclusion (Moore & Lynch, 2015).

**Phase II. Visioning and Design: Applying Universal Design**

Following the Discovery Phase, the Visioning and Design Phase of the project began. Sobel and colleagues noted that in everyday contexts such as classrooms, homes and playgrounds, universal tools may be better than specialized tools to facilitate inclusive play of all children (Sobel, O’Leary, & Kientz, 2015). They began to think about ways to drive solutions in a systematic way within the iterative design process. To the greatest degree possible, the needs of individuals who were left out of the play experience needed to be addressed. This included adults and children with physical and cognitive disabilities, autism, visual and auditory impairments, the aging population and the medically fragile. The solutions had to address the myriad of ways that individual variation lives in everyone regardless of age and ability. Ultimately the design had to close the gap for those being left out of opportunities for healthy engagement and play across the lifespan. There was a strong commitment to the aesthetics of the overall space so that it was appealing to all users. In this process the team came to realize their vision aligned with UD, a global movement of inclusive design practice initiated at North Carolina State University, College of Design.

Universal Design is a paradigm that emphasizes the notion that if the variability of all users is recognized in the design process, the results become truly universal. The paradigm embodies the configuration of products and environments to be usable by
all people, to the greatest extent possible, without the need for adaptation (Center on Universal Design, 1997). The intent of UD is to simplify life for everyone by making products, communications and the built environment usable by as many people as possible at little or no extra cost. The social benefits of UD for a changing world are enormous. People are living longer as a result of medical advances and healthier lifestyles, including people with disabilities. The ability to live independently and with greater safety and ease of existence can be influenced by how we create environments.

The team committed to the seven core principles of UD to guide and design solutions to reduce or remove the challenges to inclusion identified through the iterative design process (UD Guidelines 2.0, Center on UD, 1997). These principles are also reflected in the nature, feel and experience of Magical Bridge Playground in Palo Alto and plans for future playgrounds. A description follows of how the seven principles of UD are uniquely embedded into the overall playground, its associated activities, structures and play equipment. The unique design elements and what the MBF calls the magic behind Magical Bridge Playground, are listed under the principle they best exemplify. It is important to note that while these design elements are listed by principle, each of the ideas address all seven principles to the greatest extent possible. To illustrate this concept one major design solution is presented on its own: Play Zones.

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<thead>
<tr>
<th>The Seven Universal Design Principles</th>
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<td><strong>Principle 1: Equitable Use.</strong> The design is useful and marketable to people with diverse abilities.</td>
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<td><strong>Principle 2: Flexibility in Use.</strong> The design accommodates a wide range of individual preferences and abilities.</td>
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<td><strong>Principle 3: Simple and Intuitive Use.</strong> Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills or current concentration level.</td>
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<td><strong>Principle 4: Perceptible Information.</strong> The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.</td>
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<td><strong>Principle 5: Tolerance for Error.</strong> The design minimizes hazards and the adverse consequences of accidental or unintended actions.</td>
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<td><strong>Principle 6: Low Physical Effort.</strong> The design can be used efficiently, comfortably and with a minimum of fatigue.</td>
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<td><strong>Principle 7: Size and Space for Approach and Use.</strong> Appropriate size and space is provided for approach, reach, manipulation and use regardless of user’s body size, posture, or mobility.</td>
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**The Universal Design of Play Zones**

One of the first unique design solutions that captured all of the seven principles was the layout of the playground through what MBF calls Play Zones. Play Zones are a significantly dynamic and unique feature of Magical Bridge Playground that contribute to the authentic inclusivity of all individuals through the use of scaffolds. In the fields of child development and education, scaffolding is the term used to refer to the level of support given to an individual when they are unable to accomplish a task on their own. The level is tailored to meet individual needs. The Play Zones are designed to be scaffolded through a variety of supports (Tolerance for Error). The activities, equipment and the actual concept of zones are intended to reduce or eliminate the challenges to inclusion that were identified early on. Activities and equipment within each zone are organized to promote the development of similar sensory-motor and cognitive skills (Simple and Intuitive, Perceptible).

In keeping with the framework of UD, Magical Bridge Play Zones are designed for all people regardless of age, size and ability (Equitable, Flexible, Size and Space, Flexibility). The zones are labeled in large font and Braille (Perceptible). Moreover, there are multiple levels of challenge and means of support throughout the zones (Equitable, Tolerance for Error, Low Physical Effort). The design of the activities and equipment nurture engagement between individuals of different abilities in similar activities. Zones also make clear choices of play and developmental activity possible (Equitable, Flexibility). For example, if one knows that they or their child avoid loud or fast stimuli, then the zones provide a clear path to the quiet zones. Children
can still learn from one another side by side or through observation from a quiet zone. Zones also facilitate interaction between individuals of all ages and abilities and remove the segregation that comes from the design of equipment based on typical developmental stages. In a review of research Frost and colleagues reinforced the critical role of play and playgrounds to healthy development. They determined that it is important to focus on individual levels of physical, social and cognitive development, rather than focusing on the actual chronological age and associated developmental age (Frost, 1998).

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<th>How Magical Bridge Playground Incorporates Scaffolding into its Design:</th>
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<td><strong>Equipment and Technology:</strong> The adjustability of inclusive activities and objects ensures more opportunities for successful interaction among individuals because their experiences are individualized, customized and motivated. These adjusted experiences consider individual abilities and needs (Sobel, O’Leary, &amp; Kientz, 2015).</td>
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<td><strong>Peer Interaction:</strong> Interaction with peers is an effective way of developing skills and strategies. Cooperative learning enables less competent individuals to develop with help from more skillful peers (Vygotsky, 1978).</td>
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<td><strong>Adult Engagement and Support:</strong> Adults provide explicit support to others by teaching social and emotional skills concepts directly. They also provide physical and language tools to use during the playground experience. The goal is to generalize these skills and concepts to natural settings (Sobel, O'Leary, &amp; Kientz, 2015)</td>
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Play Zones

At the Magical Bridge Playground each child can enter their “Zone of Proximal Development” (Vygotsky, 1978) providing the right level of challenge with the right level of support to enable growth. The Zone of Proximal Development has been defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978; McLeod, 2012). Vygotsky believed that when a child is in their zone for a particular task, providing the appropriate assistance will give the child enough of a "boost" to achieve the task. This assistance, or “scaffolding” is provided for those elements of the task that are initially beyond the learner’s capacity, thus permitting the child to concentrate upon and complete only those elements that are within their range of competence. (Wood, Bruner & Ross, 1976). To allow for a variety of principles to be applied such as Equitable Use, Ease of Use, and Flexibility in Use, scaffolding can be accomplished through equipment design, technology, peer interaction, and support from parents or caregivers.
**Swinging Zone.** A time-honored tradition of childhood, swinging is a fun, freeing experience that lets you soar high above your surroundings. Magical Bridge Playground provides regular and accessible bucket swings for individuals who need additional support and disc swings that allow for different body positions and sizes. Swinging provides stimulation of the vestibular system, the sensory system that contributes to balance and spatial orientation, for the purpose of coordinating movement with balance. Swinging also provides proprioceptive input, sensations from joints and muscles through pushing or pulling heavy objects including one’s own weight. It also soothes, relaxes and increases concentration. Swinging can be a cooperative activity where children take turns pushing and swinging with their peers and can also involve parents and caregivers. This need for movement continues throughout life and is especially crucial in the developmental years, but it is essential throughout our lives to support self-regulation (Aratani, Macedo, Heloisa, & Cananca, 2010).

**Sliding and Climbing Zone.** Sliding and climbing are also core play activities in most playgrounds and provide exhilarating challenges with a variety of height, speed and tests of competencies. Sliding and climbing are accessible activities at Magical Bridge Playground adapted to wheelchair users and people with mobility challenges. Along with swinging, sliding and climbing activates the vestibular systems as well. It develops people’s sense of competence and resilience in the face of fear, all in a safe and secure space.

**Toddler Area Zone:** Magical Bridge Playground has created a small, self-contained area that is right sized and developmentally appropriate for toddlers. Toddlers can engage with equipment that is developmentally appropriate and accessible to them and their caregivers, regardless of ability.

**Music Zone.** The centerpiece of Magical Bridge Playground, the music zone is an innovative artist-designed 24-string laser harp that can be activated by moving underneath it, through standing, running, wheeling, sitting or gesturing. The design allows for people of many sizes and abilities to play with the harp. This harp, created by Jen Lewin Studio, won a CODA (Collaboration of Design and Art) WORX award in 2015. Lewin states, “The Magical Harp is a permanent, outdoor interactive instrument played by passing your body under low-voltage diode LEDs that shine from the top of the delicate arch to the
ground. Much like plucking the string of a harp, passing under the beams triggers circuitry and sensors to produce musical notes. Users play to create an ambiance that is individual to the moment of interaction that reflects a broad idea of play that’s still fun and sophisticated. When crowds flock to it and people start to play independently, the group’s participation is a musical symphony.” Music is essential to being human; it stimulates may parts of the brain (Brandt, Gebran, & Slevc, 2012; Anvari, Trainor, Woodside, & Levy, 2002). In children it motivates interaction, facilitates socialization, and improves social skills (Ribblatt, Longstreth, Hokoda, Cannon & Weston, 2013). Research literature has shown that music and language development are indistinguishable during the early stages, and only in later stages do they become more diversified. The implication is that in order to enhance the learning of either or both, music and language should be closely related (Chen-Hafteck, 1997). For individuals who have difficulty expressing themselves verbally, music provides a different avenue for expression (Hoskins, 1988). Music has long been used in speech and language therapy, early intervention and rehabilitation contexts (Aldridge, Gustorff, & Neugebauer, 1995; Edgerton, 1994). At Magical Bridge Playground music provides another form of playful engagement and the option to incorporate necessary development into play.

**Spinning Zone.** Spinning is a fun and stimulating activity that children naturally gravitate to and one that playgrounds usually facilitate. It supports the natural development of the sensory and balance systems. It can provide rotary vestibular input, a powerful form of sensory stimulation. It is often used in occupational therapy to stimulate the development of the vestibular system in children with sensory integration issues and developmental delays. The equipment in the Spinning Zone is designed for all ages, sizes and abilities.

**Playhouse and Playstage Zone:** At Magical Bridge Playground a custom-designed, fully accessible playhouse and playstage provide opportunities to engage in pretend play with other children. The playstage also provides a focal point for community gatherings and performances. Researchers have found growing evidence to suggest that high-quality pretend play is an important facilitator of perspective taking and later abstract thought. Pretend play may also facilitate higher-level cognition. Bergen (2002) reports clear links between pretend play and social and linguistic competence. Undirected play allows time for peer interaction which enhances social-emotional learning (Ginsburg, 2007) and promotes working in groups, sharing, negotiating, resolving conflict and learning self-advocacy skills.
The Playhouse and Playstage

**Kindness Corner Zone:** Unique to Magical Bridge Playground and the cornerstone of its purpose, the Kindness Corner is a gathering place for reflection, education and compassion. Magical Bridge Playground creators state that “It is intended to spark conversations and lessons about making friends with someone who is different, modeling inclusive behavior and encouraging kids to be up-standers to bullying.” Researchers have found that peer and cooperative play provide children opportunities to reason about others’ feelings, possibly serving as a unique mechanism for empathy development (Brownell, Zerwas & Balaram, 2002). Magical Bridge Playground has “Kindness Ambassadors,” volunteers of all ages that circulate in the park encouraging cooperative play and understanding of differences. To extend the impact of the Kindness Corner, MBF is creating a curriculum for children in elementary and middle schools as well as projects on Magical Bridge Playgrounds.

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**Universal Principles for Greater Access**

**Principle 1: Equitable Use**

**All ages and abilities:** The notion of equitable use resonated with the founder of Magical Bridge Playground. She was inspired by European parks as gathering places for the community, where all ages come together around a central square. Villarreal was influenced by European concepts of mixed age communities where individuals of all ages and abilities interact in meaningful ways through community centered institutions, in particular, the Scandinavian concepts such as community centered living, which integrates elders and youth as integral members of the community. The design is intended to promote
human connections between people of all ages. “Community-centered living breaks down the walls of separation that threaten to isolate our elders from their neighbors and friends. It allows those who are limited physically or mentally to stay naturally connected to society, while residing in a safe, welcoming environment (Carella, 2017).” At Magical Bridge Playground, everyone in a community benefits from the elimination of social stigmas and prejudices around disability, and this naturally happens when people of all abilities have the chance to play together.

**Access to all areas of the playground:** To address the barriers created by paths and surfaces, Magical Bridge Playground’s landscape is designed to have multiple access points and types of paths. Smooth, flat surfaces allow easy wheelchair access. Areas flow from one to the other with wide central paths. Access to play zones are provided through multiple means including paths, ramps and stairs.

**Structures and equipment designed for range of ability:** In the Magical Bridge Playground, the structures and equipment are all designed to be usable by all people regardless of ability. The priority is to have each piece of playground equipment universally designed, rather than separate, unequal pieces of equipment. In other words, they sought to create the same structures and piece(s) of equipment whenever possible. When the same equipment was not possible, they incorporated equipment that provides an equivalent experience into the zones. For example, Barbara Butler Artist-Builder, Inc. created Magical Bridge Playground’s first wheelchair-accessible, two-story playhouse and treehouse, custom designed to provide access through bridges and ramps. Once inside the structures, the design considers use by all users. Magical Bridge Playground has a fully accessible slide mound with multiple means of access, and many different types of slides. The slide mound enables wheelchair users and those with mobility devices to reach the top of the slide without climbing stairs or ladders. The experience of swinging is made accessible by providing bucket swings that provide more support for toddlers and individuals with physical disabilities. Disc swings can be accessed by laying down, sitting or standing. Bucket swings support not only toddlers but the teens and adults who also enjoy and often thrive with swinging movements. The supportive bucket seats make swinging comfortable for all. A sway boat provides wheelchair access onto the boat and a place for a wheelchair user to sit in the midst of the action with all of the children.

**Principle 2: Flexibility in Use**

**Slide with Dignity Landing:** The fully accessible slide provides a “Dignity Landing” enables children using wheelchairs to wait safely to the side once they have gone down the slide while their chair is brought back to them. Some playgrounds have included ramps to allow people with mobility devices to access slides. However in most cases, after going down the slide, the child (or adult) must wait until an attendant can bring a mobility device to the person to remove them from the end of the slide. This can be disruptive and potentially traumatic if a person is blocking the flow of play on the slide during this time. The Dignity Landing is an example of a design created for people but used and enjoyed by all. In fact, the slide with the Dignity Landing is the most used slide by small children with and without disabilities, because the rollers control the speed allowing them to descend slowly. Patents on the landing are held by Magical Bridge Foundation (United States Design Patent.

Dignity Landing

The Magical Bridge Hideaway Hut and retreat spaces: Many playgrounds are over-stimulating, particularly for children with autism and other sensory challenges. Magical Bridge Playground provides for a user’s change of pace specified in Principle 2 and for the need for privacy, security and safety specified in Principle 1. Hideway Huts and retreat spaces are places for children and adults, especially those with autism and sensory challenges, to visit in when active play feels overwhelming and frenetic. It’s a calming, cozy place. One hut is made out of redwood using cooler-color tones and providing a natural texture. Slight gaps in the boards promote observation and the wider entrance welcomes wheelchair users. Another provides a half globe for playground visitors to curl up into.

Hideaway Hut and Retreat Space
Principle 3: Simple and Intuitive Use

Play Zones: Distinct play zones provide equal opportunities for all people. Zones are designed around specific activities and intentionally designed to accommodate everyone. They are designed with multiple entry points, different types of equipment that provide the same activity in different ways and at different levels. Play Zones provide predictable ways of operating. By working with inclusion experts, the design team learned that predictability is very important for people with certain types of disabilities. This is one of the reasons the design team was inspired to create zones. Zone concepts have been written about extensively but not implemented. Zones provide a consistency in the way each part of the playground operates, create expectations for flowing between equipment, and from one area to another. Zones also provide for multiple forms of the same activity, so that a user can find the right level of challenge and support.

Principle 4: Perceptible Information

Signage: The Play Zone signs are provided in multiple modalities including Braille. Magical Bridge Playground continues to explore this aspect of its approach. A preliminary investigation was done of QR codes and may be piloted in some of the new playgrounds currently in development.

Visual Perception Aids: For people with visual disabilities, the Magical Bridge Playground team learned that color is important for depth perception, especially the color blue. The major zones are differentiated with blue surface and blue is used throughout the park to guide users.

Visual Queuing: Throughout the park visual cues are provided such as the use of large color circles to indicate a path for hoping or moving through the laser harp. Jen Lewin Studio, creator of the Laser Harp relied heavily on the expertise of the park founder regarding the set standards of accessibility. She stated that “Providing a beautiful object that encouraged engagement would have been a waste if it didn’t live up to the mission of The Magical Bridge Playground.” Jen Lewin’s background in technology and architecture provided her with the expertise needed to translate those standards into an elegant form with an interactive element. The paths to zones are also designed to be visual cues to different parts of the Playground.

Principle 5: Tolerance for Error

Differing Levels of Ability: The selection of equipment took into account the various abilities people bring to a playground. For example, with the swinging zone, there are bucket swings, disc swings, and traditional swings, that require different ways of using and accessing the equipment providing a variety of options to meet the same goal.

Multiple Challenge Levels within Activity: The slide mound was universally designed to provide a variety of types of slides, with different textures and at various angles of incline to increase the challenge of the activity.

Bridges: There are two types of bridges at Magical Bridge Playground that consider the user’s tolerance for motion and control. The first is a sway bridge that provides a back and forth motion. While it is wheelchair accessible, feedback was received early on that it may provide too much motion for some users. Therefore, in a second iteration of the bridge design, a flat bridge was added to provide more security for some users to reach the treehouse and playstage areas.

Perimeter Fencing: Many playgrounds fail to provide perimeter fencing that contains the playspace and provides for safety and security of all users. Magical Bridge Playground provides complete perimeter fencing, preferable to many and very important for parents of toddlers and children who wander or run but who lack the self-regulation skills to understand potential dangers. However perimeter fencing is not just for children. Adults with cognitive issues (e.g., memory loss, developmental delay, dementia) may also wander and elope which may put them or others at risk for bodily harm. Interior fencing, boundaries, and elevated portions of the park reduce risk of injury and increase safety.
Principle 6: Low Physical Effort

Paths, surfaces, ramps: To address barriers of access to both the playground itself and to the equipment, it is important to address the effort and capabilities required by individual users to comfortably manipulate their environment with a minimum of effort and fatigue. This is particularly important for people with limited muscle control. For wheelchair users and others with mobility issues, Magical Bridge Playground provides smooth, seamless pathways thereby reducing the physical effort required to move around.

Multiple means/positions to use the equipment: All of the equipment has been designed to enable a user to access and participate in a neutral body position such as sitting, lying, standing, or sitting in a wheelchair. In the Spinning Zone for example, people can vigorously spin by running around the funnel spinner or they can experience the spinning by laying, sitting, or hanging onto the netting while others push from the outside. The merry-go-round is flush with the ground, so everyone can join in the fun including those in wheelchairs. The Roller Slide was designed to enable children to slide with minimal physical effort, by using a neutral body position with the momentum caused by the rollers carrying them gently down.

Principle 7: Size and Space for Approach and Use

Width of ramps, bridges, paths: These accommodate both wheelchair users, caregivers, friends, or family members. To address barriers of access to both the playground itself and to the equipment, it is important to address the effort and capabilities required by individual users to comfortably manipulate their environment with a minimum of effort and fatigue. This is particularly important for people with limited muscle control.
ALL EQUIPMENT IS DESIGNED TO ACCOMMODATE DIFFERENT SIZES INCLUDING ADULTS: To address barriers to independent use of equipment found in many playgrounds, the size of the equipment and how it is situated in the environment was intentionally designed to enable users of all sizes, whether seated in a wheelchair or standing. One example of this is the wide slides that enable children to ride together for fun and peer support. This also allows an adult with disabilities to slide with another adult. Another example is the bucket swings designed to accommodate both small and large individuals.

EQUIPMENT CONSIDERS WHEELCHAIR USERS IN APPROACH AND USE: The sway boat and merry-go-round provide both ground level wide entrances for wheelchair access and for wheelchair use inside.

PHASE III. CONTINUOUS IMPROVEMENT

Equipment is an area of further innovation. In keeping with the iterative design process, with each new MBF playground, insights and expertise are gained from users and experts. Through ongoing incorporation of feedback, information on the usability of zones and equipment is gathered and adjustments are made to increase access and inclusion. Technologies to support inclusive play are understudied in Human-Computer Interaction (Sobel, O'Leary, & Kientz, 2015) and the MBF works to learn from others as well as contribute insight in this area. Great attention is also paid to the aesthetics of new playground design. The designers try to minimize the use of one material such as plastic and focus more on a blend of textures, color and sensation. Current projects include:

PARTNERSHIP WITH PLAYWORLD: In March 2018, Magical Bridge Foundation announced a strategic partnership with Playworld, a division of PlayPower®, Inc. a leading developer of playground environments and equipment that is designed to unleash the transformational power of play so bodies grow stronger, children play safely and opportunities to foster imagination are created. For nearly 50 years, Playworld has created innovative, inclusive and meaningful outdoor play experiences for all ages and abilities. This partnership is focused on developing a new joint line of playground equipment and solutions inspired by the Magical Bridge Playground approach that go beyond basic ADA requirements to create inclusive spaces for all. New Magical Bridge Playgrounds are slated to begin using this equipment in the coming few years.

SWING DESIGN: The design team is currently working with other designers to tackle the barriers posed by swing equipment for individuals with disabilities. Currently it is difficult for parents or caregivers to lift larger children and adolescents with disabilities into swings, even the accessible bucket swings. The swings need to be stable while getting an individual into them
and then released into a swinging mode. Currently, the design team is working on a system that tethers the swing to the ground to provided needed stability.

**Signage & Wayfinding:** Magical Bridge Playground designers are working on enhancing its multiple representations of information and signage within its parks. It has investigated the use of QR codes, to enhance wayfinding using electronic devices for individuals with visual impairments. Information about the item to which a QR code is attached can be listened to or read by scanning a barcode with a machine-readable label. There are a number of companies experimenting with wayfinding applications that enable a visitor to upload a map into their mobile device. By scanning the QR-code, the map of the park could open on the visitors mobile phone, with locations tagged. Magical Bridge Playground hopes to pilot this technology in some of its new parks. In addition QR codes can be embedded within the playground and used for educational purposes such as scavenger hunts. Through experimentation and exploring different equipment the MBF is learning how to reduce costs.

**Measuring Impact**

**Survey One: Comparison with Two ADA Accessible Playgrounds**

Magical Bridge Playground was envisioned to be a public playground that positively impacts the community. An array of unique design solutions was implemented to address the challenges noted early on in the Discovery Phase. On any day of the week the Magical Bridge Playground is as crowded as a large metropolitan playground. The MBF was eager to explore why this is the case. Was it because the playground is aesthetically pleasing or did the design truly accomplish the goal of authentic inclusivity? Was it used more than other ADA accessible playgrounds by individuals with disabilities and if so, did they interact more with members of the community while at the park? In order to begin to understand the success of this intentionally and universally designed playground, park visitors at three public parks in Palo Alto, including Magical Bridge Playground were interviewed. High school student interns interviewed hundreds of people as part of a school-based service learning project. The interns asked five specific questions to determine if the playgrounds differ significantly given that they are all compliant with ADA access requirements. During the summer of 2018, 388 park visitors were interviewed over a period of three weeks at Eleanor Pardy Park (n=44), Johnson Park (n=73), and Magical Bridge Playground (n=271). Interns were assigned across the three sites at the same day and time to ensure the information collected was a valid representation of opinions across parks, and not as a result of the type of visitor who might attend during other times (e.g., weekday morning vs. weekend afternoon). Interns were instructed to invite every park visitor to participate. At times there were no visitors at one park, while another had dozens of visitors during the same day and time. All data was statistically analyzed to control for group size and identify significant differences among groups. The results discussed were statistically significant when group size was controlled. The values in the charts are the percentage of people who visited each particular park. Overall, the results suggest the design process successfully moved the play experience beyond ADA compliance to advance ideas about inclusion.

**Frequency and Length of Park Visits**

Visitors were asked how often they visit the particular park where they were interviewed. The data revealed that park visitors visited Eleanor Pardy Park and Johnson Park throughout the month and more often than visitors at Magical Bridge Playground. The majority of Magical Bridge Playground participants visited the park 1-2 times per month or more than two times per month. Park visitors were also asked how long they spend at the park during their visits. Most visitors to all three parks reported spending an average of 1-2 hours per visit. However, Magical Bridge Playground visitors overall appear to spend the longest amount of time of the three groups, rarely less than one hour and more often two or more hours. While visitors to Eleanor Pardy Park and Johnson Park reported visiting those parks more frequently, they also usually stayed less than one hour and often not longer than 2 hours. About the same number of park goers spend more than three hours across all three playgrounds. These findings suggest that there are aspects about Magical Bridge Playground that encourage individuals to remain engaged in the park experience longer than park visitors at the other two parks. There are a number of reasons why the frequency of visits may be less at Magical Bridge Playground. For one, a large number of Magical Bridge Playground park visitors travel from outside of Palo Alto to visit. So they may visit with the intention to stay longer. A second survey (discussed
below) indicated that more than 63% of the people who visit Magical Bridge Playground from outside of Palo Alto are a parent, guardian or caregiver of a person(s) with a disability who they bring to the Playground. Therefore, it appears that even though all public parks must be accessible according to ADA standards, there is substantial demand for what Magical Bridge Playground provides.

When visiting this playground where do you travel from?

<table>
<thead>
<tr>
<th>Location</th>
<th>Eleanor Pardee Park</th>
<th>Johnson Park</th>
<th>Magical Bridge Playground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palo Alto</td>
<td>79.5</td>
<td>61.6</td>
<td>58</td>
</tr>
<tr>
<td>A community around Palo Alto</td>
<td>11.4</td>
<td>33.8</td>
<td>28.8</td>
</tr>
<tr>
<td>Elsewhere in the state</td>
<td>6.8</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>I am an out of state visitor</td>
<td>2.3</td>
<td>1.4</td>
<td>1.5</td>
</tr>
<tr>
<td>I am an out of country visitor</td>
<td>2.3</td>
<td>4.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Other - Write In (Required)</td>
<td>0</td>
<td>1.4</td>
<td>0.4</td>
</tr>
</tbody>
</table>

**Interaction with Others**

Magical Bridge Playground was designed to promote inclusive play. Therefore, interns asked individuals at each park, “Who do you or your children interact with while at this playground (check all that apply)”? Park goers at all playgrounds indicated they usually interact with people who they have not met before as well as people they already know to a similar degree. However, 26.5% of Magical Bridge Playground visitors interacted substantially more often with children or adults with disabilities compared to 11.8% of park visitors at the other two playgrounds. This is an important finding because all three playgrounds are ADA compliant, which suggests individuals with disabilities have equal access to all of them. The design of Magical Bridge Playground appears to increase the likelihood of a more inclusive play experience. Furthermore, compared to other playgrounds, Magical Bridge Playground visitors were found to engage with a broader spectrum of community members including elderly adults.

**Welcoming to all abilities, ages and sizes**

Magical Bridge Playground was designed to be a community park and playground that fosters inclusive play and engagement of a wide spectrum of people. The interns asked visitors how welcoming they believed the park to be. Eleanor Pardy and Johnson Park visitors rated those parks to be welcoming to a diverse group of people slightly more than not welcoming. Magical Bridge Playground however was considered to be welcoming to all abilities, ages, and sizes to a larger degree than the other ADA compliant playgrounds. In an open-ended question, visitors were given the opportunity to explain their choice. Magical Bridge Playground visitors commented on the unique features such as the bucket swings, security of the perimeter fencing, welcoming environment to individuals with disabilities - especially those with autism - ease of access to the slide mound and the appeal of the laser harp. While the other parks were described as enjoyable places to play, many comments were made about the lack of access for wheelchairs, problems with surfaces including cement, wood fiber or mulch, sand and no play equipment with access ramps. Outliers were noted too. One individual commented that they were pleased with access surfaces at Eleanor Pardy Park as they were “soft.” Another at Magical Bridge Playground said the park is too crowded for a child with autism. In the online survey discussed below, results indicated a wide range of visitors attend Magical Bridge Playground including 8% of people over the age of 70 and 25% children with a disability. Close to 58% percent of respondents felt that the mix of people (ages, abilities, sizes) at Magical Bridge Playground was different than what you see at most other playgrounds and 90.4% believed Magical Bridge Playground was welcoming to this mix of people.
Do you believe this playground is welcoming for individuals of all abilities, ages, and sizes?

Universally Designed Play Equipment
The universally designed equipment and structures at Magical Bridge Playground were key to stretching the boundaries of access and inclusive play. In this era of ADA compliant playground design “accessible” features are often highlighted. The play equipment and structures at Magical Bridge Playground were designed to not only be accessible to the widest range of abilities, but to be enjoyable for all children at the same time (i.e., one structure that promotes inclusive play for all, rather than separate structures that promote parallel play for all). To assess the value of these design features, park visitors were asked to rank how important it is to them that communities offer this kind of universally designed playground equipment.

How important is it for you that your community offer pieces of playground equipment that both children with and without disabilities can enjoy together?

Very few people across the three parks said “Not at all important” or “Not very important.” Respondents at Magical Bridge Playground appeared to value universally designed equipment the most, followed by those at Eleanor Pardy Park. It’s possible that Magical Bridge Playground visitors rated this item highest because they can see firsthand what it means to have play equipment that is designed for all, as well as observe the impact of play and engagement for a wide range of individuals.

Survey Two: The Voice of Magical Bridge
Magical Bridge Playground was designed to push the boundaries of what society typically defines as inclusive play and disrupt notions of access for people with disabilities. The disproportionately higher number of people who visit Magical Bridge Playground and also those who come from outside of their own community is significant. The belief that Magical Bridge
Playground is indeed welcoming to people of all abilities, ages and sizes more than other local ADA compliant playgrounds, is partial evidence of its impact in the community. A second online survey was created to understand more deeply the lived experiences of playground access, particularly the perceived barriers to access and inclusion. The survey was published with transparency. It was clear the survey was from the MBF with the intent to hear from the “fans of Magical Bridge Playground” about their experiences at what was termed in the survey “most other playgrounds.” The second goal was to fully understand the perceived value of Magical Bridge Playground and to identify which design solutions seem to hold the most value to the community from the perspective of its constituency. An online survey was made available to the citizens of Palo Alto who have been to Magical Bridge Playground and community members who participate in the Magical Bridge Playground social media sphere. A total of 350 surveys were submitted online over 10 days.

**Nature of Respondents**

Most of the respondents were individuals without disabilities, however all items were also analyzed by respondent type. Most were parents or caregivers of a person without a disability who they bring to Magical Bridge Playground.

What roles best fit how you will respond to this survey? (check all you volunteer to answer)

Responses about playground features that pose challenges to inclusion

Given that public playgrounds and parks are in Palo Alto are ADA compliant and required to be accessible and all, the responses of the online survey participants confirm the need to move beyond the spirit of accessible legislation.

In your experience which of the following prevent people of all abilities from interacting together at most other playgrounds? (check all that apply)
One of the first questions was about inclusive play. Well over half the respondents noted that in their experience, playground equipment is not accessible, and half noted there are no opportunities for cooperative play.

**Responses about physical or other access barriers to play**
Arguably it can be said that if playgrounds pose access barriers to play, inclusion is limited. Therefore, respondents were asked about their experience with physical and access barriers that limit play at other playgrounds. The most common barriers to play at other playgrounds included playground design that does not offer choices for retreat or stimulation, and uneven paths, curbs and loose surfacing. Roughly a quarter of the respondents also identified location of accessible entrances and gates that are challenging or heavy to operate as barriers. These are just some of the design concerns that were resolved in the iterative design process which helps explain, in part, the popularity and community impact.

In your experience, which of the following pose barriers to play at most other playgrounds? (check all that apply)

![Graph showing percentages of barriers]

**Appeal of universally designed features**
The online respondents were also asked how important it is that “playground equipment be enjoyed together by people with and without disabilities.” Here again the response was very high with 96% rating from Important to Extremely Important. Some of the design solutions are captured in the table below and respondents were asked to rate which are most appealing. All of these design solutions were answers to the “pain points” or barriers that were identified early on in the development of the Magical Bridge Playground.

Select the features that make Magical Bridge Playground appealing to you (check all that apply).

![Graph showing ratings of features]
Positively, over 60% of the respondents ranked all the features appealing, except for the egg-shaped retreat space. This feature was designed for a smaller portion of the population, so the results are understandable. Qualitatively the egg-shaped retreat space was consistently noted as a valuable structure on both surveys for individuals with autism or for children who simply get easily overstimulated on the playground. As indicated earlier 20% of parents noted their child prefers to play alone which underscores the value in an environment that considers the needs of all individuals.

**Perimeter Fencing**

One of the most commonly noted assets of Magical Bridge Playground in the intern surveys was the perimeter fencing which respondents indicated made the park a safer place. However, many park visitors do not visit with small children, children with disabilities or others who may elope unexpectedly. Still close to 84% of respondents felt it was Important to Very Important to them or their family that a playground is designed so that a person can’t leave without their caretaker’s knowledge. Approximately 16% were Neutral to Not at All Important. This finding was also echoed on the survey that compared Magical Bridge Playground to other ADA compliant playgrounds.

How important is it to you or your family that a playground is designed so that a person can’t leave the playground without their caregiver’s knowledge?

![Bar chart showing the percentage of respondents for each level of importance](chart)

**Children and Inclusion**

At Magical Bridge Playground engagement and inclusion was high as 67% interacted with people they had never met before. Thirty-two percent interacted with children or adults with a disability who they had never met before. Given the existence of the Play Zones which offer the opportunity for less distraction, it was valuable to learn that 20% of parents stated their child prefers to play alone. Ninety percent of respondents indicated that the Magical Bridge Playground experience more effectively impacts community attitudes toward inclusion and children with disabilities, compared to most other playgrounds. Only 5.7% said both play experiences are equal. When asked which playground seems to most effectively reduce stigma and perceptions around disability, 89.5% selected Magical Bridge Playground, while 6.6% said Magical Bridge Playground was equal to most other playgrounds.

**Benefit to Society**

A portion of the survey was designed to assess the impact Magical Bridge Playground has had on the values of the community such as empathy, reduction of stigma, and engagement with people of all abilities. When asked which playground experience most effectively normalizes concepts of differences and promotes understanding and appreciation of diversity, 82.1% said Magical Bridge Playground and 13.1% said Magical Bridge Playground is equal to most other playgrounds. About 82% of respondents indicated that Magical Bridge Playground most effectively fosters the kind of inclusion that “becomes the norm and spills over into other community institutions such as coffee shops and schools,” while 11.7% noted both Magical Bridge Playground and other playgrounds are equal. When asked which playground most effectively impacts the way children without disabilities treat children with disabilities at school, 80% felt that Magical Bridge Playground was most effective, while 13% noted that both Magical Bridge Playground and other ADA compliant playgrounds are equally effective. One other question
sought to examine how well playground experiences transfer to traditional environment. Respondents were asked if they agree that their experience at Magical Bridge Playground will positively impact their willingness to interact with people with disabilities in other settings. Approximately 62% Agreed or Strongly Agreed. The likelihood of interaction with a diverse group of people at Magical Bridge Playground is reflected in the chart below that reflects a range of abilities and ages who come to the park.

Who do you come with to Magical Bridge? (check all that apply)

<table>
<thead>
<tr>
<th>Who do you come with to Magical Bridge? (check all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A child or children without a disability</td>
</tr>
<tr>
<td>A child or children with a disability</td>
</tr>
<tr>
<td>An adult with a disability</td>
</tr>
<tr>
<td>Family members</td>
</tr>
<tr>
<td>Family members over 70 years of age</td>
</tr>
<tr>
<td>Friends</td>
</tr>
<tr>
<td>By myself</td>
</tr>
<tr>
<td>Other - Write In (Required)</td>
</tr>
</tbody>
</table>

**Positive Family Impact**

Overall 75% of respondents said that “Agree” or “Strongly Agree” that Magical Bridge Playground has had a positive impact on their family through a variety of aspects. These aspects included a safe and comfortable environment, welcoming, facilitates inclusive play, contributes to the community sense of belonging and inclusion, reduction in stigma and isolation for children with disabilities, and the playground is laid out for a range of abilities.

**Conclusion**

Magical Bridge Playground in Palo Alto, CA was created based on the belief that access regulations for people with disabilities were insufficient if society is to genuinely welcome all individuals into the community. The process began with empathy and involved the many voices of individuals who were dedicated to the lifelong physical, psychological and emotional development of all members of the community. Upon completion of the Magical Bridge Playground a foundation of supporters was formed to address the overwhelming demand for more playgrounds that met the vision of a space that is authentically inclusive of all people. The Magical Bridge Foundation is now creating a national movement to shift playground design from “accessible for people with physical disabilities” to “genuinely inclusive for all people.” Magical Bridge Playground is anchored in the idea that human variation is normal and incredibly multifaceted, and all individuals have the right to engage with one another in their community. By valuing this principle, the Magical Bridge Playground has positively impacted society. Universal Design is a great and powerful equalizer. Its principles can be seen in the unique design solutions that were generated in the iterative process by first identifying multiple challenges to access and inclusion at playgrounds and their unintentional contributions to stigma and exclusion. Through belief in a powerful vision for humanity and a mindful design process, something magical has been created.
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