

RECREATION MANAGEMENT

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Play to Live, Live to Play

Playground development, from design to construction and beyond

By Kyle Ryan

One of the first playgrounds in the United States, if not the first, appeared in the early 1890s in a Boston housing project. Well, "playground" might be too generous a description for a sand pile, but considering kids often had worked grueling hours in factories during the Industrial Revolution years before, that sand pile was a revelation. The idea came from Germany, and it caught the eye of Joseph Lee, a wealthy lawyer who eventually became the father of the American playground movement.

Lee, who died in 1937, believed that play could benefit children's development, from their sense of right and wrong to their education.

"Play for adults is recreation, the renewal of life," he said. "For children it is growth, the gaining of life."

His words are remarkably prescient considering he was inspired by something as low-tech as a pile of sand. But 100 years later, Lee's philosophy embodies the modern approach to playground design.

Take, for example, swinging, which is just a notch above the sand pile in terms of high-tech child-development activities. Yet research by

the International Play Equipment Manufacturers Association (IPEMA), a nonprofit trade association, suggests swinging has surprising health benefits. The leg motion works the muscles in the leg and abdominal areas, and it has a huge effect on perceptual and vestibular development—inner-ear functions related to balance and movement through space. Then there's the social interaction that comes with swinging.

Although the ideas behind Lee's words still guide playground design in the new millennium, playground applications obviously have changed drastically. Sure, certain elements of play—swinging, climbing—remain timeless, but technological developments have enhanced playgrounds over the past 15 years, much less the past 100. Along with that growth has come a much greater awareness of safety and accessibility that complicate a seemingly simple activity like play. But living in the information age means it's never been easier to address everything from design to construction to maintenance of playgrounds.

Design

In fall 2005, construction began to replace a 17-year-old playground in San Francisco's Alta Plaza Park. Breaking ground on it was the culmination of a process that began in 2002, when the Friends of Alta Plaza Park formed after a city budget crisis derailed planned park improvements. Giuliana Matioli, project manager for the Friends of Alta Plaza Park, seems relieved that construction finally has begun, and she quickly admits her organization couldn't have done it by themselves.

"At the bottom line, when you've decided that you want to redo a playground, you've got to hire an architect," she says. "You can't just have the ladies of the town get together and decide to design [a playground]. It's pretty big stuff."

Matioli worked with a landscape architect from the city who had playground-design experience, and construction should be finished by summer. The playground's old wooden structure, built two years before the passage of the Americans With Disabilities Act in 1990, will be replaced with a large, new area split in two—one side for young children, the other for older kids. It will have a two separate climbing and play structures, a high-tech geodome climber, see-saws and all the usual stuff, with a mix of rubberized surfacing and sand for surfacing. When completed, Alta Plaza Park's new playground will be a dramatic step up from its predecessor. It also will reflect just

how much playground design has changed since the 1980s.

"I think the thinking behind planning a playground is just so much more in-depth," Matioli says. "As time has passed, people just now are getting into what kids need in a play area to help them develop fully based on their age."

That's how Mike Riggs, president of Playscape Designs, Inc. in Tulsa, Okla., approaches his work. Riggs frequently refers to playgrounds as "classrooms," particularly outdoor ones.

"Adults and planners and architects who are planning for playgrounds need to understand that this playground is a learning environment for the children, not for them," Riggs says. "So what colors they pick, what functions they pick, what play elements they pick, those need to be based on child development."

Gone are the days of ordering play structures like monkey bars, throwing them on a playground and moving on to some other project.

"People want a playground," Riggs says, "but because of today's ADA laws, safety issues, installation issues, they don't realize the things that are involved when you want to pick out a piece of playground equipment. Specifically, somebody's going to call me and say they want a catalog, and they're going to talk to three or four different other people, and then they're going to go through and pick out what they like—not understanding the child-development criteria, the accessibility criteria or the safety criteria."

That's essentially what playground design comes down to: child development, play value, safety and accessibility. In the often litigious American society, you'd do well to pay particular attention to those last two. In Riggs' experience, clients often will select play equipment simply for its longevity or low price, without considering the other issues—and that kind of thinking can lead to an unused playground or, worse, a day in court.

Riggs also suggests people plan to spend half their budget on equipment, which reinforces a point he repeatedly makes: The playground doesn't begin and end with the equipment. It's the whole environment, and its needs vary by geography.

"So if you've got \$20,000, you're going to buy 10,000 dollars' worth of equipment," he says. "The other \$10,000 is going to be a mix between the installation, border and surfacing. And the other 50 percent that includes those three can vary if you're in the northeast or northwest, southeast or southwest or the mid part of the United States."

Just how long does the design process take?

"One hundred years," Riggs says, laughing. At least it can seem like a century. When the Trust For Public Land (TPL), a nonprofit organization that conserves land for parks, built a new playground for McKinley Elementary School in Newark, N.J., the design process took about three months, which seems pretty average.

Once the design process begins, ideas come quickly.

"You start to really keep your ears open as to 'Well, what do we do?'" Matioli says. "You have to research a little bit, but there's a lot of stuff that kind of comes to you. Once you start looking into something or keeping your ears open to something, you start to find all this information on it."

For example, be sure to investigate all the various guidelines set forth by IPEMA, the Consumer Product Safety Commission (CPSC), the American Society for Testing and Materials (ASTM), not to mention federal, state and local rules. Any qualified designer should have an understanding of these mandates.

Playground Safety Statistics

SOME INTERESTING NUMBERS:

- . About 45 percent of injuries involving public equipment occurred in schools.
- . About 31 percent of injuries involving public equipment occurred in public parks.
- . About 10 percent of injuries involving public equipment occurred in commercial childcare centers.
- . From January 1990 to August 2000, CPSC received reports of 147 deaths to children younger than 15 that involved playground equipment.
- . 70 percent of those deaths occurred in homes.

- . 30 percent of those deaths occurred in public use.
- . Girls were involved in a slightly higher percentage of injuries (55 percent) than were boys (45 percent).
- . Injuries to the head and face accounted for 49 percent of injuries to children 0-4, while injuries to the arm and hand accounted for 49 percent of injuries to children ages 5 to 14.
- . For children ages 0 to 4, climbers (40 percent) had the highest incidence rates, followed by slides (33 percent).
- . For children ages 5 to 14, climbing equipment (56 percent) had the highest incidence rates, followed by swings (24 percent).
- . Approximately 15 percent of the injuries were classified as severe, with 3 percent requiring hospitalization.
- . The most prevalent diagnoses were fractures (39 percent), lacerations (22 percent), contusions/abrasions (20 percent), strains/sprains (11 percent).
- . Falls to the surface was a contributing factor in 79 percent of all injuries. On home equipment, 81 percent were associated with falls.
- . Most injuries on public playground equipment were associated with climbing equipment (53 percent), swings (19 percent) and slides (17 percent).

Statistics courtesy of the National Program for Playground Safety

What kids need (and want)

Children develop quickly, but their abilities obviously vary a great deal depending on their age. According to a 2004 report by the Children's Institute for Learning and Development (CHILD), many playgrounds are designed for the so-called tweens, kids between the ages of 8 and 12. However, due to the strong pull of technology like computers and video games, tweens tend to get bored with traditional playground design. Younger kids, such as toddlers and preschoolers, end up using playground equipment designed for older kids, and that's dangerous.

In another report, CHILD broke kids up into three age groups based on ability, which basically mirrors the approach of designers like Riggs:

0 to 2: CHILD calls this the "rudimentary movement phase," where children learn how to control movements like "reaching, grasping and releasing," according to the report.

"They're using their senses to direct their motors and their motors to direct their senses," Riggs says. "So we have to provide the fundamentals for that age group, which is a fence, preferably a vinyl fence that helps keep the kids in and the other kids out. We put a shade to protect their tender skin, and then we provide a surface that is clean and, as much as possible, free of debris."

CHILD recommends tactile panels, bridges, ramps, low swings and slides, and rockers.

2 to 7: Called the "fundamental movement phase," where children's movement skills progress rapidly. They can run, jump, hop, skip, throw, catch, balance themselves, etc.

"The child is beginning to be more involved with physical, social, emotional and cognitive skill development," Riggs says.

CHILD recommends bridges/ramps, swings, slides, rockers, spinners and balance activities, and Riggs says that motion apparatuses are of particular importance because they stimulate vestibular development. Kids in this age group also get "climby," according to Riggs, so designers have to keep heights in mind. As a rule of thumb, Riggs multiplies the height by a factor of 2.5 to get a feel for what kids perceive.

"What that means is that if a 3-year-old is on a 3-foot platform, when he's standing on it, actually his mind perceives it as being 2.5 times higher," Riggs says. "So that's the reason why you don't want to put a kid on a 5-foot because now he's looking at 12 or 13 foot up, and that's a scary thing for a 2- and 3-year old."

7 and up: The "specialized movement phase" transitions from learning to lifelong utilization, so kids can take on more advanced equipment like poles, nets and monkey bars, along with the usual balance activities, slides and

swings. According to Riggs, once kids reach about 10 years old, the playground has more of a social importance as a gathering place.

That's also the age where they can get bored with playgrounds, and CHILC suggests that playgrounds often don't challenge kids enough. In one report, CHILC found that three factors have led to a "dumbing down" of playgrounds: the threat of litigation, inflexible safety standards and the perception that parks are unsafe for children. An unchallenging playground is an unused playground.

Some playgrounds aren't in danger of that. The new \$80,000 playground at Ellis School in Fremont, N.H., has a 9-foot climbing wall and 18-foot rope pole net component. And Chaires Elementary School in Tallahassee, Fla., added a ropes course. Over the past four years, the school has renovated three of its playgrounds, each of which corresponds to a certain grade level.

"Our goal for the playgrounds was to encourage student movement and activity in order to fight childhood obesity," says Principal Christi Moss. "We wanted structures that were fun, appealing to various ages and encouraged children to move their large muscle groups during play time."

To ensure kids' safety, the staff members keep an eye on kids during play time, and all children receive an orientation on the first day of school. The new playgrounds have been extremely successful; at the Ellis School, the staff had to create a rotating schedule to accommodate all the children.

Part of the success at both Ellis and Chaires was the involvement of the students. Ellis had a student advisory committee, and students suggested their own ideas at Chaires. When McKinley Elementary in inner-city Newark began its playground project with the Trust for Public Land, the kids played a big role.

"That's actually central to our program," says Susan Clark, director of public affairs for the Trust for Public Land. "Our view and belief is that, if we could wave a magic wand and put playgrounds wherever they were needed, we still wouldn't do that, because when you have a community investment—and in particular the children, the folks who are going to use the playground—

the likelihood of that resource lasting goes up tremendously."

During the three-month design process, the kids surveyed their classmates, worked with the community and dealt directly with designers. They created a playground model using construction paper and pipe cleaners, among other things, to get a better sense of the space. They went out on field trips to survey other playgrounds.

"In this particular case, we kind of had to go even more back to basics than we do in every other case because we had kids who had never even seen a working swing set," Clark says. "They didn't know what that was; they needed to go out to sites and see other playgrounds to be able to even comprehend what they might want and might be able to do at their site."

Surprisingly, the kids' top requests were trees, a water fountain and a splash play area.

"Kind of in the beginning, we'd have kids say they want roller coasters and swimming pools and ponds and all kinds of things, which is great, they're really using their imagination," Clark says. "But then they'll say, 'Well, we realize that we didn't have it in the budget to do those things.' So they're using math skills and brain skills, looking at 'Where is this water going to drain in this?' and 'What kinds of slopes can you have?'"

Before the construction, McKinley's playground consisted of a barren asphalt lot where some teachers parked, with a fire hydrant inexplicably placed in the middle of it. When the project was completed in 2002, the area had a stunning reversal: It now included a large track with artificial-turf field in the middle of it, a splash play area, climbing equipment and more.

The sense of ownership fostered in the children through the creative process also ensures a certain amount of respect for what they created.

"These kids are going to be less likely to spray graffiti or tear up grass or what have you because they were part of the process," Clark says.

Community involvement sparked another playground project for the TPL at Newark's Mildred Helms Park. The inner-city park, which an neighboring elementary school used for play time, had fallen into disrepair due to neglect. A grassroots community group similar to the Friends of Alta Plaza Park came together to renovate the space that now resembles the playground at McKinley Elementary. That community involvement pays dividends to protect the park and make sure it gets used, so it makes sense to cast a wide net when seeking input to plan a playground. The Friends of Alta Plaza Park held several community meetings to hear suggestions. Matioli says it works as long

as a small group of people can help push things along.

"In terms of actually planning all this stuff, you can't have a huge group," she says. "There has to be a smaller group guiding certain efforts. Although you need the support of the whole community, which I have to say we have been so lucky that we received."

Once general requests have been received, like a splash area favored by McKinley's students, the real planning can get under way—and that's where safety, accessibility and other issues come into play.

Health & Developmental Benefits of Playgrounds

Here's a news flash: Obesity is on the rise. But the most disturbing part of the trend may be that it affects all ages: According to the National Institute of Health Statistics, the obesity rate among elementary-school-age children was 15 percent in 2001, up from 7 percent in 1980.

In his book *The Developmental Benefits Of Playgrounds*, Dr. Joe Frost found that 7- to 11-year-olds who participated in a four-month program of sustained exercise for 40 minutes every day experienced "significant" reduction in body fat without any changes in their diet. However, as schools face tighter budgets, fewer offer physical-education classes or recess, which contributes to the problem. A recent study cited by the International Play Equipment Manufacturers Association (IPEMA) suggested that kids burn half of their recommended daily caloric expenditure during free-play sessions like recess. The Children's Institute for Learning and Development (CHILD) found that free play also helps foster children's emotional development.

Even something as simple as monkey bars can have health benefits. To move across a set of monkey bars, kids must be able support their own weight—even to hang on monkey bars, they need some kind of upper-body strength. If they lack the necessary power, they develop it rapidly, sometimes over the course of a few days, according to an article by IPEMA. Simply swinging from bar to bar increases children's hand-eye coordination, their understanding of gravitational force and their knowledge of weight transfer.

Combine an upper-body activity like that with other muscle groups used during play activities, and it's easy for kids to get adequate exercise—without them even knowing it.

Surfacing

Surfacing dramatically affects both safety and accessibility. Without the right surfacing, hard falls are harder, and people with limited mobility get relegated to the sidelines. Riggs estimates that more than 70 percent of all playground injuries come from falls to the ground, which is supported by statistics from the National Program for Playground Safety (NPPS), a playground watchdog group based at the University of Northern Iowa. According to the NPPS, falls to the surface were a contributing factor in 79 percent of all injuries.

Playground surfacing essentially falls into two categories: loose-fill material (pea gravel, sand, mulch) and unitary (a foundation covered by poured-in-place synthetics or rubberized square tiles). Generally speaking, the cheaper the surface, the less effective it is when it comes to safety.

According to Riggs, neither gravel nor sand can have verifiable attenuation testing, which measures a surface's effectiveness against falls from various heights. The ASTM has numerous reports about various playground surfaces, such as F1287, which addresses engineered wood fibers. Wood mulch isn't an engineered fiber, but it's cheap and can have verifiable attenuation testing. But it also decays and needs to be frequently replaced. Some companies offer rubberized mulch, which offers the same benefits as wood mulch but doesn't decay or have as many hygienic issues. (Wood fibers attract bacteria, and animals sometimes use them for toilets.)

Alta Plaza Park's new playground will feature a mix of sand and rubberized surfacing made from recycled tires. The original plan called for a much greater use of sand until planners realized sand and recycled surfacing didn't mix well together. Other city parks that used both encountered problems from the sand migrating onto the rubberized

material, which breaks down more rapidly because of it.

"We decided literally in the last two weeks that we're actually only going to keep one sand feature in the playground," Mاتيoli says. "We're only going to keep one on the preschool-age kids' side."

All newly constructed playgrounds have some kind of special surfacing near equipment with fall hazards, and synthetics, either from tiles or poured-in, seamless surfaces, have become more prevalent despite their higher price. But they may prove cheaper in the long run.

"[Wood mulch] is going to be compacted, and you'll have to replenish it probably every two years," Riggs says. "But if you put in the concrete, and you put in the fall zone, let's say seamless or poured-in-place or tiles, you're going to have the economics show that longevity is going to be much better than the wood mulch."

They may prove beneficial in other ways, too; the Friends of Alta Plaza park received a grant from the state of California for using recycled tires in its surfacing.

Accessibility

The ADA opened up most public places to the disabled, but it also opened up a can of worms for people who design those public places. For example, playground equipment itself may be accessible to the disabled, but the playground environment may be inaccessible.

"When somebody says 'My playground equipment meets ADA,' it's true, but it's not true," Riggs says. "It doesn't do any good if you get out of your car in a wheelchair [and] you can't get to the playground, right?...A lot of people don't realize that they're spending a ton of money on playground equipment that's not accessible."

He breaks it down like this: The first obstacle is getting to the playground itself. If there's a sidewalk, a person in a wheelchair can use that. But what if there's a containment border, like a fence or a small barrier to keep rubberized mulch in place? Even if the wheelchair-bound person can get passed the containment border, can he move on the playground's surfacing? If so, once he reaches the playground equipment, is there enough at ground level that he can play on?

"You have a design rule that says 'If I've got x number of play events up on the equipment, I have to have some y number of playground equipment functions at the ground level,'" Riggs says.

He likens it to buying a house. Think of the kitchen alone: There's more to designing a kitchen than simply figuring out where the cabinets will go in relation to the sink.

"It's all connected," he says.

The old playgrounds at Chaires Elementary predated the ADA, so the school used district funds to make the playgrounds friendlier to the disabled.

"By assuring that 25 percent of the structure includes accessible features, we were able to expand our playgrounds a great deal," Moss says.

Safety

According to the NPPS, a child is treated in the emergency room for a playground-related injury every two-and-a-half minutes. The organization estimates 205,860 preschool- and elementary-age children head to the emergency room for playground injuries every year—and 76 percent of those injuries occur on public equipment.

"Part of growing up is falling down," Riggs says. "You don't want anybody to get injured, but kids are going to fall off and hit wrong on the attenuated surface."

Even though injuries on a playground are inevitable, Riggs believes that many surface-related injuries are the result of inadequate maintenance. Lack of adult supervision is also a contributing factor.

Take swinging, for example. According to NPPS, swings had the second highest incidence rate for kids ages 5 to 14, accounting for 24 percent of injuries. Climbing equipment accounts for 53 percent of all playground injuries, regardless of age. Across all age groups, swings cause 19 percent of injuries, followed just behind by slides at 17 percent. However, IPEMA believes that most swinging injuries aren't from the activity itself but "poorly designed or poorly maintained equipment, lack of adult supervision and inadequate fall surfaces." So devoting more energy to any of those would conceivably decrease injury rates dramatically.

That's basically what the NPPS recommends: more active adult supervision, safe surfacing, regular maintenance and equipment that's appropriate for children's abilities.

Construction

Some playground-equipment manufacturers will install equipment, and some designers will install it or work with contractors to install it. Riggs' firm no longer handles installation. The Friends of Alta Plaza Park worked with a contractor who built another privately funded park in San Francisco. How long it takes to build the playground obviously depends on what's being built and the time of year.

When the community helps make a playground possible, it seems reasonable for the community to help build the playground. These "community build" projects usually occur one of two ways, according to Riggs: a manufacturer sends materials and instructions to build a design, with a person on-site to supervise, and you provide the volunteers, or the materials are delivered with instructions, and it's up to you and the volunteers to make it happen.

In 2001, when Chaires Elementary upgraded one of its playgrounds, it used volunteers from the community to build it. But when the school upgraded another playground last year, it used a builder contracted with the district.

"I was advised by our district maintenance contact that, due to liability issues on the playgrounds and with warranties, they would be contracting for all future installations," Moss says. "[I'm] not exactly sure why—don't know if there were problems at other sites or just being very careful."

Community builds still happen, but with less frequency, Riggs thinks, and for good reason: If the manufacturer didn't install the playground, what type of warranty will it offer?

"My question is, if the instructions cause you to put two bags of cement in the hole, are you sure [the volunteers] did that?" Riggs says. "I think that really is a liability issue, but more so than anything, it's a warranty issue. Who do you go to?"

Maintenance

As with anything in life, the better you care for a playground, the longer it will last. That goes double for outdoor playgrounds, which face inhospitable weather and, in many cases, vandalism. Riggs puts it simply: Every playground needs a maintenance plan and someone to be in charge of it. For example, surfaces contribute to 79 percent of all injuries, but Riggs suspects that better maintenance would lower that rate.

"Consumers for the most part are not maintaining their equipment, which, as a businessman that I am, just boggles my imagination," he says. "If I bought me a \$40,000 car, I would certainly take it in to change the oil."

Playgrounds need regular inspections based on an itemized checklist. Those inspection records need to be kept on file in the event of a lawsuit; they show that playground managers performed routine inspections, which could help minimize their liability. Most playground equipment will come with some kind of warranty, which should cover most maintenance issues. But even if it's a lifetime warranty, that may not mean, well, life. According to Riggs, some states define life as 20 years.

Maintenance becomes a particularly important issue at schools, where children are concentrated. Injuries are a factor, but schools at least have a maintenance staff that should be able to perform inspections. One of Riggs' clients in the Lee's Summit, Mo., school district has statistical evidence that suggests maintenance inspections decrease the risk of injury on playgrounds.

Vandalism is a factor, but Riggs says that it's usually limited to people defacing or tagging the equipment. Of course, keeping vandals away from the playgrounds in the first place would help.

"One of the best ways to address that, we've found in our parks nationwide, is that a well-used park is a safer park," Clark says. "If you have families regularly in and out of a place, you're much less likely to have drug dealers. That's not the 100 percent solution, but it does certainly help, so just having a place that is full of life and activity has really helped in all of our parks."

Advice from the experts

Riggs isn't an objective source on the matter, but other people tend to agree with him: When you need a

playground, work with someone who knows how to build one.

"Find somebody who designs playgrounds," he says. "My deal is quit asking for catalogs. It's fine to find out what's out there and maybe some pricing, but you need to get somebody that does it for a living."

Riggs again takes a holistic approach: Design work doesn't stop at the equipment. The whole playground environment must be taken into account, or it could negate the playground's impact, no matter how cool the equipment. Even if the entire playground is planned out with particular attention to safety, accessibility and play value, it will only work as long as it's maintained properly.

And be patient—building a playground is not a fast process, particularly when schools or government bureaucracy is involved.

"They need to believe that they can do it and be patient and committed to the process," Clark says.

It's a process that had Joseph Lee's full commitment. In 1904, the American Civic Association sponsored a "model street" for the World's Fair in St. Louis. Lee designed a playground for it that attracted more than 7,000 kids. It's not surprising, really, because Lee still seemed to be a kid at heart: "We do not cease playing because we are old," he said. "We grow old because we cease playing."

Resources

SOME HELP WITH YOUR HOMEWORK

ADA ACCESSIBILITY GUIDELINES

www.access-board.gov

AMERICAN ALLIANCE FOR HEALTH, PHYSICAL EDUCATION, RECREATION AND DANCE

www.aahperd.org

AMERICAN SOCIETY FOR TESTING & MATERIALS (ASTM)

www.astm.org

CENTERS FOR DISEASE CONTROL AND PREVENTION—PLAYGROUND FACT SHEET

www.cdc.gov/ncipc/factsheets/playgr.htm

CONSUMER PRODUCT SAFETY COMMISSION

www.cpsc.gov

INTERNATIONAL PLAY EQUIPMENT MANUFACTURERS ASSOCIATION (IPEMA)

www.ipema.org

AMERICAN ASSOCIATION FOR THE CHILD'S RIGHT TO PLAY (IPA)

www.ipausa.org

INTERNATIONAL PLAYGROUND CONTRACTORS ASSOCIATION

www.playground-contractors.org

NATIONAL PROGRAM FOR PLAYGROUND SAFETY

www.playgroundsafety.org

NATIONAL RECREATION & PARK ASSOCIATION (NRPA)

www.activeparks.org

NATIONAL SAFETY COUNCIL

www.nsc.org

THE PUBLIC INTEREST RESOURCE GROUPS

www.pirg.org

THE TRUST FOR PUBLIC LAND

www.tpl.org

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