COLORADO INTERGOVERNMENTAL CIRSA RISK SHARING AGENCY

WATER SPRAY PARK SAFETY GUIDELINES

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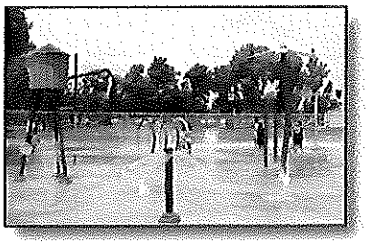
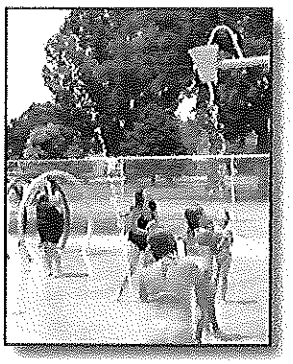
Introduction:



Spray parks are a new type of playground. These parks give kids who are tired of the typical pool an alternative play area. Children who may be afraid of swimming pools due to deep water are also attracted to these parks. Unlike swimming pools, wading pools, and water parks, spray parks typically have no standing water since it drains away to be either treated, recirculated, or recycled for landscaping purposes.

Water may be used in a passive manner or as an interactive component. Water may shoot from fountains, jets, hoses, water cannons or guns, or it may spray, cascade down falls, arches, water curtains or other features. Many features are kid-controlled with flow valves which allow the user to control the water volume. Spray parks have brightly colored interactive water toys and provide a new and fun way to beat the summer heat. They may have just a few water toys or features on platforms in the air. They may be designed around a theme such as a pirate, mining, a clock, or the ocean.



A well designed spray park will encourage children and parents to interact with each other and use teamwork. Aquatics International reports in a survey that approximately 40 percent of water parks have a spray park. About 49 percent of water parks would like to add spray parks; thus, we can expect to see more spray parks in the future.

Advantages of Spray Parks:

Spray parks average one-tenth the cost to build and operate as compared to a typical six lane, 25 meter public swimming pool. Thus, operating costs are low in relation to the play features provided. Cost savings may be realized for the following reasons:

- Lifeguards are not needed since there is no standing water. This saves salary, benefits and training costs.
- Spray parks are fully automatic and have low maintenance costs.
- Spray parks are readily usable by persons with disabilities.
- Spray parks can be open for a longer season since lifeguards are not needed.
- Spray parks are more responsive to the community needs due to the longer season.
- Recyclable water makes them more environmentally friendly.
- Most spray parks have no elevated structures from which to fall.
- Age separation during play is not needed.
- Bath houses are not required if the water is not re-circulated.

Costs:

According to Aquatics International, "a small park about 800 square feet featuring one or two above ground components and a dozen underground geysers can cost about $95,000 (including a recirculated water system). A large park about 3,200 square feet with four above ground components and five underground geysers can cost up to $200,000 (also including a recirculated water system). The types of spray features and how they operate, whether simultaneously or by pushing a button or stepping on a pad, will greatly change the costs." Feature variety and surprises will make the park interactive. If the park is too simple, user interest is quickly lost. Money is best spent on interactive, age appropriate features, rather than on items such as colored concrete. There should be something new all the time to reduce boredom.

Three types of water systems should be considered. First, city potable water can be used since it is already treated and safe if consumed. However, it is unheated, and is sent down the drain after a single use which is wasteful.

Secondly, a recirculated system can be used. Recirculated systems have hidden costs such as chemically treated filters, and must follow the codes and requirements that pertain to swimming pools. Maintenance personnel should check the park twice a day and keep chemicals balanced. Higher water flow rates can be used in this type of system for additional features as compared to a potable water system. Designers should ensure that flow rates for components meet water system design requirements. One manufacturer reports that about 25 percent of recirculated water is lost to evaporation so features that turn off and on should be used to control evaporation and chemical costs for treating water coming into the system.

The third type of system involves recycling the used water to irrigate landscaping and fields. This is less expensive than recirculated systems; however, there must be a means to collect the water, reuse it, and adequately dispose of it without over-saturation.

Themes:

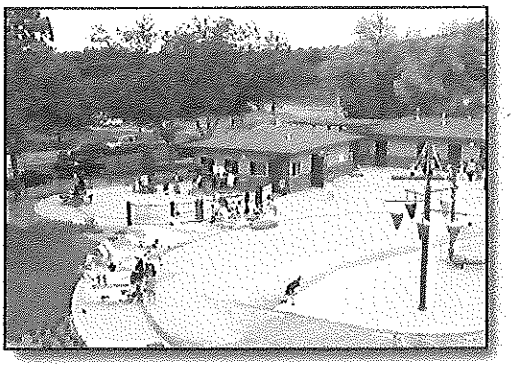
To help determine the park theme, consider local, cultural, historical or geographical influences. Spray components can often be customized based on themes to increase the play value of the park. There should be planning for the pattern of safe play around the number of toy components.

Location:

Choosing a location is important since it should be readily accessible and user friendly. If the spray park can be constructed near existing facilities, this will help reduce costs. Noise concerns should also be considered. Size, design, layout, volume of use, treated water systems, sewer access, electrical lines, and trees for shade, will also be factors in determining where to locate. Soil conditions should be evaluated to prevent pipe damage. If located near a swimming pool, this will attract users that wear swimsuits rather than street clothes and some patron behavior can be monitored. Asking patrons to shower is also an option if a swimming pool is nearby.

Safety and Design:

Although the cost to construct a spray park is less than a swimming pool, spray parks may be more complex than pools due to multiple underground fountains, working parts, and a complex system of hydraulics, plumbing and computerization. Using experienced designers and contractors will speed up construction, installation and eliminate costly errors. When considering a spray park, a pre-construction meeting is recommended to help ensure everyone is on the same page. This may involve plumbing and electrical contractors. A pool contractor may also be consulted if recirculation is involved or to provide input regarding pipe testing and pipe sizing. Spray parks should be designed by an architect or engineer together with a landscape architect.



Consideration should be given to park access, amenities such as bathrooms, changing rooms, drinking fountains, litter receptacles and areas for shade. To encourage families, provide comfortable seating, tables, and snack facilities within sight of the children. Nonparticipating parents or individuals watching children should also have comfortable seating. In an open park environment, fencing should only be used to separate the designated play area from hazards. A fence may be required if water of 2 inches or more can accumulate, since the area may be classified as a "pool" or "wading pool." There should not be any fencing or restrictions between the seating areas and areas of play. A lightning detection system that will shut down the system and notify users to take cover is also a good safety precaution.

The length of time for design and construction can be between two and 12 months. This may involve:

- Initial component, themes and water source considerations
- Final component selection
- Site drawings with services and grading submitted to the engineer or a design drawn up including a concept layout, pad layout, placement of components, dimensions, and piping plan
- Engineer approval of drawings and grading plan
- Approval of the plan by the client and architect, including final color and graphic selection
- Receipt of advance shipped anchor hardware
- Installation of footings, and site preparation of other components
- Manufacturing time for other components
- Receipt and installation of these components by the contractor, and
- Grand opening

The design may include both below ground and above ground features. Consider easily accessible brass

nozzles for flush spray features. For small toddlers, the below ground features are attractive because they are not aggressive and have a surprise element when turning off and on. Toddlers will enjoy lower flow nozzles and older patrons will enjoy more interactive elements.

The American Society for Testing Materials (ASTM) has two work items currently under development that should be evaluated by designers and manufacturers of the play items. These are Standard WK 498 New Practice/Guide for Aquatic Play Equipment for Public Use and Standard WK 1074 New Standard Practice for Manufacturer, Construction, Operations, Maintenance and Water Quality of Interactive Aquatic Play Equipment. Until ASTM develops the guidelines, one should follow other recognized precautions such as avoiding pinch points, protruding hazards, head or body entrapments, tripping hazards, and using no climbing devices or elevated platforms unless there is a well-sized, rubber surface that complies with ASTM F1292 for fall protection.

Reach, Maneuverability and Accessibility:

For those individuals using wheelchairs, the forward and side reach ranges in the following chart should also be followed:

Forward or Side Reach	Ages 3&4	Ages 5-8	Ages 9-12
High (maximum)	36 inches	40 inches	44 inches
Low (minimum)	20 inches	18 inches	16 inches

Accessible routes connecting play areas and components at ground level should have 60 inches minimum clear width with a maximum of 1:16 slope. The route may narrow down to 36 inches for a distance of 60 inches. This permits flexibility to work around site design features like existing equipment or trees. The required 60-inch width enables two wheelchairs to pass each other or to change direction. Smaller areas (those that are less than 1,000 square feet) may have ground-level accessible routes that are 44 inches clear width.

At ground level, objects may not protrude into the 60-inch wide space of an accessible route up to or below the height of 80 inches (2030 mm), measured above the accessible route surface. The 80-inch clearance applies only to the 60-inch accessible route, and is not required for the entire play area. The 80-inch vertical clearance applies to ground-level routes only, and not elevated routes. This allows features like protective roofs and sun shelters to be present.

Clear surface space is required at play components; however, maneuvering space can overlap the accessible route. For ground level items, a clear space of 30 inches by 40 inches minimum should exist. Incorporating additional circulation space around high-use play components creates extra room for movement and accessibility for everyone using the play area.

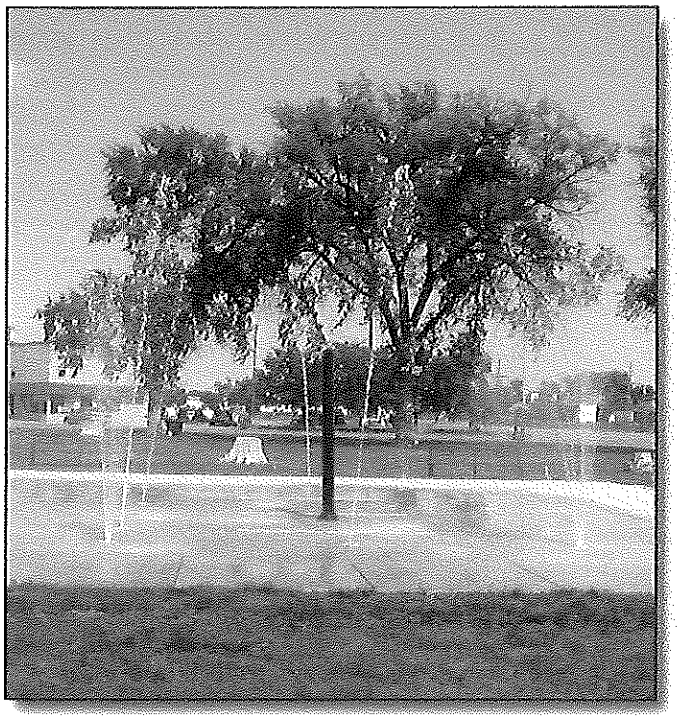
Elevated Items:

Most features are usually located at ground level. However, if the spray park will have elevated user items, the designer must consider the number of elevated and ground based items. For instance, if one elevated component is provided then there is no need to provide a minimum number and type of ground level components. If two to four elevated components are provided, then there must be a minimum of one ground level component. If there are five to seven elevated components, there must be at least two

ground level components of different types. Other considerations for elevated user features should included proper transfer platforms and steps, ramps, landings, maneuvering space, and handrails that comply with the ADA.

Surfacing:

The surface is an important consideration and the local health department may have specifications that need to be followed. A water impervious, nonporous surface will help prevent mold and biological build-up. Broom finished, colored, stamped or acid etched concrete is economical and easily cleaned by power washing. Rubberized surfaces have a higher maintenance cost and are difficult to clean. They may also provide a false sense of security if they are not designed for fall heights. Although rubberized surfaces have been used in some applications, their long term reliability in aquatic environments is still unproven. It has been reported that chlorine, ultraviolet rays and water break down the glue that binds the rubber, causing fragments to clog drains. The rubberized surface may also tear and allow water to seep in, resulting in bacteria and mold that may even find its way into the water supply. Some polyvinylchloride floors have also not held up. Surfaces for play components that are soft enough to limit injury from falls but that are also firm and stable enough for wheelchair maneuvering should be used to comply with the American with Disabilities Act (ADA). The guidelines rely on two standards from the American Society for Testing and Materials (ASTM). For wheelchair access, surfaces are required to be "firm, stable, and slip resistant" as specified in the American with Disabilities Act Accessibility Guidelines (ADAAG) and to meet the ASTM standard F1951-99, which is based on a measurement of the physical effort to maneuver a wheelchair across a surface. Accessible surfaces within the use zone (the ground level area beneath and immediately adjacent to a play item from which there is a fall potential) are also required to be "impact attenuating" in compliance with ASTM F 1292-99 requirements for drop testing.



Slope and Overspray:

The size of the pad will be determined by the number of features. The pad should be sloped towards drains and accommodate overspray due to wind. Slopes should be 2 percent to 5 percent with a maximum of 6.5 percent in wet areas. A typical overspray zone is six to ten feet. This will help avoid mud and grass clippings clogging drains and nozzles. The overspray area can be used as a buffer between the wet area and landscape. Consider predominant winds when designing the overspray zone. Surrounding walkways, which may slope away from the spray park, should provide sufficient drainage into the landscape. The low slope enables spray parks to comply with ADA accessibility requirements. Gratings should not be larger than one-half inch wide in one direction, with the long portion perpendicular to the dominant direction of travel.

Water Drainage:

Should the main drain become blocked there should be sufficient overflow drainage to limit the water depth to two inches or less. Drain covers should not cause dangerous suction or vortexes and be large enough to handle the escaping water.

Disease Control:

Controlling the possibility of disease is a major concern. In Seneca Lake, N.Y., a cryptosporidium (Crypto) outbreak in 2005 caused 4,000 people to become ill and resulted in a class action lawsuit against the state for monetary compensation. Crypto was found in the park's holding tanks. Crypto is a parasite that causes vomiting, diarrhea, fever, weight loss, and other symptoms. It can be spread through fecal matter in the water setting and takes nearly a week to be destroyed by chlorine. As a result, New York now requires switching to wading pools or an ultraviolet disinfection system, health permits for parks using recycled water, signs telling patrons with diarrhea to keep out of the area, and fencing to keep animals out.

Treatment of recirculated water with chlorine doesn't mean it is free of bacteria. A user can squat over a nozzle or a parent may change a diaper and rinse the baby in the spray, which can then become infected with recreational water illness (RWI). The contaminated water enters the drains, is filtered and sent to holding tanks where the free chlorine can quickly change. Automatic chlorine feeders and controllers must be tested regularly. If there is no chlorine or a fecal accident happens, RWI can occur. If recirculated, the water must be treated and operating equipment monitored to maintain safe water conditions.

Ultraviolet systems are very effective against bugs such as crypto. Manufacturers also recommend adopting an ozone system as an upgrade to the regular sanitation system. Many spray parks use nonrecirculated potable water that is sent to wastewater treatment or used to irrigate the landscape to avoid RWI's. Consider providing an independent shower if shower facilities are not nearby. Qualified personnel should be involved in the design of the water treatment, operation and maintenance of the system. They can help ensure water quality by backwashing filters, and cleaning strainer baskets for filters pumps, and feature pumps.

Automation:

Use a reputable and dependable computer control system to choreograph play features. Most spray parks are fully automatic. Automation consists of an activation device, a controller, and a distribution manifold. Although children anticipate features going off and on, they do not know when the next feature will activate. Figuring out the sequence creates a challenge. No one has to turn the system on and off each day. Automation allows the system to run on its own predetermined operational hours and sequencing, reduces water consumption, lowers operational costs, and increases interactive play.

Rules:

Signs should be posted to encourage appropriate behavior, help ensure safety, and minimize injuries. Rules should be posted conspicuously at the spray park and should include the following:

- Spray park hours of operation

- Please shower before use (if showers are provided)
- Do not drink the water
- Swim diapers are required for children under 4 years of age
- Individuals with diarrhea are not allowed
- Be courteous and respectful of others. Take turns. Have fun
- Children under 7 years of age must be accompanied by an adult
- Surfaces may be HOT – footwear is strongly recommended
- In case of injury or emergency, call 911
- Climbing on splash/spray items is not allowed unless the item is intended to be used in such a manner
- No alcoholic beverages or drugs are allowed
- Please keep food and beverages off the pad and use trash cans
- Pets are not allowed in the spray pad area
- No modification to spray features is permitted
- Clear the area when conditions for thunder or lightning are possible
- The (entity name) reserves the right to revoke use of the site privileges for individuals who are rowdy or do not obey the rules

Inspection and Maintenance:

Hire quality personnel who know what they are doing. During the winter, polish components every two months and keep them wrapped to reduce fading and winter damage. Parks will require regular cleaning of nozzles and fixtures, repairs due to use and vandalism, and maintenance of the pad. For recirculated water systems, chlorine levels should be checked several times a day, filters backwashed regularly, and circulation and turnover rates verified to be in compliance with health codes. Pads should also be cleaned to maintain the proper traction (coefficient of friction) to help prevent slip and fall injuries. Pads should be sprayed with bleach and features wiped down on a regular basis. If the pad is unguarded or unfenced, operators should look for pets, debris and other items that may end up on the pad. Monitoring and maintenance procedures should also be posted for the maintenance staff to follow. This may include when and how to test the water, corrective actions to be taken, and a cleaning schedule for the holding tanks washing the pad.

Sources of Information:
Aquatics International - http://www.aquaticsintl.com/
Waterplay - http://www.waterplay.com/index.php
SplashSpot

Sample Inspection Checklist

_____

Entity

Spray Park Checklist

Spray Park Name: _____ Inspector's Name: _____

Address: _____ Date: _____

	Yes	No	N/A	Comments
1. Have all previous unsafe conditions been corrected?				
2. Is the re-circulation system properly functioning?				
3. Do emergency shut down switches properly operate?				
4. Do all ground fault circuits properly trip?				
5. Are there any items that are corroded, deteriorated, broken, missing, or other potential hazards?				
6. Are the spray pad and access ways free of poor drainage and slipping and tripping hazards such as tree leaves and slime?				
7. Is the pad area clean?				
8. Is the spray pad free of debris, animal feces, rocks, glass or other foreign objects?				
9. Is the area adequately illuminated after dark?				
10. If available, is the emergency telephone properly functioning?				
11. Are all signs in good condition and free of vandalism?				
12. Are all points, corners and edges of items free of sharp areas?				
13. Are all items free of pinch, crush or shearing points?				
14. Are restrooms and water fountains clean and functioning properly?				
15. Is the perimeter environment such as benches and tables, etc. in good condition?				

Additional Comments:

Sample Audit

_____
Entity

Spray Park Audit

Spray Park Name: _____ Inspector's Name: _____
Address: _____ Date: _____

	Yes	No	N/A	Comments
Documentation				
1. Are documented inspections conducted at least monthly or at manufacturer recommended intervals for general maintenance and documented?				
2. Are all maintenance and repairs documented?				
3. Have provisions been made for the users to report unsafe conditions?				
4. Are all reported injuries investigated and corrective action taken if needed?				
5. Is documentation of testing maintained for re-circulated systems?				
Layout and Design of Spray Park				
6. If the water is re-circulated, does the disinfection comply with state regulations?				
7. Is an emergency shutdown station present that will disable all water circulation, mechanical, chemical feed and electrical devices?				
8. Are ground fault circuit interrupters present on electrical outlets and fixtures including mechanical rooms?				
9. Are drains and drain covers designed so that they will not create suction causing entanglement hazards or disembowelment?				
10. Is the area inspected for items that might corrode, deteriorate, break or become missing and other potential hazards?				
11. Is the area provided with adequate vehicle parking and safe access for pedestrians and bicyclists?				
12. Are attractive nuisance exposures such as utility poles, pad mounted transformers, utility boxes, and storm drains designed or locked to prevent access?				
13. Are the spray pad and access ways free of poor drainage, exposed pipes and slipping and tripping hazards such as tree roots, leaves, and irrigation heads, etc.?				

	Yes	No	N/A	Comments
Layout and Design of Spray Park (continued)				
14. Is the slope not less than ¼ inch per foot or more than ½ inch per foot?				
15. If the spray area is to be used after dark, is adequate lighting provided?				
16. Is the spray area visible from adjacent streets?				
17. Do the spray area parking lots, access ways, equipment and restrooms comply with the American with Disability Act (ADA)?				
18. Are restrooms and water fountains clean and functioning properly?				
19. Is a telephone available for emergency calls?				
20. Are signs present stating spray area rules and regulations?				
Surfacing				
21. Has the height of the equipment and the protective surfacing been evaluated to ensure compliance with the Consumer Products Safety Commission (CPSC) recommendations?				
22. Is the spray area impervious and easily cleanable?				
23. Is the protective surfacing free of debris, animal feces, rocks, glass or other foreign objects?				
Perimeter Environment and Shrubbery				
24. Is the perimeter environment such as benches and tables, etc. in good condition?				
General Hazards				
25. Are all points, corners and edges of items free of sharp areas?				
26. Have all items been evaluated for protrusion hazards as recommended by the CPSC?				
27. Are all items free of pinch, crush or shearing points?				
28. Has all equipment been tested according to the CPSC for entrapment hazards?				
29. Are all upward facing angles greater than 55 degrees? If not, are rigid shields which prevent a nine inch circular template from simultaneously touching on either side of the vertex installed?				
Stairways, Ladders and Handrails				
30. Do platforms over six feet in height have an intermediate standing surface?				

	Yes	No	N/A	Comments
Stairways, Ladders and Handrails (continued)				
31. Have stairways, ramps, stepladders and rung ladders been evaluated to ensure compliance with the recommended dimensions of the CPSC regarding slope, rung width, tread width, depth, and vertical rise?				
32. Are closed risers, and treads of stairways and ladders designed to prevent accumulation of sand, water, or other material?				
33. Are rungs of ladders, handrails and hand gripping components between 0.95 and 1.55 inches in diameter and secured to prevent turning? 1.25 inches are preferred.				
34. Are continuous handrails extending the full length of the access provided on both sides of all stairways and stepladders, regardless of the height of the access?				
35. Is the vertical distance between the top front edge of a step and top of the handrail between 22 and 26 inches for preschool age users? Is it between 22 or 38 inches for school age children?				
36. Are handrails designed to not create entrapment hazards?				
Platforms, Guardrails and Protective Barriers				
37. For preschool age children, are guardrails or protective barriers present on all elevated surfaces more than 20 inches above the protective surface or above another platform? Protective barriers should be used on all platforms over 30 inches above the protective surface. Unprotected openings can exist for climbing access and layered platforms.				
38. Is the top surface of the guardrails on equipment for preschool children at least 29 inches high and the lower edge no more than 23 inches above the platform?				
39. Is the top surface of the guardrails on equipment for school age children at least 38 inches high and the lower edge no more than 28 inches above the platform?				
40. Is the space below the top rail free of horizontal cross pieces used as in-fill which might also be used for climbing?				
41. If solid panels are used as in-fill for platform protection, are there some transparent areas to facilitate supervision?				
42. Unless there are alternate means of access/egress to platforms, is the maximum difference in height between stepped platforms 12 inches for preschool aged children? Is the maximum difference 18 inches for school age children?				
43. Is in-fill used to reduce the space between platforms to less than 3.5 inches if the space exceeds nine inches above the height of the lower platform?				

Additional Comments: On Back Page