Environmental Health Services Division
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www.kingcounty.gov/school-ehs

Public Health
Seattle & King County

Playground Safety

School Environmental Health and Safety Program

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Background

Play time is important for a child's development as it allows them to learn, explore, and interact with others. Playgrounds are key places where children can develop social skills, emotional stimulation, creativity and imagination, cognitive skills, and more. However, children can also get hurt on playgrounds.

Playground-related injuries are preventable. However, each year in the U.S., an estimated 200,000 children go to the emergency-room because of accidents at the playground. Falls are the most common cause of injury followed by equipment breakage, tip-over of equipment, design issues, assembly issues, entrapment, colliding with stationary equipment, and colliding with other children. Around 15 children die each year from playground incidents. Playground related deaths usually involve entanglement of ropes, leashes, or clothing; or impact from equipment tip-over or structural failure.

This document provides an overview of how to create a safe playground environment and support child development, including considerations and regulations when building, maintaining, and operating a school playground.

Key Risks & Hazards

Risk Factors for Playground Injuries

There are many reasons that children get injured at playgrounds. Some of the factors that increase the risk of kids getting hurt are:

Improper use/poor supervision

Poor maintenance

Inappropriate design

Site planning issues

Installation Errors

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Common Equipment Dangers

Some types of playground equipment are less safe than others. To reduce the risk of equipment-related injuries, we recommend installing equipment that follows the American Society for Testing and Materials (ASTM) standard.

See common equipment dangers below.

Surfacing (surface material)

Asphalt
Can cause serious injuries if a child falls onto this surface from play equipment.

Grass and compact soil
Grass is not thick enough to cusion a fall. It's less likely to absorb impact.

Slides

Metal Slides
Absorbs heat fast during sunny days which can cause skin burns. Can be slippery when wet which poses a slip and fall hazard.

Slide Exit Zone
Objects in the slide exit zone may hurt the child sliding down. This area should be cleared.

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Swings

S-Hooks
Open S-hooks and other protrusions can catch on a child's clothing. Ensure s-hooks have gaps that are less than the thickness of a dime.

Fiber Ropes
Not recommended for suspension as it degrades over time.

Fall Zones

3-Dimensional Climbers
Be mindful of fall zones. It's important that the bottom and surrounding area of a climber is protected to avoid injuries. The support of the climber above is right on the fall zone of the climber which can cause head injury if a child falls on it. We recommend installing 3-D climbers that do not have play equipment within their use zone and that are compliant with ASTM F-1487-21.

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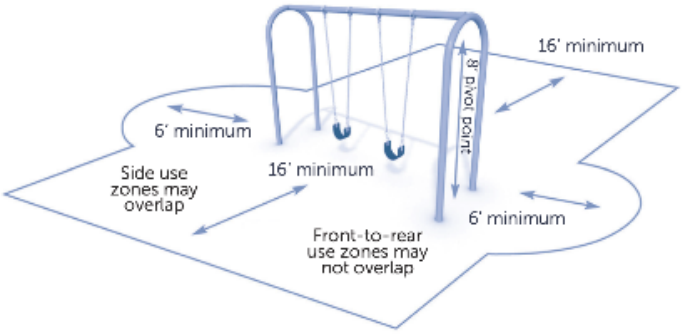
Additional Equipment Dangers



Equipment spacing and use zones
It's important to provide clearance between play structures to avoid accidents such as children on swings hitting another child or play structure.

Protrusions
Avoid having bolts extend over two threads or hooks with no safeguard. This can impale or cut a child. It can also catch on clothing which can present a strangulation hazard.

Enclosed/partially enclosed openings
These may present head and neck entrapments. Avoid openings that measure between 3.5 and 9 inches. It's important that children remove bike helmets before playing as this poses a strangulation hazard.

Resources for additional information:

- Consumer Product Safety Commission Public Playground Safety Handbook
- Relevant American Society of Testing and Materials (ASTM) standards:
  - ASTM F1487: Equipment for Public Use
  - ASTM F2373: Equipment for Children Under the Age of Two
  - ASTM F1148: Specification for Home Playground Equipment

To better minimize hazards, we recommend installing equipment that is ASTM certified/compliant.

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Guidelines & Recommendations

Site Design

Prior to constructing a playground, it's important to consider several factors regarding the physical site where the playground will be built. Ensuring the site can safely accommodate the equipment and prevent future hazards is an important step in the process.

Key site design recommendations:

- Use fencing or other separation from traffic to reduce the risk of younger children wandering off.
- Design landscape and barriers so playground users can be supervised (especially for play areas that have zones for all ages).
- Level the site to limit falls and ensure accessibility.
- Drain the site to prevent loose-fill surfacing from washing out during heavy rain periods.
- Do not locate playgrounds over a septic drain field.

Surfacing

Surfacing provides protection for head impacts and falls from playground equipment. To minimize serious head injuries, it is important to ensure that the surfacing materials used can effectively absorb impact. When deciding on surfacing, always review the site requirements provided by the manufacturer of equipment to ensure there's enough surface protection for the highest equipment.

Key recommendations for playground surfacing:

- **Grass, dirt, carpeting, and mats** are not as protective surfacing.
- **Loose fill** must not be used for play areas intended for toddlers as it can pose a choking hazard and ingestion of chemicals. If loose-filled materials are installed over hard surfacing (e.g., asphalt and concrete) additional requirements must be met (See 2.4.2.3 of CPSC Public Playground Safety Handbook)
- **Concrete, asphalt, and hard surfaces** must never be directly under playground equipment.
- **Dark-colored surfacing** may cause heat-related wounds as darker materials absorb heat.

User Age Group

It is important to be aware of the intended age group of the play area. This determines:

- Types of equipment that can and shouldn't be installed.
- Layout and landscaping of the playground. This includes use zones, buffer zones, and sight lines.
- Degree of supervision to minimize injuries.

Signs and labels must be provided to provide guidance on age appropriateness of the equipment.

Equipment Design

Playground design is important to stimulate children physically, emotionally, and cognitively. The equipment selection and design should also scale with their sizes and abilities and prevent injury. There are endless types of playground equipment to choose from today and it's important to select equipment that is properly designed and tested to ensure safe and stimulating play.

Key equipment design recommendations:

- **Fulcrum seesaws** should have padding underneath the seats, so a child's lower body won't be hurt from the impact between the seat and the ground.
- **Seesaw** maximum angles must not go over 25° to keep it at a safe height. This limits the risk of fall-related injuries and crushing hazards.
- **Slides** should have at least 6-8 feet of clearance at the end to reduce the risk of bumping into foot traffic and other playground equipment. Determine the proper exit zone measurement from the slide's height (See ASTM F1487-21).

Equipment Height

Below are questions to consider when determining the appropriate height of playground equipment.

- What is the intended age group?
- What surfacing material do you plan to install?
- What is the layout of surrounding equipment and use zones?

Resources for additional information:

- CPSC Public Playground Safety Handbook (Chapter 5)
- Relevant ASTM standards:
  - ASTM F1487: Standard Consumer Safety Performance Specification for Playground Equipment for Public Use
  - ASTM F2373: Standard Consumer Safety Performance Specification for Public Use Play Equipment for Children 6 Months through 23 Months
  - ASTM F1148: Standard Consumer Safety Performance Specification for Home Playground Equipment

Age-Appropriate Equipment

The table below outlines appropriate equipment for different age groups.

Toddler Ages 6-23 months	Preschool Ages 2-5 years	Grade School Ages 5-12 years
• Climbing equipment under 32" high • Ramps • Single file step ladders • Slides[1]	• Certain climbers[2] • Horizontal ladders less than or equal to 60" high for ages 4 and 5 • Merry-go-rounds • Ramps	• Arch climbers • Chain or cable walks • Free standing climbing events with flexible parts • Fulcrum seesaws

• Spiral slides less than 360° • Spring rockers • Stairways • Swings with full bucket seats	• Rung ladders • Single file step ladders • Slides[1] • Spiral slides up to 360º • Spring rockers • Stairways • Swings – belt, full bucket seats (2-4 years) & rotating tire	• Ladders – horizontal, rung, and step • Overhead rings[3] • Merry-go-rounds • Ramps • Ring treks • Slides* • Spiral slides more than one 360° turn • Stairways • Swings – belt & rotating tire • Track rides • Vertical sliding poles

Adapted from CPSC Public Playground Safety Handbook (PPSH)

1 CPSC Public Playground Safety Handbook (Chapter 5.3.6)
2 CPSC Public Playground Safety Handbook (Chapter 5.3.2)
3 CPSC Public Playground Safety Handbook (Chapter 5.3.2.5)

The table below outlines equipment not recommended for children 2-5 and for any public playground.

Children 2 to 5 years *equipment not recommended*	**Public Playgrounds *equipment not recommended***
• Free standing arch climbers • Parallel bars • Vertical sliding poles • Log rolls • Swinging gates • Overhead rings • Track rides • Free standing climbers with flexible components • Chain or cable walks • Fulcrum seesaws, unless spring-centering • Long spiral slides with more than one 360º turn	• Animal figure swings • Swinging gates and doors • Trapeze bars • Giant strides • Rope swings • Trampolines • Climbing ropes not secured on both ends • Swinging dual exercise rings • Multiple occupancy swings

Adapted from PHSKC_K-12 School Playground Plan Review Application and Process document.

Equipment Layout

Key equipment layout recommendations:

- Locate ADA transfer stations near school entrances to minimize travel distance.
- Add extra circulation zones to minimum required use zones to reduce congestion.
- Locate active, physical activities in a separate area from more passive or quiet activities.
- Disperse popular, heavily used equipment to avoid crowding.
- Locate composite structures so play and traffic patterns around adjacent components are complementary.

- Locate slide exits and moving equipment like swings and merry-go-rounds at the edge or corners of the playground.
- Guy wires, power lines and tree limbs should be at least 7 feet above the playground surface.

Resources for additional information:

- CPSC Public Playground Safety Handbook (section 2.2, pages 5 to 8)

Accessibility

Playgrounds should be accessible to children of all abilities to ensure that every child can enjoy a variety of activities. Below are some guidelines to help ensure compliance with the Americans with Disabilities Act:

Key accessibility recommendations:

- **Accessible routes**: At least one of each type of equipment and 50% of all equipment must have an accessible route. These routes should be at least 60-inches wide, connect the entry and exit points of equipment, have no more than a 1:16 slope, and not have any barriers.
- **Ramps:** Structures with 20 or more elevated play components must have ramps connecting to at least 25% of these components.
- **Options for elevated platforms:** Provide transfer platforms for children who'd prefer to leave their wheelchair below elevated platforms. Provide a clear space for wheelchairs to park on elevated platforms. This allows children to play with activities on elevated platforms (e.g. tic-tac-toe, telescope, etc.)
- **Surface material:** When choosing surfacing material, consider both the impact absorption and accessibility.

Resources for additional information:

- 2010 ADA Standards for Accessible Design
- Access Board – Accessibility Guidelines for Play Areas
- Relevant ASTM standards:
    - ASTM F1951-21 Standard Specification for Determination of Accessibility to Surface Systems Under and Around Playground Equipment
    - ASTM F1292-22 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment

Playground Plan Review and Inspections

The plan review process helps make sure that playground equipment will keep children safe. Public Health conducts plan reviews for new and remodeled public and private school playgrounds. We recommend submitting your application before purchasing and installing equipment. As part of the plan review process, Public Health also does preoccupancy inspections of the playgrounds. Learn more about School Plan Review.

Getting an annual inspection is also a good way to reduce playground risks. Contact the National Playground Safety Institute at certification@nrpa.org to learn about Certified Playground Safety Inspectors in your area that can conduct annual audits/ walkthroughs of an existing playground

Resources

- CPSC Public Playground Safety Handbook
- 2010 ADA Standards for Accessible Design
- Access Board – Accessibility Guidelines for Play Areas
- Virtual Playground Inspection
- **ASTM Standards**:
    - ASTM F1951-21 Standard Specification for Determination of Accessibility to Surface Systems Under and Around Playground Equipment
    - ASTM F1292-22 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment
    - ASTM F1487: Equipment for Public Use
    - ASTM F2373: Equipment for Children Under the Age of Two
    - ASTM F1148: Specification for Home Playground Equipment

Contact

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