
USACE / NAVFAC / AFCEA / NASA UFGS-11 68 13 (February 2009)

Preparing Activity: USACE Superseding
UFGS-11 68 13 (April 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2009

SECTION TABLE OF CONTENTS

DIVISION 11 - EQUIPMENT

SECTION 11 68 13

PLAYGROUND EQUIPMENT

02/09

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 DEFINITIONS
 - 1.2.1 Age-Appropriate
 - 1.2.2 Composite Structure
 - 1.2.3 Designated Play Surface
 - 1.2.4 Guardrail
 - 1.2.5 Maximum Equipment Height
 - 1.2.6 Play Event
 - 1.2.7 Protective Barrier
 - 1.2.8 Protective Surfacing
 - 1.2.9 Suspended Hazard
 - 1.2.10 Tot
 - 1.2.11 Use Zone
- 1.3 SYSTEM DESCRIPTION
 - 1.3.1 Child Safety
 - 1.3.2 Child Accessibility
 - 1.3.3 Age Groups
 - 1.3.3.1 Child Development Centers (CDC)
 - 1.3.3.2 Playground Areas Other Than CDC
 - 1.3.4 Equipment Identification
- 1.4 SUBMITTALS
- 1.5 QUALITY ASSURANCE
 - 1.5.1 Manufacturer Qualification
 - 1.5.2 Installer Qualification
 - 1.5.3 Manufacturer's Representative
 - 1.5.4 Technical Representative
 - 1.5.4.1 Child Development Centers (CDC)
 - 1.5.4.2 Playground Areas Other Than CDC
 - 1.5.5 Prohibited Equipment
 - 1.5.6 Shop Drawings
- 1.6 DELIVERY, STORAGE, AND HANDLING
- 1.7 WARRANTY
- 1.8 MAINTENANCE

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Metal

- 2.1.1.1 Steel
- 2.1.1.2 Aluminum
- 2.1.1.3 Chain
- 2.1.1.4 Rope Cable
- 2.1.1.5 Hardware
- 2.1.1.6 Rails, Loops, and Hand bars
- 2.1.1.7 Anchors

2.1.2 Wood

- 2.1.2.1 Wood Treatment
- 2.1.2.2 Plywood

2.1.3 Plastic Components

- 2.1.3.1 Panels
- 2.1.3.2 Window

2.1.4 Recycled Plastic

- 2.1.4.1 High Density Polyethylene
- 2.1.4.2 Panel
- 2.1.4.3 Structural Component
- 2.1.4.4 Recycled Plastic Molded As Lumber

2.1.5 Coatings

- 2.1.5.1 Galvanized
- 2.1.5.2 Polyester Powder
- 2.1.5.3 Polyvinyl Chloride (PVC)
- 2.1.5.4 Concrete
- 2.1.5.5 Precast Concrete
- 2.1.5.6 Cast-In Place Concrete

2.1.6 Wood Sealants

- 2.1.6.1 Paint
- 2.1.6.2 Sealants

2.1.7 Color

2.2 EQUIPMENT

2.2.1 Configuration

2.2.2 Substitution

2.2.3 Platform Height

- 2.2.3.1 Pre-Toddler Age Group
- 2.2.3.2 Toddler Age Group
- 2.2.3.3 Pre-School Age Group
- 2.2.3.4 School-Age Age Group
- 2.2.3.5 Pre-Teen Age Group

2.2.4 Protective Barrier and Guardrail

- 2.2.4.1 Protective Barrier
- 2.2.4.2 Guardrail

2.2.5 Sand Table

2.2.6 Multiple-Axis (Rotating) Swing

2.2.7 Single-Axis (To-Fro) Swing

- 2.2.7.1 General Requirements
- 2.2.7.2 Full Bucket Swing Seat

2.2.8 Spring Rocking Equipment

2.2.9 Roofs

2.2.10 Sliding Poles

2.2.11 Plastic Slide

2.2.12 Play House or Enclosures

PART 3 EXECUTION

3.1 SITE PREPARATION

- 3.1.1 Finished Grade and Underground Utilities
- 3.1.2 Layout
 - 3.1.2.1 General
 - 3.1.2.2 Use Zone
- 3.1.3 Orientation
- 3.1.4 Obstructions Below Ground
- 3.2 INSTALLATION
 - 3.2.1 Play Event Modification
 - 3.2.2 Wood Finishes
 - 3.2.3 Plastic Play Events
 - 3.2.4 Footings
 - 3.2.5 Multiple-Axis (Rotating) Swing
 - 3.2.6 Single-Axis (To-Fro) Swing
 - 3.2.7 Slide
 - 3.2.8 Chain or Rope Ladder, Climber or Net Climber
 - 3.2.9 Composite Structure
 - 3.2.10 Fall Height
 - 3.2.10.1 General
 - 3.2.10.2 Measuring Fall Height
 - 3.2.11 Signage
- 3.3 RESTORATION AND CLEAN UP
 - 3.3.1 Clean Up
 - 3.3.2 Protection
 - 3.3.3 Disposal of Materials
- 3.4 CHILD SAFETY AND ACCESSIBILITY EVALUATION
- 3.5 RE-INSTALLATION

-- End of Section Table of Contents --

USACE / NAVFAC / AFCEA / NASA UFGS-11 68 13 (February 2009)

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UFGS-11 68 13 (April 2006)

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SECTION 11 68 13

PLAYGROUND EQUIPMENT 02/09

NOTE: This guide specification covers the requirements for furnishing and installing manufactured playground equipment in children's outdoor play areas.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

NOTE: Designer should require materials, products and innovative construction methods, and techniques which are environmentally sensitive, take advantage of recycling and conserve natural resources.

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in

this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2008) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 135/A 135M	(2006) Standard Specification for Electric-Resistance-Welded Steel Pipe
ASTM A 153/A 153M	(2005) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 500/A 500M	(2007) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 513	(2008a) Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
ASTM B 108/B 108M	(2008) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B 117	(2007a) Standing Practice for Operating Salt Spray (Fog) Apparatus
ASTM B 179	(2006) Standard Specification for Aluminum Alloys in Ingot and Molten Forms for Castings from All Casting Processes
ASTM B 221	(2008) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 221M	(2007) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

ASTM B 26/B 26M	(2005) Standard Specification for Aluminum-Alloy Sand Castings
ASTM D 1248	(2005) Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D 1735	(2008) Testing Water Resistance of Coatings Using Water Fog Apparatus
ASTM D 2454	(2008) Determining the Effect of Overbaking on Organic Coatings
ASTM D 2794	(1993; R 2004) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(2008) Measuring Adhesion by Tape Test
ASTM D 3363	(2005) Film Hardness by Pencil Test
ASTM D 6112	(1997; R 2005) Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes
ASTM D 648	(2007) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ASTM D 822	(2001; R 2006) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM F 1487	(2007a ¹) Playground Equipment for Public Use

CONSUMER PRODUCT SAFETY COMMISSION (CPSC)

CPSC Pub No 325	(1997) Handbook for Public Playground Safety
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1.2 DEFINITIONS

1.2.1 Age-Appropriate

A term that describes equipment scale to include platform height, fall height and maximum equipment height, that allows safe and successful use by children of a specific chronological age; mental and physical ability; and anthropometric measurement. Maximum equipment height and complexity will not exceed a child's ability in that age group.

1.2.2 Composite Structure

Also "Composite Play Structure; Linked Structure". Two or more play events attached, directly adjacent or functionally linked, to create one integral unit that provides more than one play activity.

1.2.3 Designated Play Surface

Any elevated surface for standing, walking, sitting, or climbing; or a flat surface a minimum 50 mm 2 inches wide having up to a maximum 30 degree angle from horizontal. In some play events the platform surface will be the same as the designated play surface. However, the terms should not be interchanged as they do not define the same point of measurement in accordance with ASTM F 1487.

1.2.4 Guardrail

A device around an elevated surface that prevents inadvertent falls from the elevated surface.

1.2.5 Maximum Equipment Height

The highest point on the equipment (i.e., roof ridge, top of support pole).

1.2.6 Play Event

A piece of manufactured playground equipment that supports one or more play activities.

1.2.7 Protective Barrier

An enclosing device around an elevated surface that prevents both inadvertent and deliberate attempts to pass through the device.

1.2.8 Protective Surfacing

Material to be used within the use zone that meets the fall attenuation requirements of Section 32 18 16.13 PLAYGROUND PROTECTIVE SURFACING.

1.2.9 Suspended Hazard

Cable, wire, rope or similar devices suspended up to a maximum 2100 mm 7 feet high between play events; or installed up to a maximum 45 degree angle from the ground to the play event.

1.2.10 Tot

A child under 4 years of age in the pre-toddler and toddler age group.

1.2.11 Use Zone

The area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around equipment, and on whose surface it is predicted that a user would land when falling from or exiting the equipment.

1.3 SYSTEM DESCRIPTION

NOTE: Drawings will indicate the perimeters of the play event use zone defining fall height, platform height and maximum equipment height; spot elevations and details as required to install protective surfacing to meet child safety requirements.

Accessibility: Drawings will indicate spot elevations; dimensions; ramp slope and rise; transfer platform height and transfer space; transfer step and height; and maneuvering space as required to install play events to meet child accessibility requirements.

1.3.1 Child Safety

NOTE: Specify playground equipment in accordance with ASTM F 1487.

Playground Areas Other Than Child Development Centers (CDC): UFC 3-210-04, Children's Outdoor Play Areas, provides guidance for the age groups defined in paragraph AGE GROUPS concerning design of outdoor play areas for children. The manual describes the differences between unsupervised play areas such as family housing areas and supervised play areas such as child development centers. Site selection and analysis; user needs analysis; play area committee; age group criteria; play activities; play area relationships; child safety requirements; playground equipment; protective surfacing; and exterior plant materials are discussed in terms for designing a playground layout.

Child Development Centers (CDC): The CDC outdoor play area requirements are defined in the DA Standard Design Package for Child Development Centers and TI 800-01 Design Criteria, Appendix G, Child Development Centers. The CDC accommodate the age groups as defined in paragraph AGE GROUPS. UFC 4-740-14 discusses inspection frequency and preventative maintenance requirements to assist with selection of playground equipment.

Use Zones (Clear Area or Fall Zones): Play event use zone perimeters are measured in accordance with the requirements of paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS and paragraph FALL HEIGHT.

Provide play events that meet the child safety performance requirements described in CPSC Pub No 325 and ASTM F 1487. The requirements include the following: Head and neck entrapment; sharp points, edges, and protrusions; entanglement; pinch, crush, and shear points; suspended hazards; play event access and egress points; play event use zone perimeter; and design criteria. Since ASTM F 1487 criteria is defined for the minimum user through the maximum user (2 through 12 years of age), the requirements for the infant or pre-toddler age group are not prescribed. This specification and Section 32 18 16.13 PLAYGROUND PROTECTIVE SURFACING establish the requirements for the infant and pre-toddler age groups.

1.3.2 Child Accessibility

NOTE: Facilities will be accessible in accordance with TI 800-01 and 36 CFR 1191, Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities. Ensure that elevated play events will reasonably accommodate a user with mobility impairments. One access and egress point for a furnished play event must meet accessibility. Some play events will need to be installed higher to accommodate the transfer system. The maximum equipment height should be reduced to lower the cost of the transfer system. Ensure all children are accommodated on the playground in a 'play for all' socialization skill development environment. When children with disabilities are allowed to choose play events, they are more eager to learn the skills necessary to participate.

The accessibility requirement in accordance with ASTM F 1487 includes the following: When the play event use zone consists of a protective surfacing rated as unaccessible, provide at least one accessible route from the use zone perimeter to the play event. When there is more than one of the same play activity provided, only one shall meet accessibility requirements (i.e., one swing seat or one spring rocking play event). When the access and egress points are not the same for a play event, provide an accessible route to both. The accessible route shall access all accessible play events and elements. The protective surfacing performance requirements shall be in accordance with Section 32 18 16.13 PLAYGROUND PROTECTIVE SURFACING.

1.3.3 Age Groups

Play areas are designed to provide challenging play activities by age group. Design playground equipment to be age appropriate for the age group designated to use it. There is no anthropometric or fall attenuation significance to the discrepancy for the school-age age group between paragraph CHILD DEVELOPMENT CENTERS (CDC) and paragraph PLAYGROUND AREAS OTHER THAN CDC as described below. The Army age groups are defined as follows:

1.3.3.1 Child Development Centers (CDC)

The age groups accommodated by the CDC program range from 6 weeks through 8 years of age defined as the following: infant age group (6 weeks through 12 months); pre-toddler age group (12 through 24 months); toddler age group (2 through 3 years of age); pre-school age group (3 through 5 years of age); and school-age age group (5 through 8 years of age).

1.3.3.2 Playground Areas Other Than CDC

The age groups accommodated at these areas range from less than 12 months through 12 years of age defined as the following: infant age group (less than 12 months); pre-toddler age group (12 through 24 months); composite toddler/pre-school age group (2 through 5 years of age); school-age age group (5 through 9 years of age); and pre-teen age group (9 through 12 years of age). A multi-age playground consists of the following age groups: infant, pre-toddler, and composite toddler/pre-school age groups.

1.3.4 Equipment Identification

Identify playground equipment with attached and durable label stating the age-group that the equipment is designed to accommodate. Provide permanent WARNING labels and manufacturer's identification labels, ASTM F 1487.

1.4 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Configuration

Scale drawings defining the revised play event configuration.

Shop Drawings

Scale drawings defining the revised use zone perimeters and play event layout.

Fall Height

Scale drawings defining the revised depth or type of protective surfacing.

Finished Grade and Underground Utilities

Finished grade, underground utilities, storm-drainage system and irrigation system status; and location of underground utilities and facilities.

SD-03 Product Data

Equipment

Manufacturer's descriptive data; catalog cuts; references; and the latest edition of [ASTM F 1487](#) and [CPSC Pub No 325](#). Manufacturer's specifications, handling and storage requirements, installation procedures, and safety data sheets to include the following: bare or painted metal platform and slide bed orientation from the direct sun; warnings; and child safety performance standards.

Equipment Identification

A list to include part numbers of furnished play event and equipment materials and components.

Delivery, Storage and Handling

Delivery schedule and manufacturer's name.

Manufacturer Qualification

Name of the owner or user; service or preventive maintenance provider; date of the installation; point of contact and telephone number; and address for 10 sites.

Wood

Wood components obtained from managed forests.

Spare Parts

Manufacturer supplied spare parts.

Materials

Assembled play event structural integrity tests; vertical load tests; and the maximum number of users that can be on the play event.

SD-04 Samples

Color

[Two] [_____] color charts displaying the colors and finishes.

SD-06 Test Reports

Recycled Plastic

Individual component and assembled unit structural integrity test; creep tolerance; deflection tolerance; and vertical load test results. The estimated percentage of recovered material content in the material and components. Life-cycle durability.

Wood Finishes

Wood finish chemical content and toxicity level.

SD-07 Certificates

Materials

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include composition and tests to which the material has been subjected.

Manufacturer Qualification

Certificate of Insurance AA rated for a minimum one million dollars.

Installer Qualification

The installer's company name and address, and training and experience certification.

Manufacturer's Representative

The individual's name, company name and address, and playground safety training certificate.

Wood Treatment

Wood treatment chemical content, toxicity level, and life-cycle durability.

Substitution

Technical representative's written approval.

Play Event Modification

Manufacturer's written approval.

Child Safety and Accessibility Evaluation

Record of measurements and findings by the certified playground safety inspector. Verification stating that the installed play events and equipment meet manufacturer's recommendations and paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

SD-10 Operation and Maintenance Data

Maintenance Instructions

[Two] [_____] bound copies of the manufacturer's operation and maintenance manuals.

1.5 QUALITY ASSURANCE

1.5.1 Manufacturer Qualification

Play events and equipment similar to those furnished shall have been installed in a minimum 10 sites and been in successful service for a minimum 5 year calendar period. The manufacturer shall provide a Certificate of Insurance AA rated for a minimum one million dollars covering both product and general liability.

1.5.2 Installer Qualification

The installer shall be certified by the manufacturer for training and experience installing the play events and equipment.

1.5.3 Manufacturer's Representative

The manufacturer's certified playground safety inspector or the manufacturer's designated certified playground safety representative shall supervise the installation and adjustment of the play events and equipment to verify the installation meets the requirements of the manufacturer, this specification, and paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

1.5.4 Technical Representative

1.5.4.1 Child Development Centers (CDC)

The technical representative for outdoor play areas at CDC is the installation Child Development Services (CDS) Coordinator. Base the design of the CDC outdoor play area on the developmental play program for the age groups accommodated at the CDC. The play area is designed to support the CDC program and to provide a stage set for creative play. Developmental activities are selected which promote the intellectual, social, emotional and physical growth of the children. The developmental play program is developed by the MACOM CDS Director, installation CDS Coordinator and CDC Director. They are responsible for the developmental play program and the selection of play events to meet that program.

1.5.4.2 Playground Areas Other Than CDC

The technical representative for outdoor play areas on sites other than CDCs shall be the Director of Public Works or designated representative. Base the design of these outdoor play areas on the play program and the age groups to be accommodated as determined by the play area committee.

1.5.5 Prohibited Equipment

Equipment that does not meet the Army's developmental play program requirements and are prohibited on outdoor play areas include the following: chain balance beams; rotating equipment, such as merry-go-rounds, log rolls, whirls and may poles; fulcrum seesaws (teeter totters); spring rocking equipment intended for standing; animal figure swings; rope swings; multiple occupancy swings; swinging exercise and trapeze bars; swinging platforms; tire climbers; swinging dual exercise

rings; roller slides; trampolines; swinging gates or doors; and new or used vehicle tires. Also play houses or enclosures made of horizontal posts or bars with space between them; wood components treated with creosote, pentachlorophenol, and tributyl tin oxide; and wood components coated with a finish containing pesticide.

1.5.6 Shop Drawings

When the use zone perimeter and play event configuration conflict with the requirements and paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS, submit shop drawings defining corrective measures to include the following: Adjustment to the play event with the use zone perimeter; use zone perimeter overlaps; hard surface area and pathway widths; structures; exterior plant material and planters; walls and fences; and bare or painted metal platform and slide bed orientation to the direct sun.

1.6 DELIVERY, STORAGE, AND HANDLING

Provide a delivery schedule at least 10 calendar days prior to the first day of delivery. Inspect playground equipment, upon arrival at the job site, for meeting age-appropriate requirements for the age-group that the equipment is designated to accommodate, and specified quality in accordance with paragraphs MATERIALS and CONFIGURATION. Equipment shall be delivered, handled, and stored in accordance with the manufacturer's recommendations. Remove from the job site prohibited or unacceptable equipment. The storage area shall be as designated. Store the materials in a dry, covered area until installed.

1.7 WARRANTY

Furnished play events and equipment shall have a minimum 1 year calendar period warranty.

1.8 MAINTENANCE

Furnish the manufacturer's operation and maintenance manual containing the [Maintenance Instructions](#) and describing the recommended preventive maintenance, inspection frequency and techniques, periodic adjustments, lubricants, and cleaning requirements. Furnish play event and equipment [spare parts](#) provided by the manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

Provide materials which are the standard products of a manufacturer regularly engaged in the manufacture of play event products.

2.1.1 Metal

Metal components shall have factory-drilled holes and be corrosion resistant. The components shall be free of excess weld and spatter. Metallic materials shall conform to Section [05 50 13 MISCELLANEOUS METAL FABRICATIONS](#). Components with extra holes not filled by hardware or covered by components shall be rejected.

2.1.1.1 Steel

Steel components shall comply with [ASTM A 135/A 135M](#), [ASTM A 500/A 500M](#), or

ASTM A 513. Minimum tensile strength shall be 310 Mpa 45,000 psi. Minimum yield point shall be 225 Mpa 33,000 psi.

2.1.1.2 Aluminum

Extruded aluminum components shall be type 6061-T6, 6062-T6, or 6063-T6, and shall conform to ASTM B 221M ASTM B 221. Minimum tensile strength of extruded aluminum components shall be 270 Mpa 39,000 psi, and the minimum yield shall be 250 Mpa 36,500 psi. Cast aluminum alloy shall conform to ASTM B 179, ASTM B 26/B 26M, and ASTM B 108/B 108M.

2.1.1.3 Chain

Chain shall be a minimum size 4/0 and shall be corrosion resistant zinc plated. Polyvinyl chloride coating shall be as specified.

2.1.1.4 Rope Cable

Rope cable shall be composed of strands of steel cable with a polypropylene or Dacron synthetic covering that is UV stabilized. Cable ends shall be capped to prevent fraying.

2.1.1.5 Hardware

Hardware shall be corrosion resistant and consist of the following: aluminum, stainless steel, brass, zinc plated steel, zinc-chromate plated steel, or galvanized steel, ASTM A 153/A 153M. When secured, the hardware shall require a tool to prevent unauthorized loosening and removal.

2.1.1.6 Rails, Loops, and Hand bars

Rails, loops, and hand bars shall consist of corrosion resistant aluminum, powder-coated steel or galvanized steel. Polyvinyl chloride coating, if provided, shall be as specified.

2.1.1.7 Anchors

Anchors shall be in accordance with manufacturer's recommendations.

2.1.2 Wood

Wood components shall be exterior premium grade and free of knots. Identify wood components obtained from managed forests. Wood components shall have factory-drilled holes. Components with extra holes not filled by hardware or covered by other components will be rejected.

2.1.2.1 Wood Treatment

Treat wood components that are not naturally rot and insect resistant to resist rot and insect attack, by using standard treatment procedures. Any wood placed up to a maximum 150 mm 6 inches above, or any portion below the top elevation of the protective surfacing, shall be treated after fabrication. Creosote, pentachlorophenol, and tributyl tin oxide are prohibited according to ASTM F 1487.

2.1.2.2 Plywood

Provide plywood that is a minimum 19 mm 3/4 inch thick exterior premium grade, and adhered with a waterproof glue that will not separate under

conditions of prolonged freezing temperatures, extreme heat, or excessive moisture. Face layers shall be smooth, fine and tightly grained, free of knots, patches, or surface irregularities. Exposed surface shall consist of a material with high paint adhesion and retention characteristics. Edges shall be sanded smooth and eased to a minimum 3 mm 1/8 inch radius. Fill voids at edges with epoxy prior to sanding.

2.1.3 Plastic Components

2.1.3.1 Panels

Plastic panels shall be molded of ultraviolet (UV) and color stabilized polyethylene or nylon with a minimum 5 mm 3/16 inch thickness, ASTM F 1487. Edges shall be a minimum 5 mm 3/16 inch radius.

2.1.3.2 Window

Plastic windows shall be flat or molded into a bubble shape, consisting of clear polycarbonate plastic a minimum 5 mm 3/16 inch thick before forming in accordance with ASTM D 1248. Material shall be shatterproof and resistant to crazing, cracking, or fogging.

2.1.4 Recycled Plastic

Recycled plastic shall contain a minimum [85] [_____] percent of recycled post-consumer product conforming to EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS. Construct or manufacture recycled material with a maximum 6 mm 1/4 inch deflection or creep in any member, ASTM D 648 and ASTM D 6112.

2.1.4.1 High Density Polyethylene

NOTE: Ensure manufacturers supply quality plastic products made from post-consumer recycled high density polyethylene that is equal to the performance of metal or wood by providing tight performance standards. High density polyethylene can be manufactured using post-consumer recycled plastic resins from products such as milk containers. Recommend products using high density polyethylene.

Mold components of ultraviolet (UV) and color stabilized polyethylene consisting of a minimum 75 percent plastic profile of high-density polyethylene, low-density polyethylene, and polypropylene raw material. The material shall be non-toxic, have no discernible contaminants such as paper, foil, or wood, and contain a maximum 3 percent air voids. The material shall be free of splinters, chips, peels, buckling, and cracks and be resistant to deformation from solar heat gain. Material shall have factory-drilled holes. Components with extra holes not filled by hardware or covered by other components will be rejected. The material shall not be painted.

2.1.4.2 Panel

Panels shall be a minimum 6 mm 1/4 inch thick; exposed edges shall be smoothed, rounded, and free of burrs and points; and the material shall be

shatterproof and resistant to fading, cracking, or fogging.

2.1.4.3 Structural Component

Recycled plastic materials will not be used as load bearing structural members.

2.1.4.4 Recycled Plastic Molded As Lumber

NOTE: Recycled plastic molded as lumber and wood-polymer lumber are susceptible to both creep and deflection; therefore, it cannot be used for a load bearing structural member of playground equipment. To overcome creep and deflection, the product is increased in volume of material and dimension.

For deck or platform construction, the span of the structural support members shall be a maximum 300 mm 12 inches on center and recycled plastic decking shall connect to a minimum three joists. Material used for decking shall have a non-slip texture surface. The assembly shall deflect a maximum 1/360 of the span of the frame when exposed to a uniform live load of 585 N/m 40 lbs/ft, ASTM D 648. The product shall meet the structural integrity test requirements, ASTM F 1487 and ASTM D 6112.

2.1.5 Coatings

NOTE: Regional climatic conditions must be considered when selecting playground equipment. Regions that are extremely hot have considerations for equipment selection that are different from regions with freezing conditions. Contact burn injury or contact skin freezing are serious safety concerns. The coatings of the play equipment become extremely important to avoiding these conditions.

2.1.5.1 Galvanized

Metal components shall be hot-dipped in zinc after fabrication according to ASTM A 123/A 123M. Remove tailings and sharp protrusions formed as a result of the hot-dip process; edges shall be burnished.

2.1.5.2 Polyester Powder

Powder-coated surfaces shall receive electrostatic zinc coating prior to painting. Powder coating shall be electrostatically applied and shall be oven cured. Polyester powder shall be in accordance with the following: ASTM D 3359 for adhesion; ASTM D 1735 for flexibility; ASTM D 3363 for hardness; ASTM D 2794 for impact; ASTM D 2454 for overbake resistance; ASTM B 117 for salt spray resistance; and ASTM D 822 for weatherability.

2.1.5.3 Polyvinyl Chloride (PVC)

Prime PVC coating with a clear acrylic thermosetting solution. The primed parts shall be preheated prior to dipping. The liquid polyvinyl chloride

shall be UV stabilized and mold-resistant. The coated parts shall be cured. The coating shall be a minimum 2 mm 0.08 inch thick within a plus or minus 0.5 mm 0.020 inch tolerance. The coating shall have an 85 durometer hardness, ASTM D 3363. The finish shall be slip-resistant.

2.1.5.4 Concrete

Provide concrete conforming to Section 32 16 13 CONCRETE SIDEWALKS AND CURBS AND GUTTERS.

2.1.5.5 Precast Concrete

Provide precast concrete material conforming to Section 03 45 00 PRECAST ARCHITECTURAL CONCRETE.

2.1.5.6 Cast-In Place Concrete

Provide cast-in-place concrete material in conformance with Section 03 31 00.00 10 CAST-IN-PLACE ARCHITECTURAL CONCRETE.

2.1.6 Wood Sealants

Exposed wood surfaces shall have factory applied prime coat with a minimum [2] [_____] spray coats of two-component polyurethane or approved preservative that meets paragraph WOOD TREATMENT.

2.1.6.1 Paint

Factory apply paint using a minimum of 2 coats. Paint shall comply with Section 09 90 00 PAINTS AND COATINGS and be weather resistant, cracking, peeling and fading.

2.1.6.2 Sealants

Seal all applied surfaces from air; sealants containing pesticide are prohibited.

2.1.7 Color

Color shall be provided [as indicated] [in accordance with Section 09 06 90 COLOR SCHEDULE] [_____].

2.2 EQUIPMENT

NOTE: Ensure the play events selected are age-appropriate for the age group designated to use them.

Playground Areas Other Than Child Development Centers (CDC): CPSC Pub No 325 and ASTM F 1487 both describe the requirements for children from the toddler through pre-teen age group (2 through 12 years of age). Consult UFC 3-210-04, Children's Outdoor Play Areas, for guidance concerning children in the infant through pre-toddler age groups (less than 12 months through 2 years of age).

Child Development Centers (CDC): The CDC program

accommodates children from 6 weeks through 8 years of age. The CDC outdoor play area requirements for these age groups are defined in the DA Standard Design Package for Child Development Centers and TI 800-01 Design Criteria, Appendix G, Child Development Centers. UFC 4-740-14 Child Development Centers, discusses inspection frequency and preventative maintenance requirements may assist with the selection of playground equipment.

2.2.1 Configuration

Provide play event configuration, platform height, fall height, and maximum equipment height [as indicated] [_____]. When the configuration varies from the play event shown, provide shop drawings defining the configuration to include the following: equipment layout with the use zone perimeter; designated play surface spot elevations; maximum equipment height spot elevations; platform spot elevations; protective barriers; guardrails; bare or painted metal platform and slide bed orientation; and play events in relationship to the playground layout.

2.2.2 Substitution

Substitutions will not be allowed and play events will not be selected without written approval from the technical representative. Evaluate manufacturer substitutions which increase the play event platform height or maximum equipment height. The increased height requires additional protective surfacing in accordance with paragraph FALL HEIGHT.

2.2.3 Platform Height

Platform height is used to define the age group for age appropriate play events and composite structures. To be age appropriate, the platform height shall meet the finished elevations of the age groups in the following paragraphs. For some play events, platform height and paragraph FALL HEIGHT are the same.

2.2.3.1 Pre-Toddler Age Group

Platforms designed for children 12 through 24 months of age shall have a finished elevation a maximum 900 mm 36 inches above the finished elevation of the protective surfacing.

2.2.3.2 Toddler Age Group

Platforms designed for children 2 through 3 years of age shall have a finished elevation a maximum 1200 mm 48 inches above the finished elevation of the protective surfacing.

2.2.3.3 Pre-School Age Group

Platforms designed for children 3 through 5 years of age shall have a finished elevation a maximum 1200 mm 48 inches above the finished elevation of the protective surfacing.

2.2.3.4 School-Age Age Group

Platforms designed for children 5 through 8 years of age shall have a

finished elevation a maximum 1800 mm 72 inches above the finished elevation of the protective surfacing.

2.2.3.5 Pre-Teen Age Group

Platforms designed for children 8 through 12 years of age shall have a finished elevation a maximum 1800 mm 72 inches above the finished elevation of the protective surfacing.

2.2.4 Protective Barrier and Guardrail

Provide protective barriers and guardrails in accordance with paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS. This specification establishes the protective barrier and guardrail requirements for the infant and pre-toddler age group.

2.2.4.1 Protective Barrier

The protective barrier for pre-toddler, toddler, and pre-school age groups shall be provided on elevated surfaces a minimum 760 mm 30 inches above the protective surfacing. The protective barrier for school-age and pre-teen age groups shall be provided on elevated surfaces a minimum 1200 mm 48 inches above the protective surfacing. The protective barrier shall completely surround the elevated surface except for the access or egress route. As infants are not to be placed on an elevated surface, the protective barrier for the infant age group shall be the same as the crawl wall defined in paragraph MEASURING FALL HEIGHT.

2.2.4.2 Guardrail

The guardrail for pre-toddler, toddler, and pre-school age groups shall be provided on elevated surfaces a minimum 510 mm 20 inches above the protective surfacing. The guardrail for school-age and pre-teen age groups shall be provided on elevated surfaces a minimum 760 mm 30 inches above the protective surfacing. The guardrail shall completely surround the elevated surface except for the access or egress route. As infants are not to be placed on an elevated surface, the guardrail for the infant age group shall be the same as the crawl wall defined in paragraph MEASURING FALL HEIGHT.

2.2.5 Sand Table

NOTE: Ensure sand tables are located where play activity will not restrict or conflict with circulation.

The sand table with a cover shall be as shown. The cover shall not be attached to the table. The sand sieve size shall be provided as defined in Section 32 18 16.13 PLAYGROUND PROTECTIVE SURFACING.

2.2.6 Multiple-Axis (Rotating) Swing

The swivel mechanism shall contain a durable long life bearing to reduce friction and wear. A tire manufactured specifically for a multiple-axis swing shall be provided and shall weigh a maximum 15.8 kg 35 lb. The tire shall be composed of rotationally molded, low density elastomer, and internally reinforced with a steel ring. The tire shall have no openings for insects or water. The multiple-axis swing shall not be confused with

the multiple occupancy swing as they are not the same.

2.2.7 Single-Axis (To-Fro) Swing

2.2.7.1 General Requirements

The swing seat shall be molded of high quality rubber or polyurethane with an encapsulated steel reinforcement. The swing seat shall be designed to accommodate one user

2.2.7.2 Full Bucket Swing Seat

A full bucket swing seat is designed to accommodate children up to a maximum 4 years of age; the seat is used by a child with adult assistance. The swing seat shall be constructed of rubber with a tempered steel insert molded inside, shall be double-sided, shall be enclosed by rubber both front and back, and shall include a 360 degree waist enclosure and leg enclosures. Leg enclosures shall be sized to avoid head or neck entrapment. Finish shall be smooth and edges shall be rounded. These swing seats shall not be mixed with other swing seats within a bay.

2.2.8 Spring Rocking Equipment

Spring mechanisms shall conform to the requirements for pinch, crush, and shear points for a maximum 54 kg 120 lb weight limit in accordance with ASTM F 1487. Seats shall be designed to accommodate only the intended number of users.

2.2.9 Roofs

Roofs shall contain no designated play surface.

2.2.10 Sliding Poles

Sliding poles shall be a maximum 48 mm 1.9 inch diameter and a continuous surface with no protruding welds or joints along the sliding area.

2.2.11 Plastic Slide

NOTE: Plastic is the preferred slide material, and shall be installed to face in any direction but north.

The slide shall be molded of UV stabilized polyethylene or nylon with minimum of 5 mm 3/16 inch wall thickness. The edge shall be a minimum 5 mm 3/16 inch radius, ASTM D 1248, Type II, Class A, Grade G4.

2.2.12 Play House or Enclosures

Provide the play house with a shelf at the window. The play house and enclosures will be designed to provide other than direct outside visibility from a minimum 1.5 m 5 feet to all inside corners.

PART 3 EXECUTION

3.1 SITE PREPARATION

3.1.1 Finished Grade and Underground Utilities

Verify that finished grades are as indicated; the smooth grading has been completed in accordance with Section 31 00 00 EARTHWORK; installation of the underground utilities through the area has been completed in accordance with Section 31 00 00 EARTHWORK; installation of the storm-drainage system through the area has been completed in accordance with Section 33 40 00 STORM DRAINAGE; and the installation of underground sprinklers through the area has been completed in accordance with Section 32 84 24 UNDERGROUND SPRINKLER SYSTEMS. The location of underground utilities and facilities in the area of the operation shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

3.1.2 Layout

3.1.2.1 General

The layout of the entire outdoor play area shall be staked before excavation begins to include the following: all play event configuration access and egress points; use zone perimeters; hard surface areas and pathway widths; exterior plant material and planters; walls and fences; and structures. Provide sufficient space between all adjacent play events and individual play events for play activities and circulation. Moving and rotating play events shall be located away from circulation to prevent collisions.

3.1.2.2 Use Zone

The use zone is associated with the following terms; "Clear Area," and "Fall Zone". The use zone shall be free of hard surfaces, objects or obstacles that a child could run into or fall on top of and be injured. The use zone shall consist of protective surfacing in accordance with the requirements of Section 32 18 16.13 PLAYGROUND PROTECTIVE SURFACING. Use zone perimeters shall not overlap hard surfaces. The use zone perimeter shall meet or exceed the requirements of paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS. Use zone perimeters shall not overlap except for certain play events as defined in ASTM F 1487.

3.1.3 Orientation

Bare or painted metal platforms and slide beds shall be oriented from the direct sun; or shaded to reduce contact burn risk. Play events that require orientation to adjacent play events or to meet visibility requirements shall be properly oriented.

3.1.4 Obstructions Below Ground

When obstructions below ground affect the work, submit shop drawings showing proposed adjustments for approval.

3.2 INSTALLATION

Play events shall be installed according to the manufacturer's recommendations and as shown to meet the requirements of paragraph CHILD SAFETY AND ACCESSIBILITY STANDARDS.

3.2.1 Play Event Modification

Site modifications of play events affect the coverage provided in paragraph WARRANTY; therefore, play events and equipment shall not be modified without the written approval of the manufacturer.

3.2.2 Wood Finishes

Field applied or touch up of wood finishes shall meet the same specifications as finishes applied at the factory.

3.2.3 Plastic Play Events

Plastic and recycled plastic components shall be connected by stainless steel hardware. The hardware shall be countersunk. Recycled plastic molded as lumber or wood-polymer lumber shall be installed in accordance with the manufacturer's recommendations.

3.2.4 Footings

The top elevation of play event footings will be installed at the subbase of the protective surfacing.

3.2.5 Multiple-Axis (Rotating) Swing

The multiple-axis (rotating) swing shall be located away from other play events and circulation. It shall not be attached to a composite structure.

3.2.6 Single-Axis (To-Fro) Swing

The single-axis (to-fro) swing shall be located on the perimeter of the outdoor play area. It shall not be attached to a composite structure.

3.2.7 Slide

The required exit region clear area shall be provided in accordance with ASTM F 1487.

3.2.8 Chain or Rope Ladder, Climber or Net Climber

A chain or rope ladder; climber; net climber; and similar components shall be installed in the vertical position. Angled or arch positions are not accepted.

3.2.9 Composite Structure

The composite structure use zone perimeter shall be composed of the use zone perimeters of the play events that, when joined together, comprise the composite structure.

3.2.10 Fall Height

NOTE: To assist manufacturers in providing the required depth of protective surfacing, the fall height and the maximum equipment height dimensions and spot elevations for each play event must be shown on the drawings.

3.2.10.1 General

The fall height is defined as the vertical distance between the finished elevation of the designated play surface and the finished elevation of the protective surfacing beneath it. For some play events the fall height and paragraph PLATFORM HEIGHT are the same. For some play events the fall height and maximum equipment height are the same. When the furnished play event fall height varies from the play event shown, shop drawings defining the revised depth or type of protective surfacing to meet or exceed the requirements of Section 32 18 16.13 PLAYGROUND PROTECTIVE SURFACING shall be provided.

3.2.10.2 Measuring Fall Height

EQUIPMENT	MEASURING FALL HEIGHT
Composite Structure:	For a platform surrounded by protective barriers, measure from the platform finished elevation. For a platform surrounded by guardrails, measure from the guardrail top elevation.
Infant Crawl Area:	A maximum 600 mm height, measured from the crawl wall or barrier finished elevation.
Playhouse, Nonclimbable:	Measure from the designated play surface finished elevation.
Spring Rocking Equipment:	Measure from the seat top elevation.
Stationary Equipment, Climbable:	Measure from the maximum equipment height finished elevation.
Stationary Equipment, Nonclimbable:	Measure from the designated play surface finished elevation.
Swing:	Measure from the bottom of the pivot point.

EQUIPMENT	MEASURING FALL HEIGHT
Composite Structure:	For a platform surrounded by protective barriers, measure from the platform finished elevation. For a platform surrounded by guardrails, measure from the guardrail top elevation.
Infant Crawl Area:	A maximum 24 inch height,

EQUIPMENT

MEASURING FALL HEIGHT

measured from the crawl wall
or barrier finished elevation.

Playhouse, Nonclimbable:

Measure from the designated
play surface finished elevation.

Spring Rocking Equipment:

Measure from the seat top
elevation.

Stationary Equipment, Climbable:

Measure from the maximum
equipment height finished
elevation.

Stationary Equipment, Nonclimbable:

Measure from the designated
play surface finished elevation.

Swing:

Measure from the bottom of the
pivot point.

3.2.11 Signage

For playground areas other than CDC, durable permanent signage shall be provided to identify the age group the equipment is designed to accommodate. Signage shall be in accordance with Section 10 14 01 EXTERIOR SIGNAGE.

3.3 RESTORATION AND CLEAN UP

When the operation has been completed, clean up and protect the site. Existing areas that have been damaged from the operation shall be restored to original condition at the Contractor's expense.

3.3.1 Clean Up

The site and play events shall be cleaned of all materials associated with the operation. Play events and surfaces shall be cleaned of dirt, stains, filings, and other blemishes occurring from shipment and installation. Cleaning methods and agents shall be as recommended by the manufacturer. Required labeling shall be undamaged and visible in accordance with paragraph EQUIPMENT IDENTIFICATION.

3.3.2 Protection

The area shall be protected as required or directed by providing barricades and signage. Signage shall be in accordance with Section 10 14 01 EXTERIOR SIGNAGE.

3.3.3 Disposal of Materials

Excess and waste material shall be removed and disposed off Government property.

3.4 CHILD SAFETY AND ACCESSIBILITY EVALUATION

a. When the protective surfacing is installed the play events and protective surfacing shall be thoroughly inspected and measured to verify the playground meets manufacturer's recommendations, paragraph

CHILD SAFETY AND ACCESSIBILITY STANDARDS, and paragraph FALL HEIGHT.

b. The play events shall be age appropriate for the age group using them in accordance with paragraph PLATFORM HEIGHT. Determine 1) secure anchoring; 2) all hardware and connectors are tight; 3) all hardware and connectors require tools to loosen; 4) all hooks are closed; 5) head and neck entrapment; 6) sharp points, edges, and protrusions; 7) entanglement; 8) pinch, crush, and shear points; 9) suspended hazards; 10) all component holes are filled; and 11) recycled plastic components used as load bearing structural members.

c. Use zone distances shall be measured to determine the area is free of hard surfaces, objects or obstacles. Determine exceptions to use zone overlaps occur in accordance with paragraph USE ZONE. Play event fall height shall be measured and compared to critical height value for thickness of installed protective surfacing. The slide exit region shall have the required clear zone. Play events and surfaces shall be properly oriented. Chain, rope, net climbers or similar components shall be installed in a vertical position. Swing seat clearances shall be measured while occupied by a maximum user for the age group using the equipment. Warning labels and manufacturer identification labels shall be visible in accordance with paragraph EQUIPMENT IDENTIFICATION.

d. Play events that do not comply shall be reinstalled. Fasteners, anchors, hardware and labels that do not comply shall be replaced. Ensure positive drainage for the area and the lowest elevation of protective surfacing subgrade has been provided. A written report describing the results of the evaluation shall be provided.

3.5 RE-INSTALLATION

When re-installation is required, accomplish the following: Re-install the product as specified. Provide new replacement materials supplied by the manufacturer. Material acquisition of replacement parts is the responsibility of the Contractor. Damage caused by the failed installation shall be repaired at the Contractor's expense.

-- End of Section --