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Design & Construction Standards:

TECHNICAL GUIDELINES

Division 11

11 53 00 Laboratory Equipment

11 57 00 Vocational Shop Equipment

11 61 43 Stage Curtains

11 65 00 Athletic and Recreation Equipment

11 68 13 Play Equipment and Surfacing

FACILITY MANAGEMENT

April 2016

SECTION 11 53 00

LABORATORY EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lab Equipment:
 - 1. Fume Hoods
 - 2. Ice Maker
 - 3. Lab Glassware Washers
 - 4. Chemical Storage Cabinet

1.02 QUALITY ASSURANCE

- A. All powered equipment shall be UL rated.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fume Hoods
 - 1. Vertical sash design.
 - 2. Pre-wired and plumbed for gas, hot/cold water, compressed air, electrical outlets and vapor sealed light fixture and switch.
 - 3. Back-flow prevention device shall be installed on the outside of the cabinet.
 - 4. Integral ventilated base cabinet.
 - 5. All power outlets and switches shall be located on the exterior face of the hood (not internal).
 - 6. Internal hood lights shall be fitted with vapor seal lenses.
 - 7. Minface velocity of roof parameter. Maximum 120.
- B. Ice Maker
- C. Lab Glassware Washers
- D. Chemical Storage Cabinets:
 - 1. 30 gallon minimum size flammable cabinet.
 - 2. 15 gallong mimimum acid cabinet.
 - 3. 4 gallon flammable cainet to be provided where ammonia netrate is used (high schools).
 - 4. All steel construction with integral reservoir base.
 - a) Chemical resistant, baked-on enamel coating
 - b) Interior polypropylene lining
 - 5. Locking doors
 - 6. Chemical spill reservoir
 - 7. Acid resistant shelving
 - 8. Self-closing doors
 - 9. OSHA and NFPA-30 approved
 - 10. Separate poly cube to be provided for nitric acid storage.

PART 3 EXECUTION No Requirements

END OF SECTION 11 53 00

SECTION 11 57 00

VOCATIONAL SHOP EQUIPMENT

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop drawings and product data.
- B. Operation and Maintenance manuals.
- C. Provide record drawings of unit and venting system (both electronic and hard copy formats).
- D. Special permits for flammable/combustible use by Denver Fire Department.

PART 2 PRODUCTS

2.01 FABRICATION

- A. All booths shall comply with all regulatory agencies having jurisdiction, including but not limited to: NEC, OSHA, NFPA, IBC and Denver Code requirements and be UL listed.
- B. All booths to have a steel or concrete non-combustible floor.
- C. All booths shall have the following interlocks:
 1. Prevents spraying while drying.
 2. Ventilation system safe atmosphere and auto shut off drying when ventilation fails.
 3. Auto shut off drying if air temperature exceeds 160 degrees.
- D. All booth surfaces shall be smooth, continuous to facilitate cleaning and air movement.

2.02 MATERIALS

- A. Self supporting 18 gauge galvanized steel panels.
- B. Exhaust fans are of non-sparking construction. The motor drive and bearings are to be sealed from the air stream of the exhaust.
- C. Filters: Capture efficiency 99.6% down to 3 microns (all UL Listed) using standard sizes.
- D. Built-in overhead fluorescent lighting behind sealed clear tempered (explosion proof) safety glass (all UL listed).
- E. Switch shall be covered and all wiring installed so as to be explosion proof.
- F. Provide permanent signage that lists approved uses by the manufacturer, including no smoking sign.
- G. Provide 100 LFPM face velocity minimum.
- H. Line booths with fire resistant paper adhered with masking tape.

PART 3 EXECUTION

3.01 SPARE PARTS

- A. Provide the following:
 1. Replacement filters (one set)
 2. One roll of fire resistant paper (Flame-A-Guard) as available from NAPA Auto Parts or other vendors.

END OF SECTION 11 57 00

SECTION 11 61 43

STAGE CURTAINS

PART 1 GENERAL

1.01 QUALITY ASSURANCE

- A. All curtains shall be treated for flame resistance in accordance with requirements of NFPA 701.
- B. Installer shall have a minimum of 5 years experience installing stage curtains.
- C. Acceptable installers are:
 - 1. Production Resource Group
 - 2. Norcostco
 - 3. Barbizan
 - 4. SECOA
 - 5. Dincler

1.02 SUBMITTALS

- A. Shop drawings and product data.
- B. Operation and maintenance manuals.
- C. Certification fabric meets requirements for flame resistance.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

- A. Provide stage curtain fabrics as manufactured by one of the following:
 - 1. Dazian, Inc.
 - 2. K/M Fabrics, Inc.
 - 3. Melfabco, Inc.
 - 4. Frankel Associates, Inc.
 - 5. Valley Forge Fabrics
- B. Provide straight tracks as manufactured by one of the following (curved tracks as approved by DPS):
 - 1. Silent Steel Model No. 280, Automatic Devices Co.
 - 2. Tru-roll Model No. 1000, Brosh Scenic Studios, Inc.
 - 3. Atlas Silk Model No. 400, H&H Specialties, Inc.
 - 4. Besteel Model No. 170, Automatic Devices Co.
 - 5. Atlas Steel Model No. 101, H&H Specialties, Inc.

2.02 FABRICATION

- A. Main curtain shall be bi-parting with a three foot center overlap.
- B. Minimum valance depth shall be three feet.
- C. Main curtain and valance shall be pleated and be of matching fabric.
- D. Travelers and or walk-alongs such as mid-stage or concert curtains shall have bi-parting panels with a three foot center overlap.
- E. Side Curtains shall have bi-parting panels with a two foot overlap.

- F. Masking curtains and legs shall be made in pairs and also of a pleated fabric.
- G. Provide not less than 50 percent additional fullness for curtains, unless otherwise indicated. Horizontal seams and fabric less than half-width are not permitted.
- H. Vertical hems: Provide vertical hems not less than 3 inches wide, stitched and machine sewn with no salvage material visible from front of curtain.
- I. Turnbacks: Where specified, provide turnbacks, formed by folding 24 inches of face fabric back at each end of panels and securing by sewing across top hem and grommets through both layers of fabric.
- J. Top hems: Reinforce top hems by double-stitching 3-1/2 inches wide heavy jute webbing to top edge with minimum 1" of face fabric turned under.
- K. Pleats: Provide fullness in curtains by sewing 6 inches of additional material into box pleats spaced at 12 inches centers along top hem reinforcing. Provide not less than #4 brass grommets spaced at 12 inches and centered on box pleats, for tie lines or "S" hooks.
- L. Bottom hems: For floor –length curtains, provide 6" hems with separate interior heavy canvas chain pockets equipped with No. 8 cadmium-plated jack chain. Stitch chain pocket so chain rides 2 inches above bottom edge of curtain.
- M. Lining: Provide lining for each curtain in same fullness as face fabric, and finished 2 inches shorter than face fabric. Unless otherwise specified, provide lining constructed of IFR Black Avora (or similar) for all velour curtains, and FR Black Denim (or similar) for all non-velour curtains. Cycloramas shall be unlined. Attach lining to face fabric along bottom and side seams with 4-inch long strips of heavy woven cotton tape.
- N. Front Setting: Front curtains shall be fabricated of heavy polyester velour with 24 inch turnbacks at each end of both panels.
- O. Steel tracks shall be fabricated not less than .075 inch (14 gauge) nominal thickness galvanized roll formed steel with continuous bottom slot, and with each half of track in one continuous piece. Provide curtain carriers for track spaced at 12 o.c.
- P. Use only heavy duty tracks- equip track with heavy –duty live – end double pulley and heavy duty dead-end single pulley, with 5 inch cast-iron or nylon wheels on ball bearings, enclosed in steel housings. Provide curtain carriers of molded nylon with a pair of neoprene or nylon-tired ball bearing wheels riveted to body. Equip carriers with neoprene or rubber bumper, heavy duty swivel eye, and trim chain for attaching curtain snap or S hook. Provide end stops for track and adjustable floor block designed to maintain proper tension on 3/8 inch stretch resistant operation line of braided polypropylene or fiberglass center cord.

2.03 MATERIALS

- A. Curtain materials:
 - 1. Main curtain and valance and all travelers:
 - a) 100 % polyester/
 - b) 25 oz minimum weight/
 - c) Manufacturer's standard colors and patterns of fabric (non-premium).
 - d) Manufacturer's available pleat options/
 - 2. Drops & scrim- 95 %cotton/5% polyester:
 - a) White/
 - b) Black/
 - 3. Cyclorama - Either FR Leno-Filled Scrim or IFR Unbleached Muslin:
 - a) Available neutral colors/
 - 4. Masking (Legs and Borders):

- a) For elementary and middle schools – FR cotton twill (REPP) or IFR twill (REPP), Black, minimum 15 oz.
 - b) For high schools – IRF velour, black, minimum 21 oz.
- B. Specify lining materials.

PART 3 EXECUTION No standards

END OF SECTION 11 61 43

SECTION 11 65 00

ATHLETIC AND RECREATION EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Indoor Athletic and Recreation Equipment:
 - 1. Fixed (location and height) and fold-up (fixed height) basketball hoops and backboards.
 - 2. Fixed sleeve for volleyball nets and poles.
 - 3. Climbing ropes.
 - 4. Climbing walls, pads and rigging
 - 5. Moveable net partitions to separate courts and/or spaces.
 - 6. Wall mounted storage racks for storage of floor pads.
 - 7. Wall mounted arm ladders- at K-8 and E.S. only.
 - 8. Wall mounted adjustable chinning bar- K-8, M.S., H.S. only.
 - 9. Protective padding.
 - 10. Training room equipment:
 - a). Whirlpools.
 - b). Ice machine.
 - 11. Aerobic exercise equipment:
 - a). Mirrors
 - b). Bars

1.02 QUALITY ASSURANCE

- A. All equipment shall meet the requirement of State of Colorado athletic standards or other agencies having jurisdiction, including those of Colorado High School Athletic Scholastic Association (CHSASA), Colorado High School Activities Association (CHSAA)

PART 2 PRODUCTS

2.01 FABRICATION

- A. Indoor Equipment:
 - 1. Basketball:
 - a) Fixed height goals in H.S. & M.S.
 - b) Adjustable height goals in E.S. & K-8.
 - c) Clear acrylic backboards only at main goals of H.S. & M.S., all others are steel.
 - d) Fixed rims at all locations except the main goals in H.S. and M.S. where break-aways shall be provided.
 - e) Keyed and powered retractable goals shall be provided with the largest motor available by the manufacturer and utilized where approved by DPS.
 - f) Bolt on protection pads shall be provided at the bottom of backboards of the main goals.
 - g) Crash pads shall be mounted on wall behind main goals and folding goals.
 - h) 2" minimum thickness pads.

- i) Mount 12" above floor to a height of 7'-0" above floor. (not required if wall is more than 15 feet from the edge of the court).
 - j) Provide pads to a width of 16'-0" centered on goal and be removable.
 - k) Cut out around any wall mounted objects, switches, outlets, etc.
 - l) Anchor pads at the bottom with clips, and at top with a continuous track (no hooks)
2. Volleyball:
- a) Provide removable floor sleeve system in H.S. & M.S. only.
 - b) Provide a bolt down pole in E.S. & K-8.
 - c) Provide carts for pole system.
3. Climbing Ropes:
- a) Provide vinyl boot with ring.
 - b) Provide pulley, rope and counterbalance weight to pull rope out of way.
 - c) Provide wall mounted cleats (mounted 6'-0" above the floor).
 - d) Provide Dacron rope (no hmp or polyethelene).
 - e) Provide maximum height tambourine ring to govern allowable climbing heights.
4. Climbing Walls:
- a) Coordinate with DPS.
5. Moveable net partition:
- a) Overhead coiling with powered operation (keyed).
 - b) Provide solid vinyl panels at lower 8'-0" with open fabric mesh above.
 - c) Horizontal tracks are prohibited.
6. Protective padding:
- a) Provide vinyl covered urethane foam.
 - b) Color as selected from manufacturer's standards.
7. Training Room Equipment:
- a) Whirlpools.
 - b) Provide only at H.S.
 - c) Stainless Steel.
 - d) Single person units.
8. Aerobic Exercise Equipment:
- a) Mirrors are to be tempered glass.
 - b) Mirrors are from 6" to 6'-0" above the floor.

PART 3 EXECUTION

3.02 SPARE PARTS

- A. Provide 2 winches for tennis nets, and two nets for each 4 courts.

END OF SECTION-11 65 00

SECTION 11 68 13

PLAY EQUIPMENT AND SURFACING

PART 1 - GENERAL

A. Safety: Safety reference standards:

1. American Society for Testing and Materials (ASTM) designation F 1487 – 98 (or current issue) “Standard Consumer Safety Performance Specification for Playground Equipment for Public Use”.
 - a. U.S. Consumer Product Safety Commission (CPSC) “Handbook for Public Playground Safety” (Publication No. 325) (based on ASTM F 1487) Internet address: <https://www.cpsc.gov/PageFiles/122149/325.pdf> CPSC “Playground Surfacing Materials” (Publication No. 3005 325).

B. General:

1. Safety surfacing shall be installed under all play apparatus and within all play apparatus fall zones, use zones, and safety zones.
2. Safety surfacing materials shall have a Critical Height value (see CPSC guidelines) of at least the height of the highest accessible part of the play apparatus.
3. DPS Operations and Maintenance will provide engineered wood fiber (EWF) maintenance tools for each site, including “corn cob forks” and “clam rakes.”

C. Unacceptable Safety Surfacing Materials:

1. Sand
2. Wood chips, bark mulch, or wood mulch not certified by ASTM.
3. Any type of gravel including squeegee.

D. Engineered Wood Fiber (EWF) Safety Surfacing:

1. EWF System Design:

a. Depth Of EWF:

- 1) Minimum compacted (aged and used 90 days) depth of EWF is 12” in all safety surfacing areas.
- 2) Initially install EWF to a minimum depth of 15” in all playground areas requiring safety surfacing. It is anticipated that the EWF will compact over time to the minimum required 12” depth.

b. Drainage Layer Beneath EWF:

- 1) Provide a minimum 3” deep layer of drainage rock beneath the entire EWF surface.
- 2) The subgrade beneath the drainage layer shall be designed to direct water to a storm water drainage system.

c. Containment Of EWF:

- 1) Design perimeters of EWF areas with a minimum curb height of 4” and a maximum curb height of 6” above the surface of the compacted EWF.
- 2) Do not include geotextile fabric between the drainage layer and the EWF material.
- 3) Geotextile fabric needs to be placed between compacted subgrade and drainage layer, as well as wrapping any drainage material associated with a dry well system.

d. Ramps

- 1) Landscape Architect or Civil shall design ramps for accessible transitions between play area perimeters and surface of EWF. Refer to the play pit ramp drawing.
 - 2) In some circumstances, it may be necessary to use a resilient safety surface other than EWF for access path surfacing. In this case poured-in-place surfacing may be specified.
- e. Access
- 1) All EWF pits need to be accessible by the Grounds Department's maintenance trucks for the delivery of materials and future maintenance.
2. Drainage System Design: Site Drainage
- a. EWF drainage system shall be designed by the Landscape Architect or Civil Engineer.
 - b. The Landscape Architect or Civil Engineer shall design a subsurface drainage system sufficient to prevent standing water in EWF areas.
 - c. Design drainage system to remove a 3 inch rainfall within 4 hours.
 - d. Design drainage system so that no free water remains 12 hours after precipitation ends.
3. Certifications:
- a. The architect is to pull the current standards for the playground equipment and fall zones at the time of design and apply those to the design and specs.
 - 1) EWF and resilient tiles shall meet impact attenuation requirements of ASTM F 1292 - Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.
 - 2) Meet requirements of ASTM F 1951, Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.
 - 3) Meet accessibility requirements of the ADAAG.
4. Submittals (provided by Supplier to Playground Designer and DPS):
- a. Product Data:
 - 1) Submit product data for poured-in-place safety surfacing.
5. EWF System Material Specifications:
- a. Acceptable EWF Systems:
 - 1) "Fibar"
 - 2) "Soft Fall / Soft Step"
 - 3) "Woodcarpet"
 - 4) or pre-approved equivalent
 - b. Resilient Tiles:
 - 1) Playground Designer shall research and specify current available products.
 - 2) Thickness shall be determined by manufacturer, as appropriate to fall height and to meet certification requirements noted above.
 - 3) Play surface tiles are preferred.
- E. Overall Design Criteria:
1. Play apparatus standards apply primarily to elementary school level playgrounds, for children through 12 years of age. If play apparatus is designed for middle school or high school level students, minimum requirements contained in this standard shall apply.

2. Separation of play apparatus in separate pits and by age group is recommended. Combinations of composite play structures and individual elements of play apparatus are anticipated.
3. Accessible play elements shall be integrated into every play area.
4. All requests for substitutions must be submitted in writing with supporting documentation by or through the Contractor to the Landscape Architect for initial review 7 to 10 days prior to bid, before being submitted to the Owner for evaluation and final approval. Subject to compliance with requirements, the equipment may be provided by the following preferred manufacturers:
 - a. Miracle
 - b. Playworld Systems
 - c. Gametime
5. Each apparatus area must include stickers mounted on equipment indicating age appropriateness of play apparatus. Text to be determined during construction.

F. Safety:

1. Safety Certifications:
 - a. Design, materials and installation shall be in accordance with ASTM F 1487-98, including associated CPSC Guidelines.
 - b. Manufacturer's certification: A manufacturer's representative shall provide an on-site inspection and written certification that play apparatus has been installed according to specifications, including safety surfacing.
2. Safety Zones, Fall Zones & Use Zones:
 - a. Determined by Playground Designer and Manufacturer.
 - b. Shall be indicated for both existing and new play apparatus.
 - c. Shall be indicated on construction drawings.
 - d. Shall be indicated on manufacturer's shop drawings.

G. Accessibility:

1. Certifications:
 - a. Play apparatus identified as accessible shall be in accordance with the ADAAG.
2. Wheelchair Transfer Points:
 - a. Grade level access surface and transfer platform, steps and ramps on play apparatus shall be large enough to be useful. Meet minimum dimensions recommended by accessibility standards referenced above.
 - b. If feasible, locate wheelchair transfer points in close proximity to the bottom of slides.
 - c. A primary goal should be wheelchair access of play equipment without the need to transfer from the wheelchair.
3. Accessible Paths Within Composite Play Apparatus Structures:
 - a. Meet minimum dimensions recommended by standards referenced above.
 - b. Consider the possibility that a mobility impaired student may be able to crawl up steps from the transfer platform. Maximum four steps are allowable from one platform to another.
 - c. Where a wheelchair accessible ramp is provided for access onto a composite play structure, a continuous accessible route shall be provided to another accessible exit from the play structure. Where a separate accessible exit is not feasible, a platform of sufficient size shall be provided to allow a student using a wheelchair adequate space to turn around in order to exit.

4. Building Access To Playground:

- a. Design at least one ADA ramp from the asphalt playground (if one doesn't exist) to a building entry point.

H. Heights Of Play Apparatus:

1. General:

- a. Playground Designer shall design apparatus "fall heights" to meet "critical height" limitations of safety surfacing materials. Refer to CPSC Handbook Table 2 and Part 5.
1) On all DPS playgrounds, safety surfacing is to be installed at minimum compacted depth of 12 inches.
b. "Critical height" of safety surfacing is defined in the CPSC Handbook.
c. "Fall heights" of equipment are defined in CPSC Handbook.
d. Maximum Heights For DPS Play Apparatus:
e. In addition to apparatus height limitations recommended by the CPSC Handbook, DPS recommends the following maximum play apparatus heights:
1) Pre-Primary (ECE) And Primary Play Apparatus Maximum Heights:
a) Maximum platform or access height: 1'-0" lower than recommended height in CPSC Handbook
b) Height of swing set top rail:
- Pre-primary (ECE): 1'-0" lower than recommended height in CPSC Handbook
- Primary: 8 feet
2) Intermediate Play Apparatus Maximum Heights:
a) Maximum platform or access height: 8 feet.
b) Height of swing set top rail: 8 feet.

I. Playground Safety Signs:

- 1. The playground apparatus manufacturer shall provide a permanent sign at each play area that indicates the age groups that the play apparatus is designed to accommodate.

J. Specific Play Components:

1. Sand Box / Sand Table:

- a. Strongly recommended for every elementary level play area.
b. Provide raised area to allow student in wheelchair to transfer into sandbox.
c. Provide shade over portion of play sand area.
d. Design must provide custom fit cover for sand pit to meet health code requirements. (example: Sandlock).
e. Provide straps or stakes at midpoints to retain shape of sandbox.

K. Play Sand:

1. Application:

- a. Use for sandboxes only.

2. Specifications:

Table with 2 columns: Sieve and % Passing. Rows include #4 (100%), #8 (40-85%), #16 (0-30%), and #200 (0-2%).

3. Slides:
 - a. Slides (except spiral slides) shall face north.
 - b. No covered slides.
4. Activity Panels:
 - a. Unacceptable types of activity panels include:
 - 1) Activity panels that contain only painted graphic images .
 - 2) Panels containing clear acrylic windows or mirrors.
 - b. Acceptable types of activity panels include:
 - 1) Steering wheels.
 - 2) Tic tac toe games.
 - 3) Games such as picture match, number sequences, shape and color sequences.
5. Swings:
 - a. Provide a minimum one accessible swing at each playground.
 - b. An accessible swing should not share a bay with a standard swing.

Non-traditional Play Elements:

- c. Non-traditional play elements such as logs, mounds, etc. are encouraged for playgrounds, provided they comply with DPS and CPSC safety standards.
- d. Boulders (real or manufactured), logs, and non-traditional climbing equipment within playgrounds shall be considered as individual pieces of play apparatus. Provide safety surfacing. Provide safety zones and fall zones per CPSC guidelines.
- e. Any artificial rock/boulder shall not have a hollow cavity whereby students can hide in or become trapped in.

L. Minimum Apparatus Requirements To Promote Developmental Skills: Coordinate with DPS.

1. New play apparatus shall be provided to promote specific developmental areas, including: gross upper body, gross lower body, fine motor, social, imaginative and cognitive skills

M. Play Apparatus To Avoid:

1. Track rides, track slides.
2. Roller slides.
3. Open bed slides 8 feet high.
4. Multi-occupant swings.
5. Rope swings.
6. Merry-go-rounds.
7. Seesaws and teeter totters.
8. Trampolines.
9. Gliders.
10. Solid-wall crawl tubes.
11. Triple shot/ Triple shootout from Playworld systems.

12. Certain Types of Dome climbers that lack support in the middle and bend down. Example would be the super satellite from Playworld systems.
 13. Rope climbers.
 14. Diggers without stop pins (only allow 180 degrees of rotation).
- N. Existing Apparatus:
1. Evaluation:
 - a. Playground Designer shall evaluate existing apparatus that may be affected by a construction project. Evaluation shall be relative to these standards.
 - b. Evaluation will be used to determine whether individual pieces and assemblies of play apparatus should be left untouched or modified in place, relocated, or demolished.
 2. Relocation:
 - a. When it is feasible to relocate existing play apparatus, responsibilities for removal, modification, and reinstallation shall be clearly indicated by the Landscape Architect or Civil Engineer in the construction documents.
 - b. DPS Maintenance will be assigned the responsibility of relocating or modifying existing play apparatus only with prior approval of DPS.
 3. Modification:
 - a. When it is feasible to modify existing play apparatus, the Landscape Architect or Civil shall assure that the designed modifications meet all current applicable safety and accessibility guidelines and requirements.
 4. Traveling Rings (also called “Ringers” or “Giant Stride”)
 - a. This type of play apparatus is no longer manufactured.
 - b. Do not relocate traveling rings.
 - c. If new steps are needed for traveling rings, steps will be provided by DPS Maintenance.
 5. Unacceptable Materials:
 - a. Wood
 - b. Concrete
 - c. Rubber vehicle tires
 - d. “Home made” apparatus that do not meet DPS and CPSC standards.
 6. Materials And Fabrication:
 - a. Support Posts, Uprights:
 - 1) Material: Galvanized steel, minimum 12 gauge.
 - a) Yield strength: 55,000 psi.
 - b) Tensile strength: 50,000 psi.
 - 2) Size: Minimum 4 1/2” outside diameter (5” outside diameter preferred)
 - a) Smaller diameters may be approved for Pre-Primary (ECE) playgrounds only, and only by DPS.
 - b) Note: No posts on DPS sites shall be smaller than 3-1/2” diameter.
 - 3) Finish: Baked on, polyester powder coated paint:
 - a) Epoxy or hybrid paints not acceptable.
 - b. Other Structural Members, Including Handrails And Guardrails:

- 1) Material: Galvanized steel
 - 2) Size: Diameter of steel tubing will vary according to manufacturer's recommendations. Minimum 1 5/16" outer diameter.
 - 3) Finish: Baked on, polyester powder coated paint.
 - a) Epoxy or hybrid paints not acceptable.
 - b) On handrails, textured or knurled surfaces are preferred for better grip.
- c. Plastic Components:
- 1) Material: rotationally molded, linear, low density polyethylene with UV inhibitors.
 - 2) Minimum wall thickness: 0.250" (Except as allowed for roofs)
- d. Decks, Including Platforms, Ramps, Walking Surfaces, Bridges, Slide Ladders:
- 1) Vinyl coated
 - 2) Fully welded
 - 3) Perforated 12 gauge steel horizontal surfaces.
- e. Slides:
- 1) One piece double wall plastic (two pieces acceptable for 8' high slides)
 - 2) Stainless steel preferred, minimum 16 gauge, if budget allows.
- f. Chain:
- 1) Vinyl coated galvanized steel.
 - 2) Chains for swings will NOT be vinyl coated – (Comes off looks terrible)
- g. Roofs:
- 1) Metal preferred, for durability.
 - 2) Rotationally molded plastic acceptable.
 - 3) Tensile fabric on a case by case basis.
- h. Hardware, Accessories, Fittings:
- 1) Post Caps:
 - a) Cast aluminum.
 - b) Finish: Baked on, polyester powder coated paint.
 - Epoxy or hybrid paints not acceptable.
 - 2) Clamps:
 - a) Cast or die cast aluminum or stainless steel.
 - b) Finish: Baked on, polyester powder coated paint.
 - Epoxy or hybrid paints not acceptable.
 - 3) Fasteners:
 - a) All fasteners shall be tamper-proof stainless steel.
 - b) All nuts shall be lock nuts.
 - c) Lock nuts shall have safety caps.
 - 4) Permanent Labels:

- a) Apply to apparatus, or on sign close to apparatus.
 - b) Identify play apparatus manufacturer.
 - c) Include appropriate safety warnings.
 - d) Indicate age appropriateness of equipment.
- 5) Elevation Of Safety Surfacing:
- a) Manufacturer shall permanently mark optimum safety surfacing grade level on every post. Marking shall be a simple line and shall not be identified.
7. Installation:
- a. Landscape Architect or Civil Engineer and Installer shall ensure that all potential underground utilities and structures are located prior to digging.
 - b. Playground equipment shall be installed only by person trained and certified by the manufacturer.
 - c. Installer shall verify that sub grades are properly prepared and compacted.
 - d. Beginning of installation indicates acceptance of existing conditions.
 - e. Installer shall field verify locations of all apparatus with DPS representative before proceeding with installation.
 - f. Installer shall provide concrete footings to dimensions indicated by play apparatus manufacturer.
 - 1) Concrete shall meet DPS standards.
 - g. Protect all excavations from erosion and flooding during apparatus installation.
- O. Edges And Containment:
- 1. Fences:
 - Refer to DPS specifications 32 00 00– Site work, and 32 31 13– Chain Link Fencing.
 - 2. Curbs:
 - a. Playground Designer shall design retaining curbs at perimeters of EWF.
 - 1) Top of curb shall be 2 inches above finished surface of material to be contained at installation.
 - b. Curbs shall be cast-in-place concrete
 - c. Play pit design shall not have any shape that renders portions of the play pit unsuitable for play equipment placement.
- P. Walks And Paving:
- 1. Some schools need sidewalks within playgrounds for tricycles and other rolling play equipment.
 - a. If sidewalks are placed for rolling play equipment consider wavy walks and rumble strips
 - 1) If wavy walks are used ensure the play area and walks are still ADA accessible.
 - b. Sidewalks are to be designed to DPS standards
 - 2. Avoid use of asphalt for sidewalks.
 - 3. Refer to DPS Standards Section 32 00 00– Sitework, Section 32 13 13 – Concrete Paving, and Section-32 12 16 – Asphalt Paving.
- Q. Plant Materials:
- 1. Refer to DPS Standard Specification-32 90 00- Landscaping.
- R. Irrigation:

1. All plant materials on all DPS sites shall be irrigated by automatic irrigation systems. Refer to DPS Specification 32 84 00 for irrigation system standards.

S. Water

1. Exterior drinking fountains are discouraged on DPS sites.
2. If possible, locate student playgrounds close to building entrances where interior drinking fountains may be accessed easily.
3. If water play features are desired, the Playground Designer shall coordinate all such designs with DPS. Standing water will not be allowed in water play features. Safety and long term operations and maintenance considerations will prevail over other design considerations.

T. Landscape Furnishings:

1. Refer to DPS Standard 32 40 21– Site Furnishings.
2. Place site furnishings on pavement or other inorganic surfacing.

U. Bicycle Parking:

1. Need and requirements to be determined by individual schools. Not mandatory, except as required by Denver Zoning Administration.

V. Refer to DPS Standard 32 40 21– Site Furnishing

END OF SECTION 11 68 13