SECTION 096466 - WOOD ATHLETIC FLOORING

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. SUMMARY
				1. This Section includes wood athletic flooring.
				2. Related Requirements:

Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 096400 "Wood Flooring" for traditional solid-wood and engineered-wood, strip, plank, and parquet flooring.

* + - 1. DEFINITIONS
				1. MFMA – Maple Flooring Manufacturers Association.
			2. COORDINATION

Retain "Coordination" Article if Project includes concrete-slab depressions or floor inserts for volleyball post standards or other gymnasium equipment. Floor inserts are specified in Section 116623 "Gymnasium Equipment."

* + - * 1. Coordinate layout and installation of slab depressions to accommodate layout and height of wood athletic flooring assembly.
				2. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.
			1. SUBMITTALS
				1. General: Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wood athletic flooring.

* + - * 1. Sustainable Design Submittals:
				2. Shop Drawings: For each type of floor assembly, include the following:

Plans, sections, and attachment details.

Retain first subparagraph below if concrete-slab depressions are required.

Details of concrete-slab depressions.

Retain first subparagraph below if various grades of wood floor are required.

Locations of different grades of wood flooring.

Expansion provisions and trim details.

Layout, colors, widths, and dimensions of game lines and markers.

Locations of floor inserts for athletic equipment installed through flooring assembly.

Retain "Samples" paragraph below for single-stage Samples, with a subordinate list if applicable. Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs for two-stage Samples.

* + - * 1. Samples: For each exposed product and for each color and texture specified, approximately 12 inches long in size.

Include Sample sets showing the full range of normal color and texture variations expected in wood flooring.

Include Sample sets showing finishes[**and game-line and marker paints**] applied to wood flooring.

* + - * 1. Samples for Initial Selection: For each type of wood athletic flooring and accessory in each type of exposed color and finish.

Include manufacturer's color charts showing colors and glosses available for the following:

Floor finishes.

Game-line and marker paints.

* + - * 1. Samples for Verification: For each type of wood athletic flooring and accessory required; approximately 12 inches long and of same thickness and material indicated for the Work.

Include Sample sets showing the full range of normal color and texture variations expected in wood flooring.

Include Sample sets showing finishes[**and game-line and marker paints**] applied to wood flooring.

Manufacturers measure assembly performance differently. See "Measuring Assembly Performance" Article in the Evaluations. "Product Test Reports" paragraph below assumes manufacturer's standard tests are acceptable unless specific requirements are added to the "Performance Requirements" Article.

* + - * 1. Product Test Reports: For each wood athletic flooring system, for tests performed by a qualified testing agency.
			1. CLOSEOUT SUBMITTALS
				1. Maintenance Data: For wood athletic flooring and finish systems to include in maintenance manuals.
			2. QUALITY ASSURANCE

Retain "Installer Qualifications" paragraph below to require an MFMA-accredited Installer. Verify that installers are available to perform work in Project location using list of accredited installers available online through MFMA.

* + - * 1. Installer Qualifications: A firm or individual that has been approved by MFMA as an accredited Installer according to the MFMA Accreditation Program.

Installer responsibilities include installation and field finishing of wood athletic flooring components and accessories, and application of game lines and markers.

* + - * 1. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for installation.

Indicate portion of floor represented by mockup on Drawings or draw mockup as separate element.

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Director’s Representative specifically approves such deviations in writing.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Deliver floor assembly materials in unopened cartons or bundles.
				2. Protect wood from exposure to moisture. Do not deliver wood components until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.
				3. Store wood components in a dry, warm, well-ventilated, weathertight location and in a horizontal position.
			2. FIELD CONDITIONS
				1. Conditioning period begins not less than seven days before wood athletic flooring installation, is continuous through installation, and continues not less than seven days after installation.

Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants, but not less than 35 percent or more than 50 percent, in spaces to receive wood athletic flooring during the conditioning period.

Wood Conditioning: Move wood components into spaces where they will be installed, no later than beginning of the conditioning period.

Do not install wood athletic flooring until wood components adjust to relative humidity of, and are at same temperature as, spaces where they are to be installed.

Open sealed packages to allow wood components to acclimatize immediately on moving wood components into spaces in which they will be installed.

* + - * 1. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
				2. Install wood athletic flooring after other finishing operations, including painting, have been completed.
1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. MANUFACTURERS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=11767) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Aacer Flooring, LLC](http://www.specagent.com/Lookup?uid=123457107390).

[Action Floor Systems, LLC](http://www.specagent.com/Lookup?uid=123457107391).

[Conner Sports Surface Solutions](http://www.specagent.com/Lookup?uid=123457107392).

[Robbins Sports Surfaces](http://www.specagent.com/Lookup?uid=123457107395).

Approved equivalent.

* + - 1. SYSTEM DESCRIPTION

Retain "System Type" paragraph below if generic description is required. First option indicates systems not fastened to the concrete substrate; second option indicates systems mechanically attached to the concrete substrate; third option indicates systems with resilient pads that are mechanically restrained by channels and clips; fourth option indicates removable flooring systems used in multipurpose arenas.

* + - * 1. System Type: [**Floating**] [**Fixed**] [**Anchored resilient**] [**Portable**].

Options in "Overall System Height" paragraph below are examples only. Systems are available in various heights; coordinate system heights with slab depressions.

* + - * 1. Overall System Height: [**As indicated on Drawings**] [**2-1/8 inches**] [**2-1/4 inches**] [**2-1/2 inches**].
			1. PERFORMANCE REQUIREMENTS

Before inserting performance requirements according to ASTM, MFMA, or European standards for wood athletic flooring, see "Measuring Assembly Performance" Article in the Evaluations.

* + - 1. FLOORING MATERIALS
				1. Maple Flooring: Comply with MFMA grading rules for species, grade, and cut.

Retain "Certification" subparagraph below if required. Only MFMA members can use mark; however, nonmembers may comply with grading rules. Manufacturers listed in Part 2 provide flooring that carries MFMA mark.

Certification: Provide flooring that carries MFMA mark on each bundle or piece.

Retain "Random-Length Strip Flooring" paragraph below to coordinate with products required.

* + - * 1. Random-Length Strip Flooring: Northern hard maple (Acer saccharum), kiln dried, random length, tongue and groove, and end matched.

First Grade flooring is practically defect free. Second and Better Grade flooring may have tight knots and slight imperfections, distinct color variations, and dark green or black spots or streaks. Third Grade flooring may have knots and defects that do not materially impair the serviceability of the flooring for the intended purpose.

Grade: MFMA-RL [**First**] [**Second and Better**] [**Third and Better**].

If applicable, retain "Exception" subparagraph below.

Exception: For areas under stacked portion of telescoping bleachers that are normally concealed from view, provide Third and Better Grade.

Unless otherwise specified, MFMA permits flat grain. Edge grain is more resistant to effects of moisture and is more durable than flat grain.

Cut: [**Edge**] [**Flat**].

Usually retain first option in "Thickness" subparagraph below. Retain second option only if required for heavy-duty applications such as roller-skating rinks. Other thicknesses, including 27/32 inch, are available.

Thickness: [**25/32 inch**] [**33/32 inch**].

Face width of 2-1/4 inches is most common. Face width of 3-1/4 inches is also available.

Face Width: [**2-1/4 inches**] [**1-1/2 inches**].

Retain "Finger-Jointed Strip Flooring" paragraph below to coordinate with products required.

* + - * 1. Finger-Jointed Strip Flooring: Northern hard maple (Acer saccharum), kiln dried, random length, tongue and groove, and end matched.

First Grade flooring is practically defect free. Second and Better Grade flooring may have tight knots and slight imperfections, distinct color variations, and dark green or black spots or streaks. Third Grade flooring may have knots and defects that do not materially impair the serviceability of the flooring for the intended purpose.

Grade: MFMA-FJ [**First**] [**Second and Better**] [**Third and Better**].

If applicable, retain "Exception" subparagraph below.

Exception: For areas under stacked portion of telescoping bleachers that are normally concealed from view, provide Third and Better Grade.

Unless otherwise specified, MFMA permits flat grain. Edge grain is more resistant to effects of moisture and is more durable than flat grain.

Cut: [**Edge**] [**Flat**].

Usually retain first option in "Thickness" subparagraph below. Retain second option only if required for heavy-duty applications such as roller-skating rinks. Other thicknesses, including 27/32 inch, are available.

Thickness: [**25/32 inch**] [**33/32 inch**].

Face width of 2-1/4 inches is most common. Face width of 3-1/4 inches is also available.

Face Width: [**2-1/4 inches**] [**1-1/2 inches**].

* + - 1. SUBFLOOR MATERIALS

Retain subfloor system components in this article to suit Project, and insert others to coordinate with products required.

* + - * 1. Board Underlayment: Nominal 1-by-6-inch graded boards; of SPIB No. 2 Southern pine, WCLIB Construction grade (any species), or WWPA No. 3 (any species), dried to 15 percent moisture content.
				2. Plywood Underlayment: APA rated, C-D plugged, exterior glue, tongue and groove, [**15/32 inch**] [**23/32 inch**] thick.
				3. Wood Sleepers: Standard grade; 48 inches long; kiln-dried Eastern hemlock, fir, pine, or spruce.

Size: Nominal 2 by 3 inches.

Revise "Sleeper Anchors" subparagraph below if greater pullout strength is required.

Sleeper Anchors: Manufacturer's standard drive pins recommended by anchor manufacturer to achieve minimum 900-lbf pullout strength in 3000-psi concrete.

Sleeper Shims: In size and type recommended in writing by flooring manufacturer for application indicated.

Retain "Asphalt Primer" and "Asphalt Mastic" subparagraphs below for fixed-sleeper systems without pads. If retaining, coordinate with installation in Part 3.

Asphalt Primer: ASTM D41.

Asphalt Mastic: ASTM D312, Type I, cold-applied dead-level asphalt or Type III, hot-applied steep asphalt, as recommended in writing by manufacturer.

* + - * 1. Channels: Manufacturer's standard.

Channel Anchors: Manufacturer's standard, but not less than modified steel drive pins recommended by anchor manufacturer to achieve minimum 900-lbf pullout strength.

Retain "Clips" subparagraph below if required.

Clips: Manufacturer's standard.

* + - * 1. Resilient Pads: With air voids for resiliency and installed at manufacturer's standard spacing for product designation indicated above.

Revise "Type," "Material," and "Thickness" subparagraphs below to suit specific products required and to ensure differentiation among similar products. Different pads may be required for different installation areas; see "Subfloor Systems" Article in the Evaluations.

Type: <**Insert description**>.

Material: [**PVC**] [**Rubber**] [**Neoprene**].

Thickness: [**3/8 inch**] [**7/16 inch**] [**5/8 inch**] [**3/4 inch**].

* + - * 1. Resilient Underlayment: Flexible, multicellular, closed-cell, expanded polyethylene-foam sheet; nominal 2-lb/cu. ft. density.

Thickness: [**1/4 inch**] [**1/2 inch**] [**3/4 inch**] [**1 inch**].

* + - 1. FINISHES
				1. Floor-Finish System: System of compatible components recommended in writing by flooring manufacturer, and MFMA approved.

Floor-Sealer Formulation: Pliable, penetrating type. MFMA Group 1, Sealers.

Finish-Coat Formulation: Formulated for gloss finish indicated and multicoat application.

Verify finishes available through manufacturers and revise "Type" subparagraph below to suit Project. Consider inserting specific finish products using MFMA's "Athletic Flooring Sealer and Finish Specifications and Conformance List #31" as a guide (available online). Retain Group 5 if low-VOC products are required. Groups 3 and 5 are high gloss; revise to include low-gloss finish groups if required.

Type: MFMA Group 3, Gymnasium-Type Surface Finishes.

Game-Line and Marker Paint: Industrial enamel compatible with finish coats and recommended in writing by manufacturers of finish coats, and paint for this use.

* + - 1. ACCESSORIES

Generally, retain "Vapor Retarder" paragraph below for floors installed over concrete slabs. Delete if using asphalt primer and mastic for fixed-sleeper system without pads.

* + - * 1. Vapor Retarder: ASTM D4397, polyethylene sheet not less than 6 mils thick.
				2. Resilient Wall Base: Molded, vented, rubber or vinyl cove base; 4 by 3 by 48 inches; with premolded outside corners.

Color: Black.

In "Wood Wall Base" paragraph below, wood base in first option will not conceal expansion voids at perimeters of installation.

* + - * 1. Wood Wall Base: [**Nominal 1-by-3-inch wood base**] [**Built-up wood base as indicated on Drawings**] matching species, grade, and cut of wood flooring.
				2. Thresholds: As specified in Section 087100 "Door Hardware."

If concealed spaces between wood athletic flooring and fire-resistance-rated floor assemblies are fireblocked or filled with noncombustible material, insert requirements here. See "Code Requirements" Article in the Evaluations.

If sound-deadening underlayment is needed, insert requirements here. Sound-deadening underlayment may affect initial performance of wood athletic flooring, but it may have little effect on long-term performance; consult manufacturers for recommendations.

* + - * 1. Fasteners: Type and size recommended by manufacturer, but not less than those recommended by MFMA for application indicated.
				2. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood athletic flooring manufacturer.
				3. Adhesives: Manufacturer's standard for application indicated.
1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.
				2. Proceed with installation only after unsatisfactory conditions have been corrected.
				3. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

Retain "Moisture Testing" subparagraph below; excessive moisture vapor can cause failure of systems installed on slabs-on-grade. ASTM F1869 (anhydrous calcium chloride test) and ASTM F2170 (relative humidity test) both recommend one test per 1000 sq. ft., but no fewer than three tests per test area.

Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

Retain "Anhydrous Calcium Chloride Test" or "Relative Humidity Test" subparagraph below, or both.

First option in "Anhydrous Calcium Chloride Test" subparagraph below is based on NWFA recommendations and on floor-covering industry practices for adhered floor coverings to avoid adhesive failures; second option is based on MFMA recommendations. Consider retaining the lower value if assembly components are adhered to slab; consult manufacturers for recommendations.

Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 4.5 lb of water/1000 sq. ft. in 24 hours.

MFMA recommends a maximum relative humidity level of 80 percent for concrete slabs before installation of non-adhered systems and 75 percent for adhered systems.

Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 80 percent relative humidity level measurement.

Perform additional moisture tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

If products are installed on other substrates, including existing concrete, insert examination requirements here and revise "Preparation" Article.

* + - 1. PREPARATION
				1. Concrete Slabs:

Grind high spots and fill low spots on concrete substrates to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.

Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

Retain subparagraph below if products are adhered to concrete substrates.

Remove coatings including curing compounds and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone; use mechanical methods recommended by manufacturer. Do not use solvents.

* + - * 1. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.
			1. INSTALLATION
				1. Comply with wood athletic flooring manufacturer's written instructions, but not less than written recommendations of MFMA applicable to flooring type indicated.

Generally, retain "Pattern" paragraph below. Indicate special patterns on Drawings or by inserts.

* + - * 1. Pattern: Lay flooring parallel with long dimension of space to be floored unless otherwise indicated.
				2. Expansion Spaces: Provide as indicated, but not less than that required by manufacturer's written instructions and MFMA's written recommendations at walls and other obstructions, and at interruptions and terminations of flooring.

Indicate how expansion spaces are covered on Drawings, or insert requirements in subparagraph below.

Cover expansion spaces with base molding, trim, and saddles, as indicated on Drawings.

Retain "Vapor Retarder" paragraph below if required. Delete if using asphalt primer and mastic for fixed-sleeper system without pads.

* + - * 1. Vapor Retarder: Cover entire slab area beneath wood flooring. Install with joints lapped a minimum of 6 inches and sealed.

Retain "Underlayment" paragraph below if required.

* + - * 1. Underlayment: Install perpendicular to direction of flooring, staggering end joints in adjacent rows.

Retain "Sleepers" paragraph below if required.

* + - * 1. Sleepers:

Retain first subparagraph below for fixed-sleeper systems without pads. If retaining, delete "Vapor Retarder" paragraph in this article and in "Accessories" Article. Verify specific system requirements with manufacturer.

Prime entire slab beneath wood floor area with asphalt primer at coverage rate recommended by manufacturer.

Install sleepers perpendicular to direction of flooring, staggering end joints a minimum of 24 inches.

Generally, retain 12-inch spacing in first subparagraph below if assembly includes subfloor. If subfloor is not required, retain 12-inch spacing for 33/32-inch-thick flooring and 9-inch spacing for 25/32-inch-thick flooring. For Third and Better or Third Grade, always space sleepers at 8 inches o.c.

Space [**at spacing recommended by manufacturer for system components indicated**] [**12 inches o.c.**] [**9 inches o.c.**] [**8 inches o.c.**].

Retain first subparagraph below if sleepers are anchored directly to concrete.

Shim and level sleepers and install anchors at spacing recommended by manufacturer, but not less than 30 inches o.c.

Retain first subparagraph below for fixed-sleeper systems without pads. If retaining, delete "Vapor Retarder" paragraph in this article and in "Accessories" Article. Verify specific system requirements with manufacturer.

Pour asphalt mastic to 1/8 inch above the level of shims.

Retain subparagraph below if sleepers are anchored through resilient pads.

Anchor predrilled sleepers through resilient pads.

Retain "Channels" paragraph below if required.

* + - * 1. Channels: Anchor channels to substrate according to manufacturer's written instructions.

Install wood strip flooring across channels.

Retain subparagraph below if clips are required.

Insert steel clip at each intersection of a flooring strip with a channel.

Retain "Strip Flooring" and "Parquet Flooring" paragraphs below to coordinate with products specified in Part 2.

* + - * 1. Strip Flooring: Mechanically fasten perpendicular to supports.
				2. Installation Tolerances: 1/8 inch in 10 feet of variance from level.

If sleeper spaces are fireblocked or filled, insert requirements here. See "Code Requirements" Article in the Evaluations.

* + - 1. SANDING AND FINISHING
				1. Allow installed flooring to acclimate to ambient conditions before sanding.
				2. Follow applicable recommendations in MFMA's "Industry Recommendations for Sanding, Sealing, Court Lining, Finishing, and Resurfacing of Maple Gym Floors."
				3. Machine sand with coarse, medium, and fine grades of sandpaper to achieve a level, smooth, uniform surface without ridges or cups. Remove sanding dust by tack or vacuum.
				4. Finish: Apply seal and finish coats of finish system according to finish manufacturer's written instructions. Provide no fewer than four coats total and no fewer than two finish coats.

Retain "Water-Based Finishes" subparagraph below if required.

Water-Based Finishes: Use finishing methods recommended by finish manufacturer to reduce grain raise and sidebonding effect.

Game-Line and Marker Paint: Apply game-line and marker paint between final seal coat and first finish coat according to paint manufacturer's written instructions.

Mask flooring at game lines and markers, and apply paint to produce lines and markers with sharp edges.

Excessive wear of finishes can result in areas where game-line and marker paint buildup is heavy. Game lines should not overlap. Where game lines cross, minor game line should break at intersection.

Where game lines cross, break minor game line at intersection; do not overlap lines.

Apply game lines and markers in widths and colors according to [**requirements indicated on Drawings**] <**Insert name of sport association publication**>.

Apply finish coats after game-line and marker paint is fully cured.

* + - 1. PROTECTION
				1. Protect wood athletic flooring during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration at time of Substantial Completion.

Do not cover flooring after finishing until finish reaches full cure and not before seven days after applying last finish coat.

Do not move heavy and sharp objects directly over flooring. Protect fully cured floor finishes and surfaces with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096466