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SECTION 096400 - WOOD FLOORING

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

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

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

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes wood flooring.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:

First option in "Certificates for (Credit MR 6) (Credit MR 7)" Subparagraph below applies to LEED-CS; second applies to LEED-NC, LEED-CI, and LEED for Schools.

1. Certificates for [**Credit MR 6**] [**Credit MR 7**]: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

"Product Data for Credit IEQ 4.1" Subparagraph below applies to LEED-NC, LEED-CI, and LEED-CS; coordinate with requirements retained in Part 2.

2. Product Data for Credit IEQ 4.1: For wood flooring installation adhesives, documentation including printed statement of VOC content.

"Product Data for Credit IEQ 4.2" Subparagraph below applies to LEED-NC, LEED-CI, and LEED-CS; coordinate with requirements retained in Part 2. Factory finishing can be used to help comply with Credit IEQ 4.2.

3. Product Data for Credit IEQ 4.2: For field-applied finishes for wood flooring, documentation including printed statement of VOC content.

"Product Data for Credit IEQ 4.3" Subparagraph below applies to LEED-NC, LEED-CI, and LEED-CS; coordinate with requirements retained in Part 2.

4. Product Data for Credit IEQ 4.3: For **[wood flooring installation adhesives] [and] [field-applied finishes for wood flooring]**, documentation including printed statement of VOC content.

"Product Data for Credit IEQ 4.3" Subparagraph below applies to LEED-NC, LEED-CI, and LEED-CS; coordinate with requirements selected in Part 2 for wood flooring.

5. Product Data for Credit IEQ 4.3: For wood flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.

"Product Data for Credit IEQ 4.4" Subparagraph below applies to LEED-NC, LEED-CI, and LEED-CS; coordinate with requirements retained in Part 2.

6. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that the bonding agent contains no urea formaldehyde.

"Laboratory Test Reports for Credit IEQ 4" Subparagraph below applies to LEED for Schools; coordinate with requirements retained in Part 2.

7. Laboratory Test Reports for Credit IEQ 4: For **[adhesives] [finishes] [flooring system elements] [and] [composite wood products]**, documentation indicating that products comply with California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Samples: For each type of wood flooring and accessory.

1.3 QUALITY ASSURANCE

- A. Hardwood Flooring: Comply with NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.
- B. Maple Flooring: Comply with applicable MFMA grading rules for species, grade, and cut.
- C. Softwood Flooring: Comply with WCLIB No. 17 grading rules for species, grade, and cut.

Retain paragraph below for large-scale mockup. Indicate portion of flooring represented by mockup on Drawings or draw mockup as separate element.

- D. Build mockup of typical flooring area as shown on Drawings **[including base and shoe moldings]**.

1.4 PROJECT CONDITIONS

Conditioning period in first two paragraphs below may not be required for engineered-wood flooring products; verify with manufacturer.

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F (18 and 24 deg C) and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

Retain first paragraph below if required for LEED-NC, LEED-CS, or LEED-CI Credit IEQ 4.3; before retaining, verify availability of materials that comply.

- A. FloorScore Compliance: Wood floors shall comply with requirements of FloorScore Standard.

Retain "Low-Emitting Materials" Paragraph below if required for LEED for Schools Credit IEQ 4, Option 3.

- B. Low-Emitting Materials: Wood flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 WOOD FLOORING

Retain first paragraph below to specify wood flooring products made from certified wood for LEED. See Evaluations. An alternative method of complying with this LEED credit is to retain requirement in Section 018113.13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations," Section 018113.16 "Sustainable Design Requirements - LEED for Commercial Interiors," Section 018113.19 "Sustainable Design Requirements - LEED for Core and Shell Development," Section 018113.23 "Sustainable Design Requirements - LEED for Schools" that gives Contractor the option and responsibility for determining how the credit requirement will be met.

- A. Certified Wood: Provide wood flooring produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Solid-Wood Flooring: Kiln dried to 6 to 9 percent maximum moisture content, tongue and groove and end matched, and with backs channeled.

See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers. Retain one of first two subparagraphs and list of manufacturers below. See Section 016000 "Product Requirements."

1. Manufacturers: Subject to compliance with requirements, **[provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:**

Retain option in first subparagraph below if manufacturer's name and model number are indicated in schedules or plans on Drawings; delete option and insert manufacturer's name and model number if not included on Drawings.

2. \$L~Basis-of-Design Product~\$l~1114~L\$: Subject to compliance with requirements, provide **[product indicated on Drawings] <Insert manufacturer's name; product name or designation>** or comparable product by one of the following:
- a. \$M~Aacer Flooring, LLC~\$m~123456797159~M\$.
 - b. \$M~Anderson Hardwood Floors~\$m~123456797161~M\$.
 - c. \$M~Armstrong World Industries, Inc~\$m~123456797163~M\$.
 - d. \$M~Bellawood~\$m~123456797165~M\$.
 - e. \$M~Carlisle Wide Plank Floors~\$m~123456797167~M\$.
 - f. \$M~EcoTimber~\$m~123456797169~M\$.
 - g. \$M~International Hardwood Flooring, Inc~\$m~123456797172~M\$.
 - h. \$M~Kentucky Wood Floors~\$m~123456797173~M\$.
 - i. \$M~Miller and Company, Inc~\$m~123456797175~M\$.
 - j. \$M~Oregon Lumber Company~\$m~123456797177~M\$.
 - k. \$M~Sandy Pond Hardwoods, Inc~\$m~123456797179~M\$.
 - l. \$M~WD Flooring, LLC~\$m~123456797181~M\$.
 - m. \$M~Yesteryear Floorworks Company~\$m~123456797183~M\$.
 - n. **<Insert manufacturer's name>**.

Coordinate subparagraphs below with manufacturers retained above. Not every species, grade, cut, thickness, and face width is available from all listed manufacturers.

3. Species and Grade: **[Select red oak] [No. 1 Common red oak] [No. 2 Common red oak] [MFMA-RL First Grade hard maple] [MFMA-RL Second and Better Grade hard maple] [C & BTR - Flooring Douglas fir] [D - Flooring Douglas fir] <Insert species and grade>**.
4. Cut: **[Plain sawn] [Quarter/rift sawn] [Edge grain] [Vertical grain] <Insert description>**.
5. Thickness: **[25/32 inch (20 mm)] [3/4 inch (19 mm)] <Insert dimension>**.
6. Face Width: **[2-1/4 inches (57 mm)] [3-1/8 inches (79 mm)] [5-1/8 inches (130 mm)] <Insert dimension>**.

7. Lengths: **[Manufacturer's standard] [Random-length strips complying with applicable grading rules] [Lengths required to form pattern indicated] <Insert requirements>**.
8. Finishing: **[Field] [Factory]**.

Retain second option in "Engineered-Wood Flooring" Paragraph below if required for LEED-NC, LEED-CS, or LEED-CI Credit IEQ 4.4, which prohibits composite wood products containing urea formaldehyde. Retain third option if required for LEED for Schools Credit IEQ 4. Verify availability with manufacturers.

- C. Engineered-Wood Flooring: **HPVA EF[.], [except bonding agent contains no urea formaldehyde.], [that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."]**

See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers. Retain one of first two subparagraphs and list of manufacturers below. See Section 016000 "Product Requirements."

1. Manufacturers: Subject to compliance with requirements, **[provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:**

Retain option in first subparagraph below if manufacturer's name and model number are indicated in schedules or plans on Drawings; delete option and insert manufacturer's name and model number if not included on Drawings.

2. \$L~Basis-of-Design Product~\$l~1115~L\$: Subject to compliance with requirements, provide **[product indicated on Drawings] <Insert manufacturer's name; product name or designation>** or comparable product by one of the following:
 - a. \$M~Anderson Hardwood Floors~\$m~123456797186~M\$.
 - b. \$M~Armstrong World Industries, Inc~\$m~123456797187~M\$.
 - c. \$M~Boen Hardwood Flooring Inc~\$m~123456797188~M\$.
 - d. \$M~EcoTimber~\$m~123456797189~M\$.
 - e. \$M~Gammapar~\$m~123456797190~M\$.
 - f. \$M~Kentucky Wood Floors~\$m~123456797191~M\$.
 - g. \$M~Mannington Mills, Inc~\$m~123456797194~M\$.
 - h. \$M~Oregon Lumber Company~\$m~123456797196~M\$.
 - i. \$M~Tarkett~\$m~123456797198~M\$.
 - j. \$M~Wood Flooring International~\$m~123456797200~M\$.
 - k. **<Insert manufacturer's name>**.

Coordinate subparagraphs below with manufacturers retained above. Not every species, grade, thickness, and face width is available from all listed manufacturers.

3. Species: **[Red oak] [White oak] [Ash] [Beech] [Maple] [Black cherry] <Insert species>**.
4. Grade: **<Insert grade>**.
5. Thickness: **[1/2 inch (13 mm)] [3/8 inch (9.5 mm)] <Insert dimension>**.
6. Construction: **[Five] [Three] ply**.
7. Face Width: **[2-1/4 inches (57 mm)] [3 inches (76 mm)] <Insert dimension>**.

8. Length: Manufacturer's standard.
9. Finishing: **[Field] [Factory]**.

2.3 FIELD FINISHING

- A. Urethane Finish System: Complete **[solvent-based, oil-modified] [water-based]** system of compatible components that is recommended by finish manufacturer for application indicated.

Retain first subparagraph below if required for LEED-NC, LEED-CS, or LEED-CI Credit IEQ 4.2 or Credit IEQ 4.3. Verify availability with manufacturers retained.

1. VOC Content: When calculated according to 40 CFR 59, Subpart D (EPA Method 24), as follows:
 - a. Finish Coats and Floor Sealers: Not more than 350 g/L.
 - b. Stains: Not more than 250 g/L.

Retain first subparagraph below if required for LEED for Schools Credit IEQ 4.

2. Finish system materials shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 3. Stain: Penetrating and nonfading type.
 - a. Color: **[Match sample] [As selected by Architect from manufacturer's full range] <Insert color>**.
 4. Floor Sealer: Pliable, penetrating type.
 5. Finish Coats: Formulated for multicoat application on wood flooring.
- B. Wood Filler: Compatible with finish system components.

2.4 FACTORY FINISHING

Coordinate option retained in paragraph below with products and manufacturers retained.

- A. Finish: **[UV urethane] [Acrylic impregnated]**.
1. Color: **[As selected by Architect in manufacturer's full range] <Insert color>**.

2.5 SOUND CONTROL UNDERLAYMENT

- A. Sound Control Underlayment: Minimum Impact Insulation Class (IIC) of **[50] [55] <Insert value>** when tested according to ASTM E 492.

Retain next to last option in "Material" Subparagraph below if required for LEED-NC, LEED-CS, or LEED-CI Credit IEQ 4.4, which prohibits composite wood products containing urea formaldehyde. Retain last option if required for LEED for Schools Credit IEQ 4. Verify availability with manufacturers.

1. Material: [**Recycled rubber.**] [**Polyurethane foam.**] [**Wood fiber.**] [**Wood fiber made with binder containing no urea formaldehyde.**] [**Wood fiber that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."**] <Insert material.>
2. Thickness: [**3/4 inch (19 mm)**] [**1/2 inch (13 mm)**] [**3/8 inch (9 mm)**] [**1/4 inch (6 mm)**] [**5/32 inch (4 mm)**] <Insert dimension>.

2.6 ACCESSORY MATERIALS

- A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than [**6.0 mils (0.15 mm)**] [**8.0 mils (0.2 mm)**] thick.
- B. Asphalt-Saturated Felt: ASTM D 4869, Type II.
- C. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.

Retain first subparagraph below if required for LEED-NC, LEED-CS, or LEED-CI Credit IEQ 4.1 or Credit IEQ 4.3. VOC content limit is that for wood flooring adhesives.

1. Adhesive shall have a VOC content of not more than [**100**] <Insert value> g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

Retain subparagraph below if required for LEED for Schools Credit IEQ 4.

2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.
- E. Fasteners: As recommended by manufacturer, but not less than that recommended in [**NWFA's "Installation Guidelines: Wood Flooring."**] <Insert standard or publication>.
- F. Thresholds and Saddles: To match wood flooring. Tapered on each side.
- G. Reducer Strips: To match wood flooring. [**2 inches (51 mm)**] <Insert dimension> wide, tapered, and in thickness required to match height of flooring.
- H. Feature Strips: [**2-inch- (51-mm-) wide, square-edged walnut strips**] <Insert description>, furnished in lengths as long as practical and in thickness to match wood flooring.
- I. Metal Feature Strips: [**1/8-by-1/8-inch (3-by-3-mm) solid-brass strips**] <Insert description>, designed for inlaying into routed reveal in wood flooring surface.
- J. Wood Air Vents and Grilles: To match wood flooring and in sizes and design indicated on Drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

Retain subparagraph below for moisture testing. Excessive moisture vapor can cause failure of systems installed on slabs-on-grade.

1. Moisture Testing: Perform tests so that each test area does not exceed [**200 sq. ft. (18.6 sq. m)**] <Insert area>, and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Perform anhydrous calcium chloride test per ASTM F 1869, as follows:

First option in first subparagraph below is based on National Wood Flooring Association recommendations and on floor-covering industry practices for adhered floor coverings to avoid adhesive failures; second option is based on MFMA recommendations. Retain the lower value if assembly components are adhered to slab; consult manufacturers for recommendations.

- 1) Proceed with installation only after substrates have maximum moisture-vapor-emission rate of [**3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)**] [**4.5 lb of water/1000 sq. ft. (2.04 kg of water/92.9 sq. m)**] <Insert emission> in 24 hours.
 - b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- B. Concrete Slabs: Grind high spots and fill low spots to produce a maximum 1/8-inch (3-mm) deviation in any direction when checked with a 10-foot (3-m) straight edge.
 1. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

Retain first paragraph below if products are adhered to concrete substrates.

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

3.2 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in [NFWA's "**Installation Guidelines: Wood Flooring.**"] <Insert standard or publication>.
- B. Provide expansion space at walls and other obstructions and terminations of flooring [**as indicated on Drawings**] [**of not less than 3/4 inch (19 mm)**] <Insert requirements>.
- C. Vapor Retarder: Comply with NOFMA's "Installing Hardwood Flooring" for vapor retarder installation and the following:
 - 1. Wood Flooring Nailed to Wood Subfloor: Install flooring over a layer of asphalt-saturated felt.
 - 2. Wood Flooring Nailed to Sleepers over Concrete: Install flooring over a layer of polyethylene sheet with edges overlapped over sleepers and turned up behind baseboards.
 - 3. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.
- D. Sound Control Underlayment: Install over vapor retarder in accordance with manufacturer's written instructions.
- E. Solid-Wood Flooring: Blind nail or staple flooring to substrate.

Retain applicable subparagraphs below for plank flooring.

- 1. For flooring of face width more than 3 inches (75 mm):
 - a. Install countersunk screws at each end of each piece in addition to blind nailing. Cover screw heads with wood plugs glued flush with flooring.

Retain subparagraph above or below. Method above is commonly used for hardwood; method below, for softwood.

- b. Install no fewer than two countersunk nails at each end of each piece, spaced not more than 16 inches (406 mm) along length of each piece, in addition to blind nailing. Fill holes with matching wood filler.

Retain installation method in paragraph below to coordinate with products retained. Floating floors are not attached to other construction.

- F. Engineered-Wood Flooring: [**Set in adhesive**] [**Nail or staple**] [**Install floating floor**].

3.3 FIELD FINISHING

Retain this article if wood flooring is finished on-site.

- A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that would be noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish.

1. Comply with applicable recommendations in [NWFA's "**Installation Guidelines: Wood Flooring.**"] <Insert standard or publication>.
- B. Fill [**open-grained hardwood**] <Insert description of wood to be filled>.
- C. Fill and repair wood flooring seams and defects.
- D. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and [**three**] <Insert number> finish coats.
 1. Apply stains to achieve an even color distribution matching approved Samples.
 2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.
- E. Cover wood flooring before finishing.
- F. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.4 PROTECTION

- A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

END OF SECTION 096400