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USACE / NAVFAC / AFCEC / NASA | UFGS-12 93 00 (August 2017)
Change 1 - 08/18

Preparing Activity: USACE | Superseding
UFGS-12 93 00 (February 2009)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

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SECTION 12 93 00

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SECTION 12 93 00

SITE FURNISHINGS

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NOTE: This guide specification covers the requirements for miscellaneous site and street furniture and furnishings including shelters.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

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

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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PART 1 GENERAL

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NOTE: Units of work normally included in this section require specific fabrication to meet the desired project requirements. The Key Word Index of the CSI "Masterformat" should be consulted for the proper location of most items.

The following information will be shown on the drawings:

1. Location and configuration of all furniture and furnishings.

2. All sizes and dimensions.

3. Special fastenings, attachments or anchoring.

4. Location and size of expansion shields larger than 10 mm 3/8 inch in diameter.

5. Location of products to be galvanized.

6. Connection details, other than manufacturer's standard.

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1.1 REFERENCES

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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 Reference Identifier (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.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611	(2014) Voluntary Specification for Anodized Architectural Aluminum

AMERICAN FOREST FOUNDATION (AFF)

ATFS STANDARDS	(2015) American Tree Farm System Standards of Sustainability 2015-2020

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2016) Code of Standard Practice for Steel Buildings and Bridges
AISC 360	(2016) Specification for Structural Steel

Buildings

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

ANSI/AITC A190.1	(2007) American National Standard, Structural Glued Laminated Timber

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(2022) Nuts for General Applications: Machine Screw Nuts, and Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.6.2	(2020) Square Head Set Screws and Slotted Headless Set Screws (Inch Series)
ASME B18.6.3	(2013; R 2017) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)
ASME B18.21.1	(2009; R 2016) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
ASME B18.21.2M	(1999; R 2014) Lock Washers (Metric Series)
ASME B18.22M	(1981; R 2017) Metric Plain Washers

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.3	(2020) Safety Requirements for Powder-Actuated Fastening Systems American National Standard for Construction and Demolition Operations

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA M2	(2019) Standard for the Inspection of Preservative Treated Wood Products for Industrial Use
AWPA U1	(2023) Use Category System: User Specification for Treated Wood

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2022; E 2022) Standard Specification for Ferritic Malleable Iron

	Castings
ASTM A48/A48M	(2003; R 2021) Standard Specification for Gray Iron Castings
ASTM A53/A53M	(2022) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2023) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A500/A500M	(2021a) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A501/A501M	(2021) Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A615/A615M	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A653/A653M	(2023) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A1064/A1064M	(2022) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM B26/B26M	(2018; E 2018) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B62	(2017) Standard Specification for Composition Bronze or Ounce Metal Castings
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B429/B429M	(2010; E 2012) Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C94/C94M	(2022a) Standard Specification for Ready-Mixed Concrete
ASTM C150/C150M	(2022) Standard Specification for Portland Cement
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C979/C979M	(2016) Standard Specification for Pigments for Integrally Colored Concrete
ASTM C1048	(2018) Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
ASTM D1187/D1187M	(1997; R 2018) Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
ASTM D2990	(2017) Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
ASTM D3451	(2006; R 2017) Standard Guide for Testing Coating Powders and Powder Coatings
ASTM D4060	(2019) Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D4802	(2016) Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet
ASTM E488/E488M	(2022) Standard Test Methods for Strength of Anchors in Concrete Elements
ASTM F1487	(2021) Standard Consumer Safety Performance Specification for Playground Equipment for Public Use

CSA GROUP (CSA)

CSA Z809-08	(R2013) Sustainable Forest Management

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001	(2015) Principles and Criteria for Forest Stewardship

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules	(2015) Rules for the Measurement & Inspection of Hardwood & Cypress

PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI MNL-117	(2013) Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products, 3rd Edition
PCI MNL-128	(2001) Recommended Practice for Glass Fiber Reinforced Concrete Panels, 4th Edition

PROGRAMME FOR ENDORSEMENT OF FOREST CERTIFICATION (PEFC)

PEFC ST 2002:2013	(2015) PEFC International Standard Chain of Custody of Forest Based Products Requirements

REDWOOD INSPECTION SERVICE (RIS) OF THE CALIFORNIA REDWOOD ASSOCIATION (CRA)

RIS Grade Use	(1998) Redwood Lumber Grades and Uses

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25	(1997; E 2004) Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1003	(2014) Standard Grading Rules for Southern Pine Lumber

SUSTAINABLE FOREST INITIATIVE (SFI)

SFI 2015-2019	(2015) Standards, Rules for Label Use, Procedures and Guidance

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1925	(Rev A; Notice 3) Shield Expansion (Nail Anchors)

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB 17 (2015) Standard Grading Rules

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA G-5 (2017) Western Lumber Grading Rules

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters 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.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

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" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification 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

Benches and Chairs; G[, [_____]]

Tables; G[, [_____]]

Shelters; G[, [_____]]

Bicycle Racks; G[, [_____]]

Planters; G[, [_____]]

Bollards; G[, [_____]]

Tree Grates; G[, [_____]]

Assembly Instruction Drawings

SD-03 Product Data

Benches and Chairs

Tables

Shelters

Bicycle Racks

Planters

Bollards

Tree Grates

Recycled Content for steel components; S

Recycled Content for aluminum components; S

Recycled Content for HDPE components; S

Waste Receptacles

SD-04 Samples

Finish; G[, [_____]]

SD-06 Test Reports

Testing

SD-07 Certificates

Primer Certificate

Powder Coatings Certificate

[Certified Sustainably Harvested lumber; S]

[Certified Sustainably Harvested wood for wood seats and table tops; S]

[Certified Sustainably Harvested wood for wood benches and chairs; S]

[Certified Sustainably Harvested wood for wood containers; S]

[Certified Sustainably Harvested wood for wood shelters; S]

[Certified Sustainably Harvested wood for wood tables; S]

1.3 CERTIFICATIONS

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NOTE: Use certified sustainably harvested wood where suitable for application and cost effective. Sustainably Harvested Wood is a product which comes from a third-party Forestry Certification Program and thus carries certain characteristics: 1) Protection of biodiversity, species at risk and wildlife habitat, sustainable harvest levels, protection of water quality, and prompt regeneration (e.g., replanting and reforestation); 2) Third-party certification audits performed by accredited certification bodies; 3) Publicly available certification audit summaries; 4) Multi-stakeholder involvement in a standards development process; 5) Complaints and appeals process.

Designer must verify suitability, availability within the region, cost effectiveness and adequate competition before specifying these sustainably harvested wood certifications - if these conditions are verified for the project locale, include the following section. For projects pursuing LEED, delete certifications other than FSC; for all other projects allow the entire list of third party certifications.

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1.3.1 Certified Sustainably Harvested Wood

Provide wood certified as sustainably harvested by FSC STD 01 001[, ATFS STANDARDS, CSA Z809-08, SFI 2015-2019, or other third party program certified by PEFC ST 2002:2013]. Provide a letter of Certification of Sustainably Harvested Wood signed by the wood supplier. Identify certifying organization and their third party program name and indicate compliance with chain-of-custody program requirements. Submit sustainable wood certification data; identify each certified product on a line item basis. Provide current product certification documentation from certification body. Submit copies of invoices bearing certification numbers.

1.4 QUALITY ASSURANCE

Qualify welders in accordance with AWS D1.1/D1.1M using procedures, materials, and equipment of the type required for the work.

1.4.1 Fabrication Drawings

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

1.4.2 Installation Drawings

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation.

1.4.3 Assembly Instruction Drawings

Submit assembly instruction drawings showing layout(s), connections, bolting and anchoring details in accordance with manufacturer's standards. Submit drawings showing scaled details of proposed site furnishings, elevations for each type of site furnishing; dimensions, details, and methods of mounting or anchoring; shape and thickness of materials; and details of construction.

1.4.4 Primer Certificate

Submit a certificate from the manufacturer stating that the primer conforms to requirements of SSPC Paint 25.

1.4.5 Powder Coatings Certificate

Submit a certificate from the manufacturer stating that the powder coat conforms to ASTM D3451.

1.5 DELIVERY, STORAGE, AND HANDLING

Ship items knocked-down (KD) ready for site assembly. Packaged components must be complete including all accessories and hardware. Materials must be delivered, handled, and stored in accordance with the manufacturer's recommendations. Site furnishings must be inspected upon arrival at the job site for conformity to specifications and quality in accordance with paragraph MATERIALS. Protect from corrosion, staining, and other types of damage. Store items in designated area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

Provide materials which are the standard products of a manufacturer regularly engaged in the manufacture of such products. Provide materials with proven satisfactory usage for at least 2 years.

2.1.1 Metals

Metallic materials and products must conform to Section 08 31 00 ACCESS DOORS AND PANELS. Furnish metal components with factory drilled holes and free of excess weld and spatter. Metal components with holes that will not be filled by hardware or hidden by other components will be rejected. Structural steel products must conform to ASTM A36/A36M, ASTM A500/A500M and ASTM A501/A501M. Provide Steel Components with a minimum of 70 percent recycled content. Provide data identifying percentage of recycled content for steel components.

2.1.2 Structural Tubing

ASTM A500/A500M

2.1.3 Steel Pipe and Fittings

Steel pipe must conform to ASTM A53/A53M, Type E or S, Grade B; standard malleable iron fittings must conform to ASTM A47/A47M.

2.1.4 Gray Cast Iron

Gray cast iron must conform to ASTM A48/A48M Class 35 or better. Provide castings manufactured true to pattern and component parts that fit together in a satisfactory manner. Castings must be of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. Smooth castings must be well-cleaned by sand or shot blasting.

2.1.5 Aluminum Products

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NOTE: Use materials with recycled content where appropriate for use. Designer must verify suitability, availability within the region, cost effectiveness and adequate competition before specifying product recycled content requirements.

Research shows the product is available among US national manufacturers above the minimum recycled content stated.

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Provide Aluminum Components with a minimum of 50 percent total recycled content. Provide data identifying percentage of recycled content for aluminum components

2.1.6 Cast Aluminum

Cast aluminum must conform to ASTM B26/B26M and ASTM B108/B108M. Provide castings manufactured true to pattern and component parts that fit together in a satisfactory manner. Provide castings of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. Smooth castings must be well-cleaned by sand or shot blasting.

2.1.7 Aluminum Alloy Products

Conform to ASTM B209M ASTM B209 for sheet plate, ASTM B221M ASTM B221 for extrusions and ASTM B26/B26M or ASTM B108/B108M for castings, as applicable. Provide aluminum extrusions at least 3 mm 1/8 inch thick and aluminum plate or sheet at least 1.3 mm 0.050 inch thick.

2.1.8 Anchors and Hardware

Provide anchors, where necessary, for fastening site furnishings securely in place and in accordance with approved manufacturer's instructions. Anchoring devices that may be used, when no anchors are otherwise specified or indicated, include anchor bolts, slotted inserts, expansion shields for concrete; toggle bolts and through bolts for masonry; machine carriage bolts for steel; and lag bolts and screws for wood. Anchor bolts

must conform to ASTM A307. Hardware must be [stainless steel] [brass] [zinc-plated][zinc-chromate plated] [or] [galvanized steel] in accordance with ASTM A153/A153M and compatible with the material to which applied. All exposed hardware must match in color and finish. Mounting hardware must be concealed, recessed, and plugged.

2.1.8.1 Threaded Inserts and Expansion Anchors

Provide inserts recessed not less than [65] [_____] mm [2.5] [_____] inches into concrete or masonry. Pullout [90] [_____] kg [198] [_____] pounds in concrete with f'c of 20 MPa 3,000 psi, as tested in accordance with ASTM E488/E488M. Expansion shields must conform to CID A-A-1925, group II, type 4, class 1. Provide embedment required by manufacturer.

2.1.8.2 Lag Screws and Bolts

ASME B18.2.1, type and grade best suited for the purpose.

2.1.8.3 Toggle Bolts

ASME B18.2.1.

2.1.8.4 Bolts, Nuts, Studs and Rivets

ASME B18.2.2 or ASTM A307.

2.1.8.5 Power Driven Fasteners

Follow safety provisions of ASSP A10.3.

2.1.8.6 Screws

ASME B18.2.1, ASME B18.6.2, and ASME B18.6.3.

2.1.8.7 Washers

Provide plain washers to conform to ASME B18.22M ASME B18.21.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME B18.21.2M ASME B18.21.1.

2.1.9 Ounce Metals

Bronze, copper, and other ounce metals must conform to ASTM B62.

2.1.10 Concrete

Ready-mixed concrete must conform to ASTM C94/C94M, using 19 mm 3/4 inch maximum size aggregate, and having minimum compressive strength of 20 MPa 3000 psi at 28 days. Portland cement must conform to ASTM C150/C150M. Cast-in-place concrete materials and products must conform to Section 03 30 00 CAST-IN-PLACE CONCRETE. Precast concrete material and products must conform to Section 03 45 33 PRECAST[PRESTRESSED] STRUCTURAL CONCRETE. Reinforcing steel must conform to ASTM A615/A615M. Welded wire fabric must conform to ASTM A1064/A1064M.

2.1.11 Masonry

Masonry material and products must conform to Section 04 20 00 UNIT MASONRY

2.1.12 Tempered Glass

ASTM C1048, Kind FT (fully tempered), condition A (uncoated), Type 1 (transparent, Quality q3, [6.35] [_____] mm [1/4] [_____] inch thick, [clear] [bronze] [_____] in color.

2.1.13 Plastics

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NOTE: It is important for the designer to ensure manufacturers supply quality plastic products made from post-consumer recycled high density polyethylenes. High density polyethylene can be manufactured using post-consumer recycled plastic resins from products such as milk containers. Designer should insist on products utilizing high-density polyethylene. Use materials with recycled content where appropriate for use. Designer must verify suitability, availability within the region, cost effectiveness and adequate competition before specifying product recycled content requirements. Research shows the product is available among US national manufacturers above the minimum recycled content stated.

Plastic lumber is susceptible to both creep and deflection; therefore, it cannot be used for structural members of furnishings. To overcome creep and deflection, the product is increased in volume of material and dimension.

****

Provide High Density Polyethylene (HDPE) Components with a minimum of 90 percent total recycled content. Provide data identifying percentage of recycled content for HDPE components. Recycled materials must be constructed or manufactured with a maximum 6 mm 1/4 inch deflection or creep in any member in conformance with ASTM D2990. Provide panels and components molded of ultraviolet (UV) and color stabilized polyethylene, with minimum 6 mm 1/4 inch wall thickness; exposed edges must be smoothed, rounded, and free of burrs and points; and the material must be resistant to fading, cracking, fogging, and shattering. The material must be non-toxic and have no discernible contaminates such as paper, foil, or wood. The material must contain no more than 3 percent air voids and be resistant to deformation from solar radiation heat gain. Recycled materials to include plastic lumber will not be used as structural components of site furnishings. Submit a report of site furnishing parts consisting of recycled materials. Product specification data, providing test information for deflection and creep in accordance with ASTM D2990 for site furnishings which use plastic lumber as a component, must be submitted. Provide data for comparison of deflection and creep measurements to other comparable materials.

2.1.13.1 Extruded Acrylic Sheet

ASTM D4802 [Type I, regular] [Type II, heat resistant] [6] [_____] mm [1/4] [_____] inch thick, [clear] [_____] in color.

2.1.13.2 Cast Acrylic Sheet

ASTM D4802, Item A, [Type I, Heat resistant and ultraviolet light absorbing] [Type II, heat resistant], 6 mm 1/4 inch thick, [clear] [bronze] [_____] in color.

2.1.14 Lumber

Provide premium grade wood free of knots; boards with eased edges and ends; and wood components with factory drilled holes. Components with holes that will not be filled by hardware or hidden by other components will be rejected. Wood products must be selected to withstand the climatic conditions of the region in which the site is located.

****

NOTE: Use certified sustainably harvested wood for all specialty items where suitable for application and cost effective. The Editor may wish to selectively apply this requirement to the specialty items within this specification and delete the general requirement here

****

[Provide certified sustainably harvested lumber.]

Lumber grades must meet manufacturers standards of the grading rules under which they are manufactured. Where no standards exist the following must be the minimum acceptable grades for species used.

a. WWPA G-5 grading rules, [Douglas Fir] [Western Cedars],[Choice & Btr,] [Select or A & Btr.] in accordance with special western red cedar rules.

b. WCLIB 17 standard grading rules, [Douglas Fir] [Western Cedars], A & Btr.

c. SPIB 1003 grading rules, Southern Pine, C & Btr.

d. NHLA Rules standard specification, Cypress, C-Select.

e. RIS Grade Use standard specifications, Redwood, [Clear] [Clear All Heart].

f. NHLA Rules rules, [Cypress] [Teak], [B Finish] [Select or Btr.].

2.1.14.1 Moisture Content

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products at time of delivery must be in accordance with manufacturers standard. If no manufacturer's standard exists, then moisture content must be based on requirements for the product, grade and intended use.

2.1.14.2 Treatment

Wood that is not naturally rot and insect resistant must be treated in accordance with AWPA U1, as applicable, and inspected in accordance with AWPA M2. Provide treatment of wood in accordance with ASTM F1487.

2.1.14.3 Wood Seats and Table Tops

Clear teak, maple, oak, Jarrah, Ipe or other suitable hardwood, not less than 40 mm 1-5/8 inches thick with rounded edges.

****
NOTE: Use certified sustainably harvested wood where suitable for application and cost effective.
****

[Provide certified sustainably harvested wood for wood seats and table tops.
]

2.1.15 Fiberglass

Fiberglass must consist of at least 3 laminations of chopped glass fibers impregnated with polyester resin, with colors and textures molded into all exposed surfaces so that colors resist fading. Fiberglass must be resistant to cleaners, fertilizers, high power spray and salt.

2.2 PRETREATMENT, PRIMING AND PAINTING

****
NOTE: Use manufacturers standard treatment when painting and finishing is required.
****

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. [On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 0.03 mm 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.]

2.2.1 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.2 Aluminum Surfaces

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.3 COATINGS AND FINISHES

****
NOTE: The content of volatile organic compounds (VOC), and marking, must be in compliance with air quality regulations for the type of application and jurisdiction where used.
****

2.3.1 Galvanizing

****
NOTE: Specify galvanizing for items installed in exterior exposures subject to salt spray or corrosive fumes and interior areas subject to

continual wetting or high humidity.
****

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing must conform to ASTM A123/A123M, ASTM A153/A153M or ASTM A653/A653M, as applicable. Tailings and sharp protrusions formed as a result of the hot-dip process must be removed and exposed edges burnished. Galvanize anchor bolts, grating fasteners, washers and parts or devices necessary for proper installation, unless otherwise indicated.

2.3.2 Polyester Powder

Powder-coated surfaces must receive electrostatic zinc coating prior to painting. Powder coating must be electrostatically applied and oven cured. Polyester powder coating must be resistant to ultraviolet (UV) light.

2.3.3 Polyvinyl-Chloride (PVC)

PVC coating must be primed with a clear acrylic thermosetting solution. The primed parts must be preheated prior to dipping. The liquid polyvinyl chloride must be ultraviolet (UV) stabilized and mold-resistant. The coated parts must be cured. The coating must be a minimum 2 mm 2/25 inches thick plus or minus 0.5 mm 0.020 inches and must have an 85 durometer hardness with a slip-resistant finish.

2.3.4 Finish

Finish must be as specified by the manufacturer or as indicated. Exposed surfaces and edges must be rounded, polished, or sanded. Finish must be non-toxic, non-glare, and resistant to corrosion. Exposed surfaces must be smooth and splinter-free exposed surfaces. Submit [two] [_____] sets of color data for each furnishing displaying manufacturer's color selections and finishes, and identifying those colors and finishes proposed for use.

2.3.4.1 Wood Sealants

Exposed wood surfaces must have, as a minimum, two shop coats of paint, varnish, sealer, or other approved preservative. Sealants must seal all applied surfaces from air.

2.3.4.2 Paint

Paint must be factory applied with a minimum of 2 coats. Paint must be weather-resistant and resistant to cracking, peeling and fading.

2.3.4.3 Color

Color of site furnishing components must be in accordance with Section 09 06 00 SCHEDULES FOR FINISHES.

2.4 SITE STANDARDS

Site furnishings must be furnished with the dimensions and requirements indicated. Site furnishings placed in children's outdoor play areas must meet the safety requirements of ASTM F1487 for entrapment; sharp points, edges, and protrusions; entanglement; pinch, crush, and shear points.

Site furnishings to be included in children's outdoor play areas must be free from sharp vertical edges and any protruding elements and designed with a minimum radius of 13 mm 1/2 inch on all vertical edges; this includes, but is not limited to, seat walls, containment curbs and planters. Where practical, horizontal edges exposed to children's activities must be rounded.

2.5 BENCHES AND CHAIRS

Furnish benches and chairs with no sharp edges or protruding hardware.

a. Height: The height above finished grade or specified surface must be between 450-500 mm 18-20 inches and level.

b. Seat: The seat surface must be pitched or slotted to shed water; the seat depth must be between 300-460 mm 12-18 inches and pitched down at the back at a 0-5 degree angle. Seat must have a minimum width of 610 mm 24 inches per person, and must overhang the support base by a minimum of 100 mm 4 inches for heel space and to facilitate rising from a seating position.

c. Back Rest: When back rests are required, the height must be between 380-460 mm 15-18 inches from the top of the seat and the connection must be at a 90-110 degree angle to the seat.

d. Arm Rest: When arm rests are required, a minimum of 150 mm 6 inches height from the seat and a minimum arm rest width of 38.3 mm 1-1/2 inches must be provided.

e. Weight Limit: Seats must support a minimum 136 kg 300 lbs for each person they are designed to accommodate.

[2.5.1 Precast Units

Design precast units in accordance with manufacturer's standards, size as indicated. Finish and color as indicated selected from manufacturer's standards.

[2.5.1.1 Glass Fiber Reinforced Concrete (GFRC) Units

Provide glass fiber reinforced concrete (GFRC) units at locations indicated on the drawings. Comply with PCI MNL-128 recommended practice for glass fiber reinforced concrete, including Appendix G, Polymer Modified Glass Fiber Reinforced Concrete Panels.

a. Design precast benches to sustain a live load of not less than 10 kPa 200 pounds per square foot.

b. Provide ASTM C150/C150M cement, use only one brand and type of cement throughout project.

c. Provide alkali resistant (AR) glass fibers produced specifically for use in glass fiber reinforced concrete, minimum three percent glass fiber content.

d. Provide clear silica sand aggregate passing 1.18 mm No. 16 sieve; washed, dried and free from deleterious materials. Provide type with successful history of uses in GFRC fabrication standard with the manufacturer.

e. Provide 20.7 MPa 3000 psi concrete, 28 day minimum compressive strength with approximately 1921 kg/cubic meter 120 pcf density; shell thickness of 10 to 16 mm 3/8 to 5/8 inch.

f. Provide manufacturer's standard acrylic thermoplastic copolymer admixture.

g. Provide factory finished units standard with the manufacturer; texture and color as selected.

(1) Provide white or grey cement consistent with final finish.

(2) Provide ASTM C33/C33M (less gradation) facing aggregates, clean, hard, durable, inert and free of staining and deleterious materials; as required to match approved samples.

(3) Provide color meeting ASTM C979/C979M, pure, non-fading mineral oxides, maximum ten percent cement weight; as required to match approved samples without impairing strength of GFRC.

(4) Apply finish meeting ASTM D4060 waterborne crosslinked acrylic 49.5 +/- two percent solids by weight providing 1000 cycles per 0.0254 mm 1000 cycles per 0.001 inch resistance to abrasion.

h. Prefabricate units within following maximum fabrication tolerances.

(1) Dimension: Plus or minus 3 mm 1/8 inch in any direction, noncumulative.

(2) Material Thickness: Plus 6 mm 1/4 inch and minus 0-inch.

(3) Total Unit Thickness: Plus 6 mm 1/4 inch and minus 3 mm 1/8 inch.

(4) Insert Locations: Plus or minus 6 mm 1/4 inch.

][2.5.1.2 Precast Concrete/Cast Stone Units

Provide reinforced precast concrete units consisting of a mixture of cement, aggregates and mineral colors suitable for exterior use, located as indicated. Design benches to sustain a live load of not less than 10 kPa 200 pounds per square foot.

2.5.1.2.1 Portland Cement

ASTM C150/C150M Type I II or III

2.5.1.2.2 Aggregate

ASTM C33/C33M, maximum size 19 mm 3/4 inch

2.5.1.2.3 Reinforcing Steel

ASTM A615/A615M

2.5.1.2.4 Galvanized Wire Mesh

ASTM A1064/A1064M

2.5.1.2.5 Integral Color

ASTM C979/C979M, pure mineral oxide, limeproof and non-fading

2.5.1.2.6 Concrete Strength

Provide minimum 35 MPa 5000 psi 28 day compressive strength concrete, maximum five percent absorption.

2.5.1.2.7 Admixture

ASTM C260/C260M for air-entraining

]][2.5.2 Wood Units

Provide manufacturer's standard wood units with wood, metal, fiberglass or concrete pedestals as indicated. Provide fasteners and accessories required for onsite assembly. Kiln dry and pressure treat wood components to manufacturer's standards. Pre-treat metal components and provide manufacturer's standard primer and powder coat finish complying with ASTM D3451, color as selected. Provide fiberglass non-fading gel coat color as indicated. Provide manufacturer's standard exposed aggregate or sandblasted finish and protection coating on concrete pedestals.

****

NOTE: Use certified sustainably harvested wood where suitable for application and cost effective.

****

[Provide certified sustainably harvested wood for wood benches and chairs.]

a. Design wood benches to sustain a live load of not less than 10 kPa 200 pounds per square foot.

b. Provide kiln dried, surfaced four sides (S4S), clear all sides wood slats of species and sizes indicated.

(1) Species: [Teakwood] [Marine Teak] [Clear All Heart Redwood] [Red Cedar] [Alaska Yellow Cedar] [Clear Douglas Fir] [Ipe] [Mahogany] [Purple Heart].

(2) Nominal wood slat sizes: 25 by 63 mm 1 by 2-1/2 inch [25 by 75 mm 1 by 3 inch] [50 by 75 mm 2 by 3 inch] [50 by 100 mm 2 by 4 inch]. Top and bottom rail may be larger in size and configuration for comfort of seating.

2.5.2.1 Support Pedestals

Provide [cast iron] [cast aluminum] [steel] [wood] [concrete] [fiberglass] support pedestals in accordance with manufacturer's standard.

2.5.2.1.1 Cast Grey Iron

ASTM A48/A48M Class 30 or recycled cast grey iron ASTM A48/A48M Class 25

2.5.2.1.2 Cast Aluminum

ASTM B26/B26M or ASTM B108/B108M as applicable

2.5.2.1.3 Steel

ASTM A653/A653M

2.5.2.1.4 Wood

Match in species, grade, grain, color and finish of the wood slats.

2.5.2.1.5 Concrete

Concrete must be of the same quality and finish as specified for precast concrete.

2.5.2.1.6 Fiberglass

Design fiberglass pedestals to support the loads imposed in design of bench. Color as approved.

[2.5.2.2 Steel Arms

Provide 9 mm 3/8 inch thick by 75 mm 3 inch wide steel bench arms conforming to ASTM A653/A653M.

]][2.5.3 Fiberglass Benches

Provide reinforced fiberglass benches molded with multiple laminations of glass fiber impregnated with polyester isophthalic thermosetting resins, minimum thickness of 3 mm 1/8 inch and reinforced in accordance with manufacturer's standard practice.

a. Design bench to sustain a live load of not less than 10 kPa 200 pounds per square foot.

b. Provide manufacturer's finish, 12-15 mil color impregnated polyester gel coat, of color as selected from manufacturer's standard colors and finishes, [smooth matte] [orange peel] [polished granite].

]2.5.4 Steel Units

[2.5.4.1 Perforated Steel

Provide [1.9 mm 14 gage] [1.6 mm 16 gage] perforated steel sheet, electrostatically coated with two component polyester enamel.

a. Design bench to sustain a live load of not less than 10 kPa 200 pounds per square foot.

[b. Provide 9 mm 3/8 inch thick by 100 mm 4 inch wide hot rolled steel pedestals conforming to ASTM A653/A653M.]

[c. Provide 38.3 mm 1-1/2 inch O.D. ASTM A53/A53M schedule 40 steel pipe pedestals.]

][2.5.4.2 All-Welded Wire

Provide all-welded wire construction of 3.8 mm 9 gage, 3.1 mm 11 gage wire with 13 mm 1/2 inch clear spacing and 8 mm 5/16 inch wire with 63 mm 2 1/2 inch spacing.

a. Design benches to sustain a live load of not less than 10 kPa 200 pounds per square foot.

b. Provide 33 mm one inch O.D. by 1.3 mm 18 gage [38.3 mm 1-1/2 inch O.D. by 1.6 mm 16 gage] galvanized tubing for bench frames.

[c. Provide 38.2 mm 1-1/2 inch O.D. by 3.1 mm 11 gage galvanized tubing for armrest.]

d. Provide cadmium or zinc plated hardware; nuts, bolts, screws, and lock washers with a clean chromate finish.

]2.5.5 Aluminum Units

[AA DAF45] [AAMA 611]. Provide [extruded] [formed] aluminum benches in accordance with manufacturers standard, with [dark] [medium] [light] bronze [clear anodized] [black anodized] [acrylic paint] [powder coat] finish, color as selected from manufacturer's standards.

a. Design benches to sustain a live load of not less than 10 kPa 200 pounds per square foot.

b. Provide manufacturer's standard [cast grey iron] [cast aluminum] [steel] [precast concrete] [fiberglass] pedestals.

2.5.6 Accessories

Provide manufacturer's standard materials and accessories as required for assembly of units and as indicated on the assembly drawings. Provide unexposed aluminum, stainless steel or steel plates, angles and supports as required for complete assembly. Separate dissimilar materials to prevent electrolytic action.

2.5.7 Fasteners

Provide concealed fasteners except where specifically approved; types as required for specific usage.

2.5.8 Anchoring Brackets

Provide 6 mm 1/4 inch zinc plated steel angle anchoring brackets, 47 mm 1-7/8 inch wide by 50 mm 2 inches deep by 63 mm 2-1/2 inches high [47 mm 1-7/8 inch wide by 90 mm 3-1/2 inch deep by 150 mm 6 inch high], pre-drilled for bolting benches to substrate.

2.6 BICYCLE RACKS

Design bicycle racks (stanchions) in accordance with manufacturer's standards and to meet design conditions indicated. Locate as shown on the drawings. Provide powder coat finish in color as selected from manufacturer's standards. Racks must accommodate locking devices and secure, as a minimum, one wheel and part of the frame simultaneously. The spacing between racks must be a minimum of 610 mm 24 inches.

[2.6.1 Metal Pipe Bicycle Racks

Provide ASTM A53/A53M schedule 40 steel pipe bicycle racks in configuration and of [114] [_____] mm [4-1/2] [_____] inch pipe size. Type of mounting, bicycle rack capacity and height above the ground as

shown on the drawings.

][2.6.2 Precast Concrete Bicycle Rack

Provide one-piece precast concrete bicycle rack base with embedded galvanized metal hitching loops. Design bicycle rack with wheel notches for bike support and wheel locking device.

]2.7 BOLLARDS

****
NOTE: Bollards are often included as a site furnishing but function primarily as a vehicle barrier; for bollard specification, verify cross reference with Section 34 75 13.13 CRASH RATED ACTIVE VEHICLE BARRIERS AND CONTROLS.
****

Provide reinforced concrete bollards [300] [450] mm [12] [18] inch [square] [round], height as indicated, suitable for ground mount installation. Provide exposed aggregate or sandblast finish as indicated; manufacturer's standard clear acrylic sealer. Submit manufacturer's descriptive data and catalog cuts.

2.7.1 Portland Cement

ASTM C150/C150M Type I II or III

2.7.2 Aggregate

ASTM C33/C33M, maximum size 19 mm 3/4 inch

2.7.3 Reinforcing Steel

ASTM A615/A615M

2.7.4 Integral Color

ASTM C979/C979M, pure mineral oxide, limeproof and non-fading

2.7.5 Concrete Strength

35 MPa 5000 psi, 28 day minimum compressive strength

2.7.6 Admixture

ASTM C260/C260M for air-entraining

2.8 PLANTERS [WASTE RECEPTACLES] [ASH RECEPTACLES]

[Provide for waste receptacles [spun aluminum] [reinforced fiberglass] [flat] [domed] tops and removable semi-rigid plastic liner insert.] [Provide top-mounted ash trays for ash receptacles.] Waste receptacles must be furnished with weather protection, odor containment, and insect/animal-proofing. Container size must be [as directed] [_____].

2.8.1 Height

Trash and litter deposit openings must be between 800-1000 mm 30-40 inches

above the ground.

2.8.2 Liners

Trash and litter receptacles must be furnished with [disposable inner-linings] [removable/reusable inner containers]. Self-dumping type designs to include hinged bottom, top or sides will be rejected.

2.8.3 Anchors

Trash and litter receptacles that can be anchored to resist overturning by typical use, high winds, or animals must be furnished and anchored in accordance with the manufacturer's recommendations.

2.8.4 Openings

Openings for trash and litter insertion must be a minimum of 100 mm 4 inches in diameter. Edges of the openings must be crimped, rounded and smoothed.

2.8.5 Ash Receptacles

Provide ash receptacles with a fire-proof metal bowl or screen or sand-filled containers for ash containment. Ash receptacles must have a minimum diameter of 200 mm 8 inches; ash containers must have a fire-proof metal bowl or screen and must be easily removable for cleaning.

2.8.6 Planter Size

The planter size must be determined according to the spacial root requirements at 2/3 maturity size of the designated plant material, in conformance with Section 32 93 00 EXTERIOR PLANTS.

2.8.7 Drainage

Drainage for the planter must be as follows: a minimum of one drainage hole in the base of each planter and a minimum 3 mm 1/8 inch space, in 2 locations, between the base of the planter and the supporting surface.

2.8.8 Base

The planter base must be capable of supporting the weight of the planter filled with both the designated plant material and fully saturated soil. The planter must not crack, overturn, or sink below the existing grade. Planters must allow for relocation.

[2.8.9 Glass Fiber Reinforced Concrete (GFRC) Precast

Provide glass fiber reinforced concrete (GFRC) precast [planters] [waste receptacles] [ash receptacles] at locations indicated on the drawings. Comply with PCI MNL-117 and PCI MNL-128.

[2.8.9.1 Materials

Provide manufacturer's standard shell thickness of 9 to 16 mm 3/8 to 5/8 inch.

2.8.9.1.1 Cement

ASTM C150/C150M, use only one brand and type of cement throughout the Project.

2.8.9.1.2 Glass Fibers

Alkali resistant (AR) glass fibers produced specifically for use in glass fiber reinforced concrete. Glass content of GFRC unit to be a minimum of three percent.

2.8.9.1.3 Aggregates

Clear silica sand passing 1.18 mm No. 16 sieve; washed, dried, and free from deleterious materials; provide type with successful history of use in GFRC and as standard with the manufacturer.

2.8.9.1.4 Compressive Strength

Minimum20.7 MPa 3000 psi 28 day strength

2.8.9.1.5 Density

Approximately 1921 kg/cu. m 120 pcf

2.8.9.1.6 Polymer Admixture

Manufacturer's standard acrylic thermoplastic copolymer

][2.8.9.2 Finishes

Provide factory finished units with manufacturer's standard texture or sandblasted finish as selected.

2.8.9.2.1 Cement

White or grey as consistent with final finish

2.8.9.2.2 Facing Aggregates

ASTM C33/C33M (less gradation), clean, hard, durable, inert, and free of staining and deleterious materials; as required to match approved samples

2.8.9.2.3 Color

ASTM C979/C979M, pure, non-fading mineral oxides which do not impair strength of GFRC; designed and mixed to provide color matching approved samples; maximum 10 percent cement weight

2.8.9.2.4 Applied Finishes

ASTM D4060 waterborne crosslinked acrylic 49.5 +/-2 percent solids by weight providing 1000 cycles per 0.0254 mm 1000 cycles per 0.001 inch resistance to abrasion

]][2.8.10 Precast Concrete/Cast Stone Planters

Provide reinforced precast concrete planters [waste receptacles] [ash receptacles] consisting of a mixture of cement, aggregates, and mineral

colors suitable for exterior use as located on the drawings. Provide manufacturer's standard exposed aggregate or sandblast finish (with clear acrylic coating) as selected.

2.8.10.1 Portland Cement

ASTM C150/C150M, gray, Type I

2.8.10.2 Aggregate

ASTM C33/C33M, 2.36 mm No. 8 crushed limestone and sand

2.8.10.3 Galvanized Steel Mesh

ASTM A1064/A1064M

2.8.10.4 Integral Color

ASTM C979/C979M, pure mineral oxide, limeproof and non-fading

2.8.10.5 Concrete Strength

30 MPa 4000 psi minimum compressive strength at 28 days

2.8.10.6 Admixture

ASTM C260/C260M for air-entraining

][2.8.11 Wood Containers

Provide manufacturer's standard [wood planter][waste receptacle][ash receptacle] fabricated of 19 mm 3/4 inch thick tongue and grooved wood slats permanently bonded with fiberglass interior shell. For top-trim, provide wood for square containers and fiberglass for round containers. Interior shell must be sufficient to protect wood from deterioration due to contact with soil and/or moisture

****

NOTE: For wood species other than Redwood or Cedar use the next sentence in order to avoid contact with ground or finish grade in order to avoid moisture and insect damage. Redwood and Cedar are naturally rot and insect resistant.

****

[Elevate wood finishes at minimum 13 mm 1/2 inch above finish grade.]Freestanding wood planters must be structurally sufficient to support saturated soil and designated plant materials at the designated mature size.

****

NOTE: Use certified sustainably harvested wood where suitable for application and cost effective.

****

[Provide certified sustainably harvested wood for wood containers.]

2.8.11.1 Wood Species

[Marine Teak] [Alaska Yellow Cedar] [Clear All-Heart California Redwood] [Purple Heart] [Ipe] [_____]

2.8.11.2 Fiberglass

Molded with multiple laminations of glass fiber impregnated with polyester isophthalic thermosetting resins with a finish of 0.30-0.38 mm 12-15 mil color impregnated polyester gel coat.

2.8.11.3 Metal Frame

Black color-coated steel frame

][2.8.12 Wood Planters with Metal Frames

Provide manufacturer's standard [wood planter][waste receptacle][ash receptacle] with galvanized steel welded frames, and nominal 50 mm two inch tongue and grooved, beveled or square cut wood staves. Attach wood staves to metal frame from inside with steel plated screws.

2.8.12.1 Wood Species

Kiln dried, maximum 19 percent moisture content, [Clear All Heart California Redwood] [Western Yellow Cedar] [Red Oak] [Phillipine Mahogany] [Purple Heart] [Ipe]

2.8.12.2 Metal Frame

Reinforced with steel bars in accordance with manufacture's standard construction, black color factory finish coated.

2.8.12.3 Bottom

6.25 mm 1/4 inch exterior grade redwood with drain holes

[2.8.12.4 Liners

Removable galvanized steel or manufacturer's standard

][2.8.12.5 Tops

[Hinged top opening] [spun aluminum open top with molded rim] [ash top]

]]2.8.13 Fiberglass Planters [Waste Receptacles] [Ash Receptacles]

Provide reinforced fiberglass planters [waste receptacles] [ash receptacles] molded with multiple laminations of glass fiber impregnated with polyester isophthalic thermosetting resins; with 0.30-0.38 mm 12-15 mil color impregnated polyester gel coat finish; minimum thickness of 6.35 mm 1/4 inch; color as selected.

2.8.14 Metal Planters [Waste Receptacle]

Provide metal planters [waste receptacles] as indicated, fabricated from [perforated steel sheet material] [wire or diamond mesh steel sheet] [steel frame with steel staves welded to frame] [cast aluminum] [cast iron]; powder coat finish, color as selected.

a. Metal thickness, width, and configuration must be manufacturer's standard. Chemically clean and phosphate coat prior to final powdercoat.

b. Provide 5 mm 3/16 inch thick fiberglass-reinforced polyester resin liner in black for planter liners.

2.9 SHELTERS

****

NOTE: It is important that the drawings reflect the type and size of Shelter intended. The specifications are intended to cover everything from small BUS STOP SHELTERS to large PAVILION SHELTERS. Types of structural frames, roofing materials and facias, glazing systems, and foundations must be carefully coordinated with the drawings. These systems are all factory designed and prefabricated ready for site assembly.

****

AISC 360. Provide prefabricated shelter systems to meet design conditions indicated. Shelter design must conform to all applicable State and Local Building Codes and must meet manufacturer's standards of construction and materials. Shelter systems must be [preglazed] pre-drilled and pre-cut, shipped with all hardware and accessories necessary for complete field assembly.

2.9.1 Framing Systems

Framing system; columns, rafters, ridge, purlins and other structural framing members must be [aluminum] [steel] [wood] as indicated. Manufacturer must provide shop drawings and calculations prepared by a structural engineer.

[2.9.1.1 Aluminum

Extruded aluminum alloy tubing must conform to ASTM B429/B429M 6063-T5 or 3003-H14, dark [medium] [light] bronze [black] [clear anodized] [powder coat] finish. Framing sizes and configurations must be as required for size of structure indicated meeting manufacturer's standards and applicable building codes.

][2.9.1.2 Steel

Structural steel must conform to ASTM A36/A36M or ASTM A500/A500M, 248 MPa 36,000 psi yield strength and 400 MPa 58,000 psi tensile strength, factory finished with rust inhibited primer and powder coat conforming to ASTM D3451. Framing sizes and configurations must be as required for size of structure indicated meeting manufacturer's standard and applicable building codes.

][2.9.1.3 Wood

Wood framing system must consist of surfaced four sides (S4S), #2 grade southern yellow pine [_____] solid timber columns with eased edges, pressure treated against decay, fungi and insect infestation, surfaced four sides (S4S), #1 grade, southern pine, [_____] glue-laminated columns

manufactured in accordance with ANSI/AITC A190.1 and AITC certified glue-laminated structural grade southern yellow pine [_____] beams, rafters and purlins, factory sealed and individually wrapped for protection during shipment. Factory stain all wood members prior to shipment.

****

NOTE: Use certified sustainably harvested wood where suitable for application and cost effective.

****

[Provide certified sustainably harvested wood for wood shelters.]

]2.9.2 Roof Panels [Decking]

Provide manufacturer's standard [molded acrylic translucent roof panel] [standing seam metal roof panel] [wood decking] [V-beam aluminum roof panels] [FRP roof panels] [_____] roof panels as indicated. Materials must be factory finished and shipped with all necessary fasteners and accessories as required for complete site assembly.

2.9.3 Glazing

Factory installed in separate structural window frames, gasketed and glazed in accordance with manufacturer's standard, interchangeable, glazing system. Provide [6.35 mm 1/4 inch acrylic sheet] [6.35 mm 1/4 inch tempered glass] [6.35 mm 1/4 inch polycarbonate plastic sheet] [6.35 mm 1/4 inch mar-resistant polycarbonate plastic sheet], [clear] [_____] color.

2.10 TABLES

Picnic tables must be furnished with attached benches that have no backrests. Table's exposed edges and corners must be rounded, eased or chamfered.

2.10.1 Height

Between 750-1200 mm 29-48 inches from the finished grade to the lowest surface of the top, or as noted.

2.10.2 Clearance

A minimum vertical clearance of 230 mm 9 inches between the seat top and the bottom edge of the table top must be provided. A minimum of 460 mm 18 inches of leg space under tables, measured from the inside edge of the seat top to the nearest table support, must be provided. A minimum of 460 mm 18 inches from the end of the table top to the nearest support leg must be provided.

2.10.3 Top

Table top surfaces must not contain recesses that might hold water or food particles. The table top width must be a minimum of 460 mm 18 inches when utilized from one side only, and a minimum of 900 mm 36 inches when utilized from two sides. The table top length must be a minimum of 610 mm 24 inches per person.

2.10.4 Wheelchair Access

A minimum clear space of 740 mm 29 inches from the finished grade to the underside of the table must be provided for persons with disability to be able to pull a wheelchair beneath the table top at the end of the table; the minimum clear width must be 860 mm 34 inches.

2.10.5 Precast Concrete Tables

Provide reinforced precast concrete tables with smooth tops; minimum 35 MPa 4500 psi concrete, 28 day minimum compressive strength, consisting of a mixture of cement, aggregates, and mineral colors suitable for exterior use as located on the drawings. Provide manufacturer's standard exposed aggregate or sandblast finish with clear acrylic coating.

a. Portland cement: ASTM C150/C150M, gray, Type I.

b. Aggregate: ASTM C33/C33M, washed 2.36 mm No. 8 limestone and sand.

c. Galvanized wire mesh: 1.9 mm 14 gage, 50 by 50 mm 2 by 2 inch.

d. Welded wire fabric: ASTM A1064/A1064M

e. Reinforcing steel: ASTM A615/A615M

f. Integral color: ASTM C979/C979M, pure mineral oxide, limeproof and non-fading

g. Admixture: ASTM C260/C260M for air-entraining.

2.10.6 Fiberglass Tables

Provide reinforced fiberglass table tops molded with multiple laminations of glass fiber impregnated with polyester isophthalic thermosetting resins, minimum thickness of 6 mm 1/4 inch with 0.30-0.38 mm 12-15 mil thickness color impregnated polyester gel coat, color as selected.

a. Steel pedestal base: ASTM A53/A53M Schedule 40 steel pipe, [38] [41] [60] mm [1-1/2] [1-5/8] [2-3/8] inch O.D.

b. Mounting: Type as indicated.

c. Metal finish: Powder coating conforming to ASTM D3451 testing.

2.10.7 Perforated Steel Tables

Provide 1.9 mm 14 gage [1.6 mm 16 gage] perforated steel sheet table tops with solid metal edges in accordance with manufacturer's standard. Weld tops to base as required for frame support.

a. Steel pedestal base: ASTM A53/A53M Schedule 40 steel pipe, 60 mm 2-3/8 inch O.D.

b. Mounting: Type as indicated.

c. Hardware: Zinc or cadmium plated nuts, bolts, screws, and lock washers.

d. Metal finish: Powder coating conforming to ASTM D3451 testing.

2.10.8 [Wood Tables

Provide manufacturer's standard wood tables with wood [metal] [_____] bases as indicated. Provide fasteners and accessories required for onsite assembly. Kiln dry and pressure treat wood components to manufacturer's standard, maximum 19 percent moisture content. [Pre-treat metal components and provide manufacturer's standard primer and powder coat finish complying with ASTM D3451, color as selected].

****

NOTE: Use certified sustainably harvested wood where suitable for application and cost effective.

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[Provide certified sustainably harvested wood for wood tables.]

a. Design wood tables to sustain a live load of not less than 10 kPa 200 pounds per square foot.

b. Provide kiln dried, surfaced four sides (S4S), clear all sides wood slats of species and sizes indicated.

(1) Species: [Teakwood] [Marine Teak] [Clear All Heart Redwood] [Red Cedar] [Alaska Yellow Cedar] [Clear Douglas Fir] [Ipe] [Mahogany] [Purple Heart].

(2) Nominal wood slat sizes: 25 by 63 mm 1 by 2-1/2 inch [25 by 75 mm 1 by 3 inch] [50 by 75 mm 2 by 3 inch] [50 by 100 mm 2 by 4 inch].

c. Design bases of the materials listed below to support the loads imposed in the design of the tables.

d. Wood Support: Match in species, grade, grain, color and finish of the wood slats.

[e. Steel Support: ASTM A653/A653M].

[f. Cast Grey Iron Support: ASTM A48/A48M, Class 30 or recycled cast grey iron ASTM A48/A48M, Class 25.]

[g. Cast Aluminum Support: ASTM B26/B26M or ASTM B108/B108M as applicable.]]

2.11 [TREE GRATES

Provide [cast aluminum] [cast iron] [cast bronze] [punched steel] [stainless steel] tree grates in [round] [square] model of sizes indicated on the drawings. Furnish complete with angle steel frames with finish to match tree grates.

]PART 3 EXECUTION

3.1 CHILDREN'S PLAY AREAS

Install the site furnishings outside the play structure use zone in accordance with ASTM F1487. Verify and mark the locations of the use zone. These zones are to be free from obstacles and hard surfaces. When child accessibility requirements are to be met, child anthropometric

dimensions must be used and not adult anthropometric dimensions.

3.2 INSTALLATION

Verify that finished grades and other operations affecting mounting surfaces have been completed prior to the installation of site furnishings. Site furnishings must be installed plumb and true, at locations indicated, in accordance with the approved manufacturer's instructions.

3.2.1 Assembly and Erection of Components

New parts must be acquired from the manufacturer; substitute parts will not be accepted unless approved by the manufacturer. When the inspection of parts has been completed, the site furnishings must be assembled and anchored according to manufacturer's instructions or as indicated. When site furnishings are assembled at the site, assembly must not interfere with other operations or pedestrian and vehicular circulation.

3.2.2 Anchorage, Fastenings, and Connections

Furnish metal work, mounting bolts or hardware in ample time for securing into concrete or masonry as the work progresses. Provide anchorage where necessary for fastening furniture or furnishings securely in place. Provide, for anchorage not otherwise specified or indicated, slotted inserts, expansion shields, and power-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish the fastenings to which they are applied. Conceal fastenings where practicable.

3.3 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.4 TESTING

Test each site furnishing to ascertain a secure and correct installation. A correct installation must be according to the manufacturer's recommendations and by the following procedure: Measure the physical dimensions and clearance of each installed site furnishing for compliance with manufacturer's recommendations and as indicated. Site furnishings which do not comply must be reinstalled. Fasteners and anchors determined to be non-compliant must be replaced. Submit a written report describing the results of the testing and a report of post-installation test results.

3.5 FINISHES

3.5.1 Field Finishes

Where indicated, field finishes must be applied in accordance with Section 09 90 00 PAINTS AND COATINGS. Where dissimilar metals are in contact, protect surfaces with a coat conforming to SSPC Paint 25 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, mortar, masonry, wood, or absorptive materials subject to wetting, protect

with ASTM D1187/D1187M, asphalt-base emulsion.

3.5.2 Repair of Zinc-Coated Surfaces

****
NOTE: Delete this paragraph when no galvanized items are specified.
****

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A780/A780M or by the application of stick or thick paste material specifically designed for repair of galvanizing, as approved by the Contracting Officer. Clean areas to be repaired and remove the slag from the welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread the molten material uniformly over surfaces to be coated and wipe the excess material off.

3.6 BOLLARDS

Install in pipe sleeves embedded in concrete and filled with non-shrink grout or quick setting anchoring cement.

3.7 BICYCLE RACKS

Affix to base structure by flanges anchored to concrete or other existing masonry by expansion shields. Provide Series 300 stainless steel bolts to anchor aluminum alloy flanges, of a size appropriate to the standard product of the manufacturer. Where aluminum or alloy fittings or extrusions are to be in contact with dissimilar metals or concrete, give the contact surface a heavy coating of bituminous paint.

3.8 SHELTERS

Secure to the adjacent construction with the clip angles attached to the concrete. Secure to concrete with not less than two 13 mm 1/2 inch diameter expansion bolts.

3.8.1 Glazing

Factory install windows into separate structural frame. Miter corners and connect internally by extruded aluminum corner keys or screw bosses with tamper-proof stainless steel screws. Provide continuous gasketing around windows set to metal frames. Provide 13 to 19 mm 1/2 to 3/4 inch deep pocket for polycarbonate glazing. Fully gasket and frame in independent interchangeable factory assembled units. Affix to shelter frame with 5 mm 3/16 inch mustow head aluminum rivets at approximately 331 mm13-1/4 inches on centers for full 6.28 rad 360 degrees, rivet from inside of shelter.

3.8.2 Roof

Provide manufacturer's standard roof system including facia [gutter] assembly, ensuring a weather-tight seal and installation.

3.9 RESTORATION AND CLEAN UP

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

3.9.1 Clean Up

The site must be cleaned of all materials associated with the installation. Site furnishing surfaces must be cleaned of dirt, stains, filings, and other blemishes occurring from shipment and installation. Cleaning methods and agents must be according to manufacturer's instructions or as indicated.

3.9.2 Protection

The area must be protected as required or directed by providing barricades and signage. Signage must be in accordance with Section 10 14 00.10 EXTERIOR SIGNAGE.

3.9.3 Disposal of Materials

Excess and waste material must be removed and disposed off Government property [_____].

3.10 RE-INSTALLATION

Where re-installation is required, the following must be accomplished:

a. Re-install the product as specified. Material acquisition of replacement parts is the responsibility of the Contractor. Provide replacement materials that are new and supplied by the original manufacturer to match.

b. Damage caused by the failed installation must be repaired.

-- End of Section --