
USACE / NAVFAC / AFCEA UFGS-02870 (July 2003)

Preparing Activity: USACE Superseding
UFGS-02870N (September 1999)
UFGS-02870A (June 1998)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMR L dated 22 December 2004

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE CONSTRUCTION

SECTION 02870

SITE FURNISHINGS

07/03

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 QUALIFICATION OF WELDERS
- 1.4 DELIVERY, INSPECTION, STORAGE AND PROTECTION
- 1.5 GENERAL REQUIREMENTS
 - 1.5.1 Fabrication Drawings
 - 1.5.2 Installation Drawings
 - 1.5.3 Assembly Instruction Drawings
 - 1.5.4 Primer Certificate
 - 1.5.5 Powder Coatings Certificate

PART 2 PRODUCTS

- 2.1 MATERIALS
 - 2.1.1 Metals
 - 2.1.2 Structural Tubing
 - 2.1.3 Steel Pipe and Fittings
 - 2.1.4 Gray Cast Iron
 - 2.1.5 Cast Aluminum
 - 2.1.6 Aluminum Alloy Products
 - 2.1.7 Anchors and Hardware
 - 2.1.7.1 Threaded Inserts and Expansion Anchors
 - 2.1.7.2 Lag Screws and Bolts
 - 2.1.7.3 Toggle Bolts
 - 2.1.7.4 Bolts, Nuts, Studs and Rivets
 - 2.1.7.5 Power Driven Fasteners
 - 2.1.7.6 Screws
 - 2.1.7.7 Washers
 - 2.1.8 Ounce Metals
 - 2.1.9 Concrete
 - 2.1.10 Masonry
 - 2.1.11 Tempered Glass
 - 2.1.12 Plastics

- 2.1.12.1 Extruded Acrylic Sheet
 - 2.1.12.2 Cast Acrylic Sheet
 - 2.1.13 Lumber
 - 2.1.13.1 Moisture Content
 - 2.1.13.2 Treatment
 - 2.1.13.3 Wood Seats and Table Tops
 - 2.1.14 Fiberglass
- 2.2 PRETREATMENT, PRIMING AND PAINTING
 - 2.2.1 Nonferrous Metal Surfaces
 - 2.2.2 Aluminum Surfaces
- 2.3 COATINGS AND FINISHES
 - 2.3.1 Galvanizing
 - 2.3.2 Polyester Powder
 - 2.3.3 Polyvinyl-Chloride (PVC)
 - 2.3.4 Finish
 - 2.3.4.1 Wood Sealants
 - 2.3.4.2 Paint
 - 2.3.4.3 Color
- 2.4 SITE STANDARDS
- 2.5 BENCHES AND CHAIRS
 - 2.5.1 Precast Units
 - 2.5.1.1 Glass Fiber Reinforced Concrete (GFRC) Units
 - 2.5.1.2 Precast Concrete/Cast Stone Units
 - 2.5.2 Wood Units
 - 2.5.2.1 Support Pedestals
 - 2.5.2.2 Steel Arms
 - 2.5.3 [Fiberglass Benches
 - 2.5.4 Steel Units
 - 2.5.4.1 Perforated Steel
 - 2.5.4.2 All-Welded Wire
 - 2.5.5 Aluminum Units
 - 2.5.6 Accessoriess
 - 2.5.7 Fasteners
 - 2.5.8 Anchoring Brackets
- 2.6 BICYCLE RACKS
 - 2.6.1 Metal Pipe Bicycle Racks
 - 2.6.2 Precast Concrete Bicycle Rack
- 2.7 BOLLARDS
 - 2.7.1 Precast Concrete Bollards
- 2.8 PLANTERS [WASTE RECEPTACLES] [ASH RECEPTACLES]
 - 2.8.1 Glass Fiber Reinforced Concrete (GFRC) Precast
 - 2.8.1.1 Materials
 - 2.8.1.2 Finishes
 - 2.8.2 Precast Concrete/Cast Stone Planters
 - 2.8.3 Wood Planters
 - 2.8.4 Wood Planters with Metal Frames
 - 2.8.5 Fiberglass Planters [Waste Receptacles] [Ash Receptacles]
 - 2.8.6 Metal Planters [Waste Receptacle]
- 2.9 SHELTERS
 - 2.9.1 Framing Systems
 - 2.9.2 Roof Panels [Decking]
 - 2.9.3 Glazing
- 2.10 TABLES
 - 2.10.1 Precast Concrete Tables
 - 2.10.2 Fiberglass Tables
 - 2.10.3 Perforated Steel Tables
 - 2.10.4 Wood Tables
- 2.11 TREE GRATES

PART 3 EXECUTION

- 3.1 INSTALLATION
 - 3.1.1 Assembly and Erection of Components
 - 3.1.2 Anchorage, Fastenings, and Connections
- 3.2 WELDING
- 3.3 TESTING
- 3.4 FINISHES
 - 3.4.1 Field Finishes
 - 3.4.2 Repair of Zinc-Coated Surfaces
- 3.5 CHILDREN'S PLAY AREAS
- 3.6 BOLLARDS
- 3.7 BICYCLE RACKS
- 3.8 SHELTERS
 - 3.8.1 Glazing
 - 3.8.2 Roof
- 3.9 RESTORATION AND CLEAN UP
 - 3.9.1 Clean Up
 - 3.9.2 Protection
 - 3.9.3 Disposal of Materials
- 3.10 RE-INSTALLATION

-- End of Section Table of Contents --

USACE / NAVFAC / AFCEA UFGS-02870 (July 2003)

Preparing Activity: USACE Superseding
UFGS-02870N (September 1999)
UFGS-02870A (June 1998)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 22 December 2004

SECTION 02870

SITE FURNISHINGS 07/03

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

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

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

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

PART 1 GENERAL

NOTE: The following information shall 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.

1.1 REFERENCES

NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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 DAF-45 (2003) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611 (1998) Voluntary Specification for Anodized Architectural Aluminum; includes 604.2, 606.1, 607.1 and 608.1 (which are no longer available as separate documents)

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303 (2000) Code of Standard Practice for Steel Buildings and Bridges

AISC 335 (1989) Structural Steel Buildings Allowable Stress Design and Plastic Design

AISC 350 (1999) Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC A190.1 (2002) Structural Glued Laminated Timber

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.3 (1995) Operations -- Safety Requirements for Powder Actuated Fastening Systems

ANSI B18.2.1 (1996; Errata 2003) Square and Hex Bolts and Screws Inch Series

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2004) Structural Welding Code - Steel

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C1 (2000) All Timber Products - Preservative Treatment by Pressure Processes

AWPA C9 (2000) Plywood - Preservative Treatment by Pressure Processes

AWPA M2 (2001) Standard for Inspection of Treated Wood Products

ASME INTERNATIONAL (ASME)

ASME B18.2.2 (1987; R 1999) Square and Hex Nuts

ASME B18.21.1 (1999) Lock Washers (Inch Series)

ASME B18.21.2M (1999) Lock Washers (Metric Series)

ASME B18.22.1 (1965; R 2003) Plain Washers

ASME B18.22M (1981; R 2000) Metric Plain Washers

ASME B18.6.2 (1998) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series (B18.6.2)

ASME B18.6.3 (1999) Machine Screws and Machine Screw Nuts

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M (2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 153/A 153M (2004) Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 185 (2002) Steel Welded Wire Reinforcement, Plain, for Concrete

ASTM A 307 (2004) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM A 36/A 36M (2004) Carbon Structural Steel

ASTM A 47/A 47M (1999) Ferritic Malleable Iron Castings

ASTM A 48/A 48M (2003) Gray Iron Castings

ASTM A 500 (2003a) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A 501	(2001) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 53/A 53M	(2004a) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 615/A 615M	(2004b) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 653/A 653M	(2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM B 108	(2003a) Aluminum-Alloy Permanent Mold Castings
ASTM B 209	(2004) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 209M	(2004) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221	(2004a) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 221M	(2004) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B 26/B 26M	(2003) Aluminum-Alloy Sand Castings
ASTM B 429	(2002) Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM B 62	(2002) Composition Bronze or Ounce Metal Castings
ASTM C 1048	(2004) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM C 150	(2004a) Portland Cement
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 33	(2003) Concrete Aggregates
ASTM C 94/C 94M	(2004a) Ready-Mixed Concrete
ASTM C 979	(1999) Pigments for Integrally Colored Concrete
ASTM D 1187	(1997; R 2002e1) Asphalt-Base Emulsions for Use as Protective Coatings for Metal

ASTM D 2990	(2001) Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
ASTM D 3451	(2001) Testing Coating Powders and Powder Coatings
ASTM D 4060	(2001) Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D 4802	(2002) Poly(Methyl Methacrylate) Acrylic Plastic Sheet
ASTM D 648	(2004) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ASTM E 488	(1996; R 2003) Strength of Anchors in Concrete and Masonry Elements
ASTM F 1487	(2001e1) Playground Equipment for Public Use

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules	(2003) Rules for the Measurement & Inspection of Hardwood & Cypress
------------	---

PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI MNL-117	(1996) Quality Control for Plants and Production of Architectural Precast Concrete Products
PCI MNL-128	(2001) Glass Fiber Reinforced Concrete Panels

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

RIS Grade Use	(1998) Redwood Lumber Grades and Uses
---------------	---------------------------------------

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Spec	(1986; Supple No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress
-----------	---

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1003	(2002) Standard Grading Rules for Southern Pine Lumber
-----------	--

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25	(1997; R 2000) Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II
---------------	--

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-1925 (Rev A; Notice 1) Shield, Expansion (Nail Anchors)

FS L-P-391 (Rev D; Am 1) Plastic Sheets, Rods and Tubing Rigid Cast, Methacrylate (Multiapplication)

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB 17 (2000) Standard Grading Rules

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA G-5 (1998) Western Lumber Grading Rules

1.2 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

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

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

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with

Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Benches and Chairs[; G][; G, [____]]
Tables[; G][; G, [____]]
Shelters[; G][; G, [____]]
Bicycle Racks[; G][; G, [____]]
Planters[; G][; G, [____]]
Bollards[; G][; G, [____]]
Tree Grates[; G][; G, [____]]
Assembly Assembly Instruction Drawings

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.

SD-03 Product Data

Benches and Chairs
Tables
Shelters
Bicycle Racks
Planters
Bollards
Tree Grates
Waste Receptacles

Manufacturer's descriptive data and catalog cuts.

SD-04 Samples

Finish[; G][; G, [____]]

[Two] [____] sets of color data for each furnishing displaying manufacturer's color selections and finishes, and identifying those colors and finishes proposed for use.

SD-06 Test Reports

Recycled Materials

A report of site furnishing parts consisting of recycled materials. Product specification data, providing test information for deflection and creep in accordance with ASTM D 648 and ASTM D 2990 for site furnishings which use plastic lumber as a component, shall be submitted. The data shall provide a comparison of deflection and creep measurements to other comparable materials.

Testing

A report of post-installation test results.

SD-07 Certificates

Primer certificate
Powder coatings certificate

Manufacturer's certificate of compliance.

1.3 QUALIFICATION OF WELDERS

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

1.4 DELIVERY, INSPECTION, STORAGE AND PROTECTION

Materials shall be delivered, handled, and stored in accordance with the manufacturer's recommendations. Site furnishings shall 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.

1.5 GENERAL REQUIREMENTS

1.5.1 Fabrication Drawings

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

1.5.2 Installation Drawings

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

1.5.3 Assembly Instruction Drawings

Submit assembly instruction drawings showing layout(s), connections, bolting and anchoring details as per manufacturer's standards.

1.5.4 Primer Certificate

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

1.5.5 Powder Coatings Certificate

Submit a certificate from the manufacturer stating that the powder coat conforms to ASTM D 3451.

PART 2 PRODUCTS

NOTE: Product selections should be based on
esthetic values, reliability and cost. Select
applicable materials as they may apply and delete
non-applicable items. Verify cross-references with
other sections related to materials.

2.1 MATERIALS

Materials shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. The materials provided shall be of a type with proven satisfactory usage for at least 2 years.

2.1.1 Metals

Metallic materials and products shall conform to Section 05500A MISCELLANEOUS METAL. Metal components shall be furnished with factory drilled holes. Components shall be 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 shall conform to ASTM A 36/A 36M, ASTM A 500 and ASTM A 501.

2.1.2 Structural Tubing

ASTM A 500.

2.1.3 Steel Pipe and Fittings

Steel pipe shall conform to ASTM A 53/A 53M, Type E or S, Grade B; standard malleable iron fittings shall conform to ASTM A 47/A 47M.

2.1.4 Gray Cast Iron

Gray cast iron shall conform to ASTM A 48/A 48M Class 35 or better. The Contractor shall provide castings manufactured true to pattern and component parts that fit together in a satisfactory manner. Castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. Smooth castings shall be well-cleaned by sand or shot blasting.

2.1.5 Cast Aluminum

Cast aluminum shall conform to ASTM B 26/B 26M and ASTM B 108. The Contractor shall provide castings manufactured true to pattern and component parts that fit together in a satisfactory manner. Castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. Smooth castings shall be well-cleaned by sand or shot blasting.

2.1.6 Aluminum Alloy Products

Conform to ASTM B 209M ASTM B 209 for sheet plate, ASTM B 221M ASTM B 221 for extrusions and ASTM B 26/B 26M or ASTM B 108 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.

2.1.7 Anchors and Hardware

Anchors shall be provided, 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 shall conform to ASTM A 307. Hardware shall be [stainless steel] [brass] [zinc-plated] [zinc-chromate plated] [or] [galvanized steel] in accordance with ASTM A 153/A 153M and compatible with the material to which applied. All exposed hardware shall match in color and finish. Mounting hardware shall be concealed, recessed, and plugged.

2.1.7.1 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 per ASTM E 488. Expansion shields shall conform to FS A-A-1925, group II, type 4, class 1. Provide embedment required by manufacturer.

2.1.7.2 Lag Screws and Bolts

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

2.1.7.3 Toggle Bolts

ANSI B18.2.1.

2.1.7.4 Bolts, Nuts, Studs and Rivets

ASME B18.2.2 or ASTM A 307.

2.1.7.5 Power Driven Fasteners

Follow safety provisions of ANSI A10.3.

2.1.7.6 Screws

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

2.1.7.7 Washers

Provide plain washers to conform to ASME B18.22M ASME B18.22.1. 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.

2.1.8 Ounce Metals

Bronze, copper, and other ounce metals shall conform to ASTM B 62.

2.1.9 Concrete

Ready-mixed concrete shall conform to ASTM C 94/C 94M, using 19 mm 3/4 inch maximum size aggregate, and having minimum compressive strength of 20 MPa 3000 psi at 28 days. Portland cement shall conform to ASTM C 150. Cast-in-place concrete materials and products shall conform to Section [03300A CAST-IN-PLACE STRUCTURAL CONCRETE] [03300N CAST-IN-PLACE CONCRETE]. Precast concrete material and products shall conform to Section 03410N PLANT-PRECAST STRUCTURAL CONCRETE. Reinforcing steel shall conform to ASTM A 615/A 615M. Welded wire fabric shall conform to ASTM A 185.

2.1.10 Masonry

Masonry material and products shall conform to Section 04200 MASONRY

2.1.11 Tempered Glass

ASTM C 1048, Kind FT (fully tempered), condition A (uncoated), Type 1 (transparent, Quality q3, [6.35] [_____] mm [1/4] [_____] inch thick, [clear] [bronze] [_____] in color.

2.1.12 Plastics

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. 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.

Recycled materials shall contain a minimum [85] [_____] percent recycled post-consumer product and shall conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS. Recycled materials shall be constructed or manufactured with a maximum 6 mm 1/4 inch deflection or creep in any member in conformance with ASTM D 648 and ASTM D 2990. The Contractor shall provide panels and components molded of ultraviolet (UV) and color stabilized polyethylene, with minimum 6 mm 1/4 inch wall thickness; exposed edges shall be smoothed, rounded, and free of burrs and points; and the material shall be resistant to fading, cracking, fogging, and shattering. The material shall be non-toxic and have no discernible contaminants such as paper, foil, or wood. The material shall contain no more than 3 percent air voids. Material shall 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.

2.1.12.1 Extruded Acrylic Sheet

ASTM D 4802 [Type I, regular] [Type II, heat resistant] [6] [_____] mm [1/4] [_____] inch thick, [clear] [_____] in color.

2.1.12.2 Cast Acrylic Sheet

FS L-P-391, Item A, [Type I, Heat resistant and ultraviolet light absorbing] [Type II, heat resistant], 6 mm 1/4 inch thick, [clear] [bronze] [_____] in color.

2.1.13 Lumber

The Contractor shall 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 shall be selected to withstand the climatic conditions of the region in which the site is located. Lumber grades shall meet manufacturers standards of the grading rules under which they are manufactured. Where no standards exist the following shall be the minimum acceptable grades for species used.

- a. WHPA G-5 grading rules, [Douglas Fir] [Western Cedars], [Choice & Btr,] [Select or A & Btr.] per 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. SCMA Spec 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.].

2.1.13.1 Moisture Content

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

2.1.13.2 Treatment

Wood that is not naturally rot and insect resistant shall be treated with standard procedures. Creosote, pentachlorophenol, tributyl tin oxide shall not be used in conformance with ASTM F 1487. Ammonium Copper Quat (ACQ) shall not be used for surfaces likely to contact the skin of small children. AWPAC1 and AWPAC9, as applicable, and inspected in accordance with AWPAM2.

2.1.13.3 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.

2.1.14 Fiberglass

Fiberglass shall 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 shall 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, shall 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 shall conform to ASTM A 123/A 123M, ASTM A 153/A 153M or ASTM A 653/A 653M, as applicable. Tailings and sharp protrusions formed as a result of the hot-dip process shall 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 shall receive electrostatic zinc coating prior to painting. Powder coating shall be electrostatically applied and oven cured. Polyester powder coating shall be resistant to ultraviolet (UV) light.

2.3.3 Polyvinyl-Chloride (PVC)

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

2.3.4 Finish

Finish shall be as specified by the manufacturer or as indicated. Exposed surfaces and edges shall be rounded, polished, or sanded. Finish shall be non-toxic, non-glare, and resistant to corrosion. Exposed surfaces shall be smooth and splinter-free exposed surfaces.

2.3.4.1 Wood Sealants

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

applied surfaces from air.

2.3.4.2 Paint

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

2.3.4.3 Color

Color of site furnishing components shall be in accordance with Section 09915 COLOR SCHEDULE.

2.4 SITE STANDARDS

Site furnishings shall be furnished with the dimensions and requirements indicated. Site furnishings placed in children's outdoor play areas shall meet the safety requirements of ASTM F 1487 for entrapment; sharp points, edges, and protrusions; entanglement; pinch, crush, and shear points. Site furnishings to be included in children's outdoor play areas shall 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 shall be rounded.

2.5 BENCHES AND CHAIRS

Benches and chairs shall be furnished with no sharp edges or protruding hardware.

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

b. Seat: The seat surface shall be pitched or slotted to shed water; the seat depth shall be between 300-460 mm 12-18 inches and pitched down at the back at a 0-5 degree angle. Seat shall have a minimum width of 610 mm 24 inches per person, and shall 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 shall be between 380-460 mm 15-18 inches from the top of the seat and the connection shall 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 40 mm 1-1/2 inches shall be provided.

e. Weight Limit: Seats shall 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 C 150 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 20/25 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 C 33 (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 C 979, 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 D 4060 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 shown on the drawings.

- a. Design benches to sustain a live load of not less than 10 kPa 200 pounds per square foot.
- b. Portland cement: ASTM C 150 Type I II or III.
- c. Aggregate: ASTM C 33, maximum size 19 mm 3/4 inch.
- d. Reinforcing steel: ASTM A 615/A 615M.
- e. Galvanized wire mesh: ASTM A 185.
- f. Integral color: ASTM C 979, pure mineral oxide, limeproof and non-fading.
- g. Provide minimum 35 MPa 5000 psi 28 day compressive strength concrete, maximum five percent absorption.
- h. Admixture: ASTM C 260 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 D 3451, 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.

- 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 as per manufacturer's standard.

- a. Cast grey iron: ASTM A 48/A 48M Class 30 or recycled cast grey iron ASTM A 48/A 48M Class 25.

- [b. Cast aluminum: ASTM B 26/B 26M or ASTM B 108 as applicable.]
- [c. Steel: ASTM A 653/A 653M.]
- [d. Wood: Match in species, grade, grain, color and finish of the wood slats.]
- [e. Concrete shall be of the same quality and finish as specified for precast concrete.]
- [f. 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 A 653/A 653M.

]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 as per 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 A 653/A 653M.]
- [c. Provide 48.3 mm 1 1/2 inch O.D. ASTM A 53/A 53M 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 [48.3 mm 1 1/2 inch

O.D. by 1.6 mm 16 gage] galvanized tubing for bench frames.

[c. Provide 48.2 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 DAF-45] [AAMA 611]. Provide [extruded] [formed] aluminum benches as per 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 Accessoriess

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 shall accommodate locking devices and secure, as a minimum, one wheel and part of the frame simultaneously. The spacing between racks shall be a minimum of 610 mm 24 inches.

[2.6.1 Metal Pipe Bicycle Racks

Provide ASTM A 53/A 53M 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 02840 ACTIVE VEHICLE BARRIERS.

2.7.1 Precast Concrete Bollards

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.

- a. Portland cement: ASTM C 150 Type I II or III.
- b. Aggregate: ASTM C 33, maximum size 19 mm 3/4 inch.
- c. Reinforcing steel: ASTM A 615/A 615M.
- d. Integral color: ASTM C 979, pure mineral oxide, limeproof and non-fading.
- e. Concrete strength: 35 MPa 5000 psi, 28 day minimum compressive strength.
- f. Admixture: ASTM C 260 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 shall be furnished with weather protection, odor containment, and insect/animal-proofing. Container size shall be [as directed] [_____].

- a. Height: Trash and litter deposit openings shall be between 800-1000 mm 30-40 inches above the ground.
- b. Liners: Trash and litter receptacles shall be furnished with [disposable inner-linings] [removable/reusable inner containers]. Self-dumping type designs to include hinged bottom, top or sides will be rejected.
- c. Anchors: Trash and litter receptacles that can be anchored to resist overturning by typical use, high winds, or animals shall be furnished and anchored in accordance with the manufacturer's recommendations.
- d. Openings: Openings for trash and litter insertion shall be a minimum of 100 mm 4 inches in diameter. Edges of the openings shall be

crimped, rounded and smoothed.

e. Ash Receptacles: The Contractor shall provide ash receptacles with a fire-proof metal bowl or screen or sand-filled containers for ash containment. Ash receptacles shall have a minimum diameter of 200 mm 8 inches; ash containers shall have a fire-proof metal bowl or screen and shall be easily removable for cleaning.

f. Planter Size: The planter size shall be determined according to the spacial root requirements at 2/3 maturity size of the designated plant material, in conformance with Section 02930 EXTERIOR PLANTS.

g. Drainage: Drainage for the planter shall 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.

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

[2.8.1 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.

] [2.8.1.1 Materials

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

- a. Cement: ASTM C 150, use only one brand and type of cement throughout the Project.
- b. 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.
- c. 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.
- d. Compressive Strength: Minimum 20/25 MPa 3000 psi 28 day strength.
- e. Density: Approximately 1921 kg/cu. m 120 pcf.
- f. Polymer Admixture: Manufacturer's standard acrylic thermoplastic copolymer.

] [2.8.1.2 Finishes

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

- a. Cement: White or grey as consistent with final finish.

- b. Facing Aggregates: ASTM C 33 (less gradation), clean, hard, durable, inert, and free of staining and deleterious materials; as required to match approved samples.
- c. Color: ASTM C 979, 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.
- d. Applied Finishes: ASTM D 4060 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.

] [2.8.2 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.

- a. Portland Cement: ASTM C 150, gray, Type I.
- b. Aggregate: ASTM C 33, 2.36 mm No. 8 crushed limestone and sand.
- c. Galvanized Steel Mesh: ASTM A 185.
- d. Integral Color: ASTM C 979, pure mineral oxide, limeproof and non-fading.
- e. Concrete Strength: 30 MPa 4000 psi minimum compressive strength at 28 days.
- f. Admixture: ASTM C 260 for air-entraining.

] [2.8.3 Wood Planters

Provide manufacturer's standard wood planter [waste receptacle] [ash receptacles] fabricated of 19 mm 3/4 inch thick tongue and grooved wood slats permanently bonded with fiberglass interior shell. Provide wood top trim for square planters and fiberglass top trim for round planters. Freestanding planters shall support designated plant material to reduce wood deterioration from contact with soil and moisture; wood materials shall be provided only as a decorative exterior application to other types of planters.

- a. Wood Species: [Marine Teak] [Alaska Yellow Cedar] [Clear All-Heart California Redwood] [Purple Heart] [Ipe] [_____].
- b. 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.
- c. Metal Frame: Black color-coated steel frame.

] [2.8.4 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.

- a. Wood species: Kiln dried, maximum 19 percent moisture content, [Clear All Heart California Redwood] [Western Yellow Cedar] [Red Oak] [Phillipine Mahogany] [Purple Heart] [Ipe].
- b. Metal frame: Reinforced with steel bars as per manufacture's standard construction, black color factory finish coated.
- c. Bottom: 6.25 mm 1/4 inch exterior grade redwood with drain holes.
- [d. Liners: Removable galvanized steel or manufacturer's standard.]
- [e. Tops: [Hinged top opening] [spun aluminum open top with molded rim] [ash top]].

]2.8.5 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.

2.8.6 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 shall 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 350; AISC 335. Provide prefabricated shelter systems to meet design conditions indicated. Shelter design shall conform to all applicable State and Local Building Codes and shall meet manufacturer's standards of construction and materials. Shelter systems shall 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 shall be [aluminum] [steel] [wood] as indicated. Manufacturer shall provide shop drawings and calculations prepared by a structural engineer.

- a. Extruded aluminum alloy tubing shall conform to ASTM B 429 6063-T5 or 3003-H14, dark [medium] [light] bronze [black] [clear anodized] [powder coat] finish. Framing sizes and configurations shall be as required for size of structure indicated meeting manufacturer's standards and applicable building codes.
- [b. Structural steel shall conform to ASTM A 36/A 36M or ASTM A 500, 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 D 3451. Framing sizes and configurations shall be as required for size of structure indicated meeting manufacturer's standard and applicable building codes.]
- [c. Wood framing system shall consist of surfaced four sides (S4S), #2 grade southern yellow pine [_____] solid timber columns with eased edges, pressure treated CCA (Copper Chrome Arsenate) 9.6 kg/cu. m 0.6 PCF against decay, fungi and insect infestation, surfaced four sides (S4S), #1 grade, southern pine, [_____] glue-laminated columns manufactured in accordance with 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.]

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 shall 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 as per 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 shall be furnished with attached benches that have no backrests. Table's exposed edges and corners shall be rounded, eased or chamfered.

- a. Height: The table height shall be between 750-1200 mm 29-48 inches from the finished grade to the lowest surface of the top, or as noted.
- b. Clearance: A minimum vertical clearance of 230 mm 9 inches between the seat top and the bottom edge of the table top shall 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, shall be provided. A minimum of 460 mm 18 inches from the end of the table top to the nearest support leg shall be provided.

c. Top: Table top surfaces shall not contain recesses that might hold water or food particles. The table top width shall 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 shall be a minimum of 610 mm 24 inches per person.

d. Wheelchair Access: A minimum clear space of 740 mm 29 inches from the finished grade to the underside of the table shall 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 shall be 860 mm 34 inches.

2.10.1 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 C 150, gray, Type I.
- b. Aggregate: ASTM C 33, 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 A 185
- e. Reinforcing steel: ASTM A 615/A 615M
- f. Integral color: ASTM C 979, pure mineral oxide, limeproof and non-fading
- g. Admixture: ASTM C 260 for air-entraining.

2.10.2 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 A 53/A 53M 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 D 3451 testing.

2.10.3 Perforated Steel Tables

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

- a. Steel pedestal base: ASTM A 53/A 53M 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 D 3451 testing.

[2.10.4 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 D 3451, color as selected].

- 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 A 653/A 653M].
- [f. Cast Grey Iron Support: ASTM A 48/A 48M, Class 30 or recycled cast grey iron ASTM A 48/A 48M, Class 25.]
- [g. Cast Aluminum Support: ASTM B 26/B 26M or ASTM B 108 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 INSTALLATION

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

3.1.1 Assembly and Erection of Components

Items shall be shipped knocked-down (KD) ready for site assembly. Packaged components shall be complete including all accessories and hardware. New parts shall 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 shall be assembled and anchored according to manufacturer's instructions or as indicated. When site furnishings are assembled at the site, assembly shall not interfere with other operations or pedestrian and vehicular circulation.

3.1.2 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.

3.2 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.

3.3 TESTING

Each site furnishing shall be tested to determine a secure and correct installation. A correct installation shall be according to the manufacturer's recommendations and by the following procedure: The Contractor shall 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 shall be reinstalled. Fasteners and anchors determined to be non-compliant shall be replaced. A written report describing the results of the testing shall be provided.

3.4 FINISHES

3.4.1 Field Finishes

Where indicated, field finishes shall be applied in accordance with Section 09900 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 D 1187, asphalt-base emulsion.

3.4.2 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 A 780 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.

3.5 CHILDREN'S PLAY AREAS

The site furnishings shall be installed outside the play structure use zone in accordance with ASTM F 1487. The contractor shall 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.

3.6 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 12 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 shallow head aluminum rivets at approximately 331 mm 13 1/4 inches

on centers for full 6.28 rad360 degrees, rivet from inside of shelter.

3.8.2 Roof

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

3.9 RESTORATION AND CLEAN UP

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

3.9.1 Clean Up

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

3.9.2 Protection

The area shall be protected as required or directed by providing barricades and signage. Signage shall be in accordance with Section 10430 EXTERIOR SIGNAGE.

3.9.3 Disposal of Materials

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

3.10 RE-INSTALLATION

Where re-installation is required, the following shall 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 shall be repaired.

-- End of Section --