SECTION 105313 – SHADE STRUCTURES

ALL LIBRARIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Tension Fabric Shade Structures.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for blocking, shims, reinforcing, and supplemental support members for shade structure.
2. Section 061000 "Rough Carpentry" for blocking, nailers, shims, reinforcing, framing, and furring for shade structure anchorage.

1.3 PERFORMANCE REQUIREMNENTS

A. General: Design, fabricate, and install shade structure to withstand loads from gravity, wind, ponding, drift, seismic, and structural movement, including thermally induced movement; and to resist, without failure, other conditions of in-service use, including exposure to weather.

B. Structural Performance: Provide shade structure capable of withstanding the effects of gravity loads and the following loads and stresses within limits.

1. Wind Loads: Determine loads based on the following minimum design wind pressures:

a. Frame Only: 150 m.p.h.
b. Frame with Canopy: 90 m.p.h.

C. Seismic Performance: Provide shade structure capable of withstanding the effects of earthquake motions determined according to ASCE 7, “Minimum Design Loads for Buildings and Other Structures.”

D. Thermal Movements: Provide shade structure that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperature by preventing buckling, opening of joints, overstressing of components, failure of connections, tearing of

fabric, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg. F (67 deg. C), ambient; 180 deg. F (100 deg. C0, material surfaces.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, fabrication details, dimensions of individual components and profiles, hardware, fittings, mounting accessories, features, and finishes for awnings.

B. Shop Drawings:

1. Include plans, elevations, sections, mounting heights, and attachment details.
2. Show location and extent of shade structures.
3. Show locations for blocking, reinforcement, and supplementary structural support.
4. Show colors and content of fabrics.
5. For installed products indicated to comply with design loads, including structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Calculate requirements for supporting shade structure and for seismic restraint. Verify capacity of members and connections to support loads and verify loads, point reactions, and locations for attachment of fabric to structure with those indicated on the Drawings.

C. Samples for Initial Selection: For each type of exposed finish.

1. Awning Fabric: 12-inch- (300-mm-) square section of fabric from dye lot to be used for the Work, with specified treatments applied. Mark face of fabric.
2. Include similar samples of accessories involving color selection.
3. Seam, Edge, and Corner Condition: Not less than 12-inch- (300-mm-) long section showing seam, edge, and corner treatment.
4. Exposed Hardware Finishes: Manufacturer's standard-size unit, not less than 3 inches (76 mm) square.
5. Accessories: Manufacturer's full-size unit.

D. Product Schedule: For shade structure. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For shade structure.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator and professional engineer.

B. Welding certificates.

C. Product Certificates: For each type of awning fabric, signed by product manufacturer.

D. Evaluation Reports: For anchors and fasteners, from ICC-ES.

E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For awnings to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Methods for maintaining shade fabrics and finishes.
b. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Fabricator is a Master Fabric Craftsman certified by the Industrial Fabrics Association International.
2. Fabricator's responsibilities include fabricating and installing awnings and providing professional engineering services needed to assume engineering responsibility.

B. Installer Qualifications: Fabricator of products.

C. Source Limitations: Obtain shade structures through one source from a single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

E. Regulatory Requirements: Provide shade structure comply with or exceeding requirements of current local building codes.

F. Fire-Test-Response Characteristics: Provide shade fabrics with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Resistance Ratings: Passes NFPA 701, ASTM E-84, and California Code of Regulations, Title 19.

G. Mockups: Before installing shade structure, build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.

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

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of awnings in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Where awning installation is indicated to fit to other work, verify dimensions of other work by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for fenestration operation throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer and fabricator agree to repair or replace components of shade structure that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including framework.
   b. Deterioration of fabric including seam failure.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Framing Warranty Period: Five years from date of Substantial Completion.
3. Fabric Warranty Period: 10 years from date of Substantial Completion.
4. Thread Warranty Period: Eight years from date of Substantial Completion.
5. Component Warranty Period: Outdoor durability not less than five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings, Tenshon LLC, 8743 East Pecos Road, Suite 122, Mesa, Arizona 85212, or comparable product by one of the following:

1. Lawrence Fabric and Metal Structures, Inc.
2. Tenshon LLC.

B. Source Limitations: Obtain awnings from single source from single manufacturer.

2.2 AWNING FABRICS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings, Tenshon LLC, 8743 East Pecos Road, Suite 122, Mesa, Arizona 85212, or comparable product by one of the following:

1. Lawrence Fabric and Metal Structures, Inc.
2. Tenshon LLC.

B. Fire-Test-Response Characteristics: Provide awning fabrics with the fire-test-response characteristics indicated, as determined by testing identical products according to test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

C. Fabric Fiber Content: High density polyethylene with Ultra Violet stabilizers and flame retardant.

1. Fabric Weight: 10 ounces per square yard for durability.
2. Monofilament and tape construction for strength.
3. UV stabilizer for protection.

    a. UVA, up to 96.3 percent; UVB up to 96.2 percent.
    b. Mean UPF (color dependent): up to 27.

4. Shade Factor (Visual Light): up to 97% (color dependent).
5. Molecular orientation manufacturing process for increased fabric strength.
6. Raschel-knitted to prevent unraveling if cut.
7. Temperature stability: -22 to 167 degrees F.
8. Minimum fading allowed after 5 years.
9. Weatherability: ASTM G53.
10. Fully recyclable.
11. Performance Characteristics: As follows:

    a. Mildew Resistance: Showing no growth when tested according to ASTM G 21.

12. Comtex strength test results:

    a. Breaking Force (AS2001.2.3. 1-2001), Warp: 179 lbf; Weft: 562 lbf.
    b. Breaking Extension (AS 2001.2.3. 1-2001), Warp: 92.2%; Weft: 49.2%.
    c. Teear Resistance (AS 2001.1.2. 10-1998), Warp: 39 lbf; Weft: 63 lbf.

D. Tread:

1. Shall be high density; high strength and low shrinkage.
2. Shall be abrasion resistant and immune to UV radiation.
3. Shall be unaffected by non-hydrocarbon based cleaning agents, acid rain, mildew, rot, chlorine, saltwater, and industrial pollution.

2.3 SHADE STUCTURE FRAMES

A. Steel Frames:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Cold-Formed Steel Tubing: ASTM A 500/A 500M, grade as required by structural loads.
3. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless another weight is indicated or required by structural loads.
4. Steel Finish: Polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

2.4 TENSIONING CABLES AND HARDWARE

A. Anchors, Fasteners, Fittings, Hardware, and Installation Accessories: Complying with performance requirements indicated and suitable for exposure conditions, supporting structure, anchoring substrates, and installation methods indicated. Corrosion-resistant or noncorrodible units; weather-resistant, tamperproof, vandal- and theft-resistant, compatible, nonstaining materials. Provide as required for awning assembly, mounting, and secure attachment. Number as needed to comply with performance requirements and to maintain uniform appearance; evenly spaced. Where exposed to view, provide finish and color as selected by Architect from manufacturer's full range.

1. 7 by 19 galvanized steel cable shall conform to ASTM A-603.
2. Cable diameter determined by calculated engineering load.

   a. ¼-inch diameter for small-to-medium loads.
   b. 3/8-inch diameter for heavy loads.

3. Cable connectors, shackles and turnbuckles shall be stainless steel or hot dipped galvanized.
4. Machine bolts shall conform to ASTM A-307, unless otherwise noted.

2.5 FOOTING REINFORCEMENT

A. All reinforcement shall conform to ASTM A-615, Grade 60.

B. All reinforcing steel shall conform to approved shop drawings and calculations.

2.6 AWNING FABRICATION (SEWING)

A. On-Site sewing of fabric will not be accepted.

B. All corners shall be reinforced with extra non-tear material and strap.

C. The perimeters that contain the cables shall be double lock stitched.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for supporting members, blocking, inserts, installation tolerances, operational clearances, lighting, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install shade structure at locations and in position indicated, securely connected to supports, free of rack, and in proper relation to adjacent construction. Use mounting methods of types described and in compliance with Shop Drawings and fabricator's written instructions.

B. Install shade structure after other finishing operations, including joint sealing and painting, have been completed.

C. Attach fabric to attachment points as recommended by fabricator, using wire rope cable method in fabric hem pockets to ensure tight, wrinkle-free fit of fabric to frame.

D. Ensure all parts interact freely and smoothly without bonding.

E. Install shade structure in a timely manner and coordinate with the work of other trades

F. Anchoring to In-Place Construction: Use anchors, fasteners, fittings, hardware, and installation accessories where necessary for securing awnings to structural support and for properly transferring load to in-place construction.

3.3 FOOTING CONSTRUCTION

A. Footings shall conform to approved shop drawings and calculations.

B. Reinforcement fabricated and placed at latest ACI Detailing Manual and Manual of Standard Practices.

C. Concrete work shall conform to the latest edition of American Concrete Building Code ACI 318.

D. Concrete specifications shall conform to approved shop drawings and calculations.

E. 28 days strength F’

3.4 CLEANING AND PROTECTION

A. Clean shade structure surfaces after installation, according to manufacturer’s written instructions

B. Touchup Painting: Immediately after erection, clean field welds, connections, and abraded areas. Paint uncoated and abraded areas with same or compatible material as used for shop-applied finish painting.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

C. Provide final protection and maintain conditions, in a manner acceptable to Manufacturer and Installer, that ensures that shade structures are without damage or deterioration at time of Substantial Completion.

D. Replace damaged shade structures that cannot be repaired, in a manner approved by the Architect, before time of Substantial Completion.

END OF SECTION 107313