SECTION 05522 - BALCONY GLASS RAILINGS

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PART 1. - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Balcony Glass Railings for locations and configurations indicated on Drawings.

B. Related Sections include the following:

1. Division-3, Section 03300-"Cast-In-Place Concrete".
2. Division-5, Section 05500-"Metal Fabrications".
3. Division-8, Section 08800-"Glazing".

1.3 SUBMITTALS

A. General: Product data and samples to comply with provisions of Contract Documents.

B. Product Data: Provide material specifications, characteristics, and Manufacturer's "Instructions for Installation".

C. Samples: Submit two (2) samples, 12-inches in length, illustrating each type of exposed finish required, prepared on components indicated below, showing same thickness and type of metal indicated for Final Unit of Work for review and acceptance for conformance to design intent by Architect..

D. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, details, and erection drawings for metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. Prepare Shop Drawings under direct supervision of a Florida-Licensed Professional Engineer, experienced in design of this Work. Shop Drawings shall be signed and sealed.
4. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by qualified professional engineer responsible for their preparation.

E. Product Test Reports: Qualified Testing Laboratory shall provide Product Test Reports based on tests performed by Testing Laboratory evidencing compliance of railing systems components with ASTM E 985-00e1 for Structural Performance.

1.4 SYSTEM DESCRIPTION

A. General: Handrails and Railing Systems shall be engineered to withstand structural loads indicated. Allowable design working stresses of railing materials are based on the following:

1. Aluminum: AA "Specifications for Aluminum Structures".

B. Structural Performance of Handrails and Railing Systems: Aluminum Handrails and Railing Systems shall be engineered, fabricated, and installed to withstand structural loads listed without exceeding allowable design working stress of materials for handrails, railing systems, anchors, and connections.

C. Apply each load to produce maximum stress in each of respective component comprising handrails and railing systems as follows:

1. Top Rail of Railing Systems - Shall be capable of withstanding load required by Florida Building Code, 2001 Edition, and shall comply with design wind-load requirements of Wind Pressure Test.

2. Handrails Not Serving as Top Rails – Shall be capable of withstanding load required by Florida Building Code, 2001 Edition, and shall comply with design wind-load requirements of Wind Pressure Test.

3. All Railing Systems shall be tested to 2 X design pressures as determined by requirements of Wind Pressure Test.

1.5 QUALITY ASSURANCE

A. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

B. Installer Qualifications: Engage an experienced Installer who has successfully completed metal and glass railing systems of same materials and extent to that indicated on Drawings for Project.

C. Comply with the following Standards for Aluminum:

1. ASTM B 221-02, 6063-T6 – Aluminum:Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
2. ASTM B 429-02, 6063-T6 – Aluminum:Alloy Extruded Structural Pipe and Tube.
3. ASTM B 483-03 – Aluminum and Aluminum Alloy: Drawn Tubes for General Purpose Applications.

D. Fabricator Qualifications: A firm experienced in producing handrails and railing systems of each type similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient installation capacity to install required units.

E. Finish Applicator: Applicator of polyvinylidene fluoride powder coatings must be Certified by Polyvinylidene Fluoride (PVDF) Powder-Coating Manufacturer.

F. Source Limitations: Obtain handrails, railing systems, and glass of each type and material from a single fabricator.

G. Field-Constructed Mockups: Before installing Work of this Section, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups as shown on Drawings. Locate mock-ups on site in location and size indicated, or as directed by Architect.
2. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than six (6) feet in length.
3. Retain and maintain mock-ups during construction in undisturbed condition as a Standard for judging completed unit of Work.
4. Mandatory Requirement: Obtain Architect's acceptance of mock-ups prior to start of fabrication and before start of handrail and/or railing systems Work.

1.6 JOB SCHEDULING

A. Sequence and coordinate installation of railing systems as follows:

1. Mount railing systems only on completed balconies. Do not support handrails temporarily by any means not satisfying structural performance requirements.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents, and shall be in addition to, and run concurrent with, other warranties made by the contractor under requirements of Contract Documents, including, but not limited to, requirements of State of Florida Statute Article 718-203 from date of Final Acceptance subject to Owner Acceptance.

B. Submit written agreement for Balcony Glass Railing Systems on Manufacturer's Standard Form, signed by Manufacturer, Installer, and Contractor, agreeing to repair or replace defective parts and components that do not comply with referenced Quality Standards.

1. Warranty Period: to be determined under Contract in accordance with State of Florida Statute Article 718-203 from date of Final Acceptance subject to Owner Acceptance.
2. Glass Warranty: See Division-8, Section 08800-"Glazing".

PART 2 - PRODUCTS

2.1 FABRICATORS

A. In order to establish design intent, the following Fabricators of Handrails and Railing Systems have been approved for use:

1.	RC Aluminum Industries, Inc.	(305) 592-1615	www.rcalum.com.
2.	J.G. Braun, div. of R & B Wagner	(800) 786-2111	www.rbwagner.com.
3.	Skyrail Systems	(800) 937-1885	www.skyrail.com.
4.	Sun Metal Systems	(212) 584-7662	www.sunmetalssystems.com.
5.	Tubular Specialties Mfg., Inc.	(800) 225-5876	www.calltsm.com.

B. Substitutions:

1. One (1) substitute Manufacturer may be submitted on completed "Substitution Request Form" (see Section 01600) for each Product specified in this Section.
2. Architect will consider Substitutions for Brand Name Products Specified provided Products proposed are in compliance with Requirements of Specifications and are equal to or better than approved Product.
3. Architect reserves right to reject any Product which, in his opinion, will not produce quality of Work specified herein.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by Aluminum Producer and Finisher for type of use and finish indicated and with not less than strength and durability properties of alloy and temper designated below for each aluminum form required:

1. Aluminum Extruded Pipe & Tubes: ASTM B 221-02, 6061-T6.
2. Aluminum Extruded Bar and Shapes: ASTM B 221-02 Alloy 6063-T5/T52.
3. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M-02, Alloy 6061-T6.
4. Aluminum Castings: ASTM B 26/B 26M-03, Alloy 443.0-F.
5. Finish for Exposed Surfaces: Buffed and etched with electrostatically applied acrylic enamel (ESP), equal to Aluminum Association M21-C22-A44, color to be selected. Coordinate shade of selected color to match finish on other items specified elsewhere.

B. Tempered Glass: Shall comply to ASTM C 1048-04, Kind FT (Fully Tempered), Condition A (uncoated), Type 1 (transparent glass, flat), Quality – q3 (glazing select). Provide products complying with requirements indicated below for class, thickness, and manufacturing process that have been tested for Surface and Edge Compression according to ASTM C 1048-04, and for Impact Strength according to 16 CFR, Part 1201 for Category II Materials.

1. Clear Glass: Class 1 (clear).
2. Thickness: As required by structural loads.
3. Manufacturing Process: Manufacture fully tempered glass by horizontal (roller-hearth) process with roll-wave distortion parallel with bottom edge of glass as installed, unless otherwise indicated.
4. Subject to compliance with requirements, provide safety-glass, permanently-marked with Certification Label of Safety Glazing Certification Council or another Certification Agency acceptable to authorities having jurisdiction.
5. Exposed Glass Edge: flat ground polished.

2.3 COMPONENTS

A. Aluminum Rails and Posts: 1-1/2-inch, shape as indicated, shall be cast or extruded 6063-T6 alloy, sizes as indicated on Drawings.

B. Aluminum Fittings: Elbows, tee-shapes, wall brackets, escutcheons shall be Machined Aluminum.

C. Aluminum Pickets: Shall be 3/4-inch-square extruded tubing.

D. Aluminum Mounting: Shall consist of brackets and flanges with steel inserts for casting in concrete, and shall have prepared backing-plate for mounting in drywall partitioning.

E. Aluminum Splice Connectors: Concealed spigot shall be Machined Aluminum.

F. Structural Silicone: Shall be Dow Corning #995 or General Electric #SSG-4000.

G. Provide caps or matching profile fittings and claddings at exposed ends. Finish-to-match ending member.

1. Top Rail: Sand-cast aluminum with 0.250-inch nominal wall thickness.
2. Base: Sheet Aluminum with 0.062-inch nominal wall thickness.

H. Inserts: Provide protective insert at top edge of glass to prevent glass from contact with metal railing cap. Provide resilient setting block at base to cushion and center glass when inserted in shoe-moulding base.

2.4 FINISHES

A. Finish designations prefixed by AA comply with system established by Aluminum Association for designating aluminum finishes.

B. Exterior Aluminum Finish: Electrostatically applied thermoplastic fluoropolymer polyvinylidene fluoride (PVDF) resin-containing powder-coating with inhibitive-flash-primer over chromate-conversion-coating. Resin for resin-based powder or liquid Coating shall be "Kynar 500" resin as manufactured by Arkema or "Hylar 5000" as manufactured by Solvay Solexis.

1. Fluoropolymer (PVDF) Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive-primer and fluoropolymer-color-topcoat containing not less than seventy-percent (70%) polyvinylidene fluoride (PVDF) resin- by-weight, complying with AAMA 2605.
2. Color: Shall be as selected by Architect/Owner from color-samples submitted for approval by Coating Manufacturer.

2.5 MISCELLANEOUS MATERIALS

A. Non-shrink, Gypsum-free, Non-metallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout comply with CE CRD-C 621. Provide grout specifically recommended by Manufacturer for interior and exterior applications of Type specified in this Section.

1. Master Builders Set-45 (non-gypsum) Grout is an approved product for use or a substitute approved equal.

B. Welding electrodes and Filler Metal: Provide Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

C. Fasteners for Anchoring Railing Systems to Other Construction: Select fasteners of type, grade, and class required to produce connections that are suitable for anchoring railing system to other types of construction indicated and capable of withstanding design loadings.

1. For Aluminum Railing Systems, provide fasteners fabricated from Type 304 Stainless Steel.

D. Fasteners for Interconnecting Railing System Components: Use fasteners of same basic metal as fastened metal unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnection of handrail and railing system components and for their attachment to other work, except where otherwise indicated.

E. Cast-In-Place and Post-Installed Anchors in Concrete: Anchors fabricated from corrosion-resistant materials with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing per ASTM E 488-96(2003), conducted by a qualified Independent Testing Laboratory.

F. Primer: Epoxy type.

G. Cold-applied asphalt mastic complying with SSPC-Paint 12, containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187-97(2002); Use Karnak 118 Black Asphaltum, Karnak Corp., (800) 526-3236; www.karnakcorp.com, or approved equal.

2.6 FABRICATION

A. Site-verify dimensions prior to Shop-Fabrication. When fabrication must precede construction and field measurements are not practical, dimensions shall be established with construction conforming to given dimensions for fabricated items. Ill-fitting Work due to failure to coordinate shall not be accepted.

B. Shop Assembly: Pre-assemble items in shop to greatest extent possible, in largest size practical. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces. Miter all corners.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Accurately form exposed work true-to-line-and-level with accurate angles, surfaces and straight edges.

F. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

G. Form exposed connections with hairline joints, flush and smooth, able to exclude water infiltration, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

H. Fabricate seams and other connections which will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

I. Provide caps or matching profile fittings at exposed ends. Finish to match ending member. Use Manufacturer's Standard prefabricated end fittings.

J. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

K. Cast Aluminum Wall Brackets and Pipe Handrails, as detailed:

1. Brackets: Curved tops, 3-inch projection from wall to centerline of railing (as indicated on Drawings), equal to J.G. Braun No. 4394, or Julius Blum No. 498, finish to match handrail.
2. Handrail: 1-1/2-inch diameter pipe (as indicated on Drawings), 1.660" o.d., Schedule 40, clear anodized (204R1) finish in public areas; mill finish in exit stairways and utility areas.

L. Accurately form components required for anchorage of railings to each other and to building structure.

M. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8-inch-by-1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8-inches from ends and corners of units and 24-inches-o.c., unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Coordinate Setting Drawings, Diagrams, Templates, Instructions, and Directions for Installation of Anchorages; Coordination is required for placement of all sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors that are to embedded in concrete as masonry construction. Coordinate delivery of such items to project site.

3.2 ATTACHMENT TO POST-TENSIONED CONCRETE

A. Reference: See Section 01730 "Cutting and Patching" – 1.5.E, Attachment to Post-Tensioned Concrete for specified requirements.

3.3 INSTALLATION, GENERAL

A. Install assembly to comply with railing Manufacturer's written instructions, approved Shop Drawings, and approved mock-up. Attach base channel to building structure, then insert and connect factor-fabricated and assembled glass panels.

1. Erect glass handrails and railing systems under direct supervision of Manufacturer's authorized Technical Personnel.
2. All vertical glass edges that are exposed are to be flat-ground-polished

B. Post-Supported Glass Hand Rails and Railing Systems: Install assembly to comply with railing Manufacturer's written instructions. Set posts in three (3) inch diameter drilled holes not less than three (3) inches deep. Clean holes of loose material and fill with anchoring cement flush with surface of concrete. Do not leave a recess where water can collect. Build-up grout 1/8-inch, sloping away from post.

1. Secure clearance from Structural engineer before drilling in post-tensioned concrete members.

C. Setting of Factory-cut Glass Panels: Once posts and other railing components have been erected, then set Factory-Cut Glass Panels. Do not cut, drill, or alter glass panels in field. Protect glass edges from damage.

D. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint

G. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less that that required by structural loads. Provide concealed fitting unless otherwise approved by Owner.

H. Obtain Architect / Engineer's approval prior to site-cutting.

I. Field Welding: Comply with AWS D1.1 and the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion-resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. Touch-up welds with primer.
6. Paint field-weld with paint to match finish of Factory-applied finish for Handrails and Railings.

J. Upon completion of Work, touch-up minor abrasions and defects. Invisible field-repair, removal and shop-refinishing, or replacement shall be required to correct situation.

3.4 ADJUSTING AND CLEANING

A. Clean aluminum surfaces immediately after installation. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

C. Finish-Coat Touchup: Immediately after installation, sand smooth any damaged areas of finish coat and apply touchup of compatible "Kynar 500" or "Hylar 5000"-flouropolymer-resin-based powder coating containing a minimum of seventy-percent (70%) PVDF resin by weight air-drying primer.

D. Protect finishes of handrails and railing systems from damage during building construction by use of temporary protective coverings approved by railing Manufacturer. Remove protective covering at time of Substantial Completion.

E. Protective coverings for handrails and railing systems shall be supplied by Sub-trades installing Work in or around handrails/railing systems.

F. Clean, polish, and protect Glass in accordance with Division-8, Section 08800-"Glazing".

END OF SECTION 05522