

SECTION 19 BUS SHELTERS

19.01 GENERAL

The City has two standard design bus shelters within the City. There is an architectural grade design for specific use within City Specific Plan Areas and along City Loop Parkways and Major Arterials. Contact the City Capital Projects Department for the standard plans, details, and specifications for these architectural grade bus shelters. All other bus shelters constructed within the City shall be in accordance with these Standard Construction Specifications below and in accordance with the Standard Details #261 through 264.

19.02 ALLOYS AND COLORS

All exposed aluminum shall be anodized. All aluminum extrusions except for the interior foot mounting, shall be 6063-T5 extruded aluminum and shall have a dark bronze Alcoa Duranodic #313E finish of minimum zero-point-seven (0.7) mil thickness or approved equal.

The interior foot mounting and all sheet aluminum used on the shelter except the top of the roof shall have baked enamel finish to match anodized finish. The top of the roof shall have a white baked enamel finish. All finishes shall conform to NAAMM Metal Finishes Manual recommendations and designations except as otherwise indicated.

19.03 FINISH

- A. ALL EXPOSED SURFACES AND EDGES on vertical columns, horizontal frame members and adjustable base caps or legs, shall be smooth, free from burrs and shall be neatly finished. There shall be no welds in or on the aluminum surfaces.
- B. ALL ALUMINUM FINISHING SHALL be done in strict accordance with procedures established by the Aluminum Association of America.

19.04 FRAME, VERTICAL SECTIONS

- A. THE SHELTER FRAME SHALL BE SUPPORTED by vertical columns of extruded aluminum construction. They shall support the roof and all wall sections.
- B. ALL VERTICAL FRAME MEMBERS SHALL be of one (1) piece construction, no welds, split tubes, or other fastenings shall be allowed.
- C. VERTICAL FRAME MEMBERS SHALL BE of extruded aluminum, Amoclad 11 structural alloy material of minimum one-eighth (1/8) inch thickness or approved equal and shall have an outside perimeter of ten (10) inches minimum and be of constant section for their entire length.
- D. MAXIMUM DISTANCE BETWEEN vertical dividers shall be thirty (30) inches.

- E. FRAME SHALL BE CONSTRUCTED TO accommodate acrylic (plexiglass) window panel, of one-quarter (1/4) inch thickness.
- F. EACH WALL SECTION SHALL HAVE vertical glazing supporting mullions, which are securely fastened to the top and bottom horizontal members. The mullions shall be at least two-and-one-half (2-1/2) inches wide to enhance the appearance of the shelter. Mullions shall be designed in such a way that they fit together firmly and hold the glazing securely in place. The mullions shall be made of the same material and size as the vertical posts and shall be securely fastened thereto. The Contractor shall submit details for approval prior to installation.

19.05 FRAME, HORIZONTAL SECTIONS

- A. EACH SHELTER WALL SHALL HAVE three (3) horizontally frame members: One located on top of the vertical supports, one a maximum of six (6) inches from the floor of the shelter and one midway between the top and bottom horizontal members.
- B. ALL HORIZONTAL FRAME MEMBERS SHALL BE of one (1) piece construction. No welds, split tubes, or other fastenings shall be allowed except those to fasten horizontal sections to vertical sections.
- C. DESIGN OF SHELTER SHALL BE SUCH THAT each wall section provides an open area along the bottom. The opening shall be approximately six (6) inches high. The end wall sections shall extend perpendicularly from the back wall.
- D. THE TOP, BOTTOM AND MIDDLE HORIZONTAL members of the wall sections shall be made of the same material and size as the vertical posts and shall be securely fastened thereto. Each wall section shall have vertical glazing-supporting mullions, which are securely fastened to the top and bottom horizontal members. The mullions shall be at least two-and-one-half (2-1/2) inches wide to enhance the appearance of the shelter.

Mullions shall be designed in such a way that they fit together firmly and hold the glazing securely in place.

19.06 CONNECTIONS AND FASTENERS

- A. WALL SECTIONS SHALL INTERCONNECT with the vertical posts with an unobtrusive and tamper-proof final assembly. Prior to installation the Contractor shall supply details to the City of the method used to interconnect wall section assemblies and vertical posts. The City shall make the final determination on their acceptability as related to simplicity of design, appearance, tamper-proof features, strength, and ease of disassembly during replacement.
- B. ALL COMPONENTS OF THE SHELTER ARE to be designed with attention to a clean appearance and a tamper-proof assembly. No regular, Phillips, hex, or square head screws or bolts will be used except where approved and concealed. All fasteners shall

be of a noncorrosive type when used with these components and shall be of the same color as the surrounding material.

- C. FOR EACH TYPE OF TAMPER-PROOF FASTENER, the Contractor shall provide the City a set of six (6) fasteners of each type used in a labelled container and three (3) tools required to work each type of fastener.

19.07 BASE MOUNTING

- A. THE SHELTER SHALL BE DESIGNED TO be securely mounted to a new Portland cement concrete pad at all four corners. Adjustable inside mounted base and caps or legs shall be utilized to properly secure and mount the shelter to a new Portland cement concrete pad with anchor bolts, (J hooks) as shown in the Standard Details. Each leg shall be adjustable a minimum of one and one-half (1-1/2) inches to accommodate uneven or sloping bases. Mounting shall be such that the shelters could be removed by the City, without damage caused to them, and used elsewhere. Prior to installation, the Contractor shall supply details of the base mounting for City approval.
- B. EACH SHELTER BASE MOUNTING SHALL HAVE a small beveled anodized bronze aluminum boot. The edge of the boot shall not extend more than one-half (1/2) inch outside of the perimeter of the vertical frame member on two opposite sides and shall not extend more than three (3) inches outside the perimeter on the two remaining sides. The interior base mounting shall have baked enamel finish to match the bronze anodized as specified above.

19.08 WINDOW PANELS

- A. ALL WINDOW PANELS SHALL INCORPORATE windows of transparent material providing complete visibility from inside or outside. The window panels shall be of high impact strength, high finish hardness, high tensile strength, low flexibility and high color or tint retention under all weather conditions. The Contractor shall submit manufacturer's specification for City approval. All window panels, except the display holder, shall be dark bronze acrylic (plexiglass) or approved equal. Color of tint shall be subject to City approval. Window panel in the display holder shall be clear plexiglass. All acrylic glazing materials shall be one-quarter (1/4) inch thickness.

Manufacturer's labels showing strength, grade, thickness, type, and quality shall be required on each piece of acrylic (plexiglass) glazing.

- B. ALL WINDOW PANELS, EXCEPT FOR the display holder, shall be of the same size and interchangeable.
- C. WINDOW PANELS SHALL INCORPORATE frame construction without need for dismantling shelter for window replacement. Grooved extrusions are not acceptable. Each acrylic glazing frame shall provide for a minimum engagement width of one-half (1/2) inch, but in no case shall it be less than the width recommended by the

manufacturer of the acrylic glazing material.

Windows shall be glazed to frame with dry rubber sealing material with edge engagement as recommended by acrylic (plexiglass) manufacturer. Rubber sealing material shall be black in color and shall be guaranteed not to crack or disintegrate for a period of five (5) years.

- D. TAMPER-PROOF FASTENERS, such as Spanner Head Screws, or aluminum flush break rivets, shall be used to secure window frames to vertical and horizontal columns and to dividers of members. All shall produce a neat and clean appearance.
- E. THE FRAMEWORK SHALL BE DESIGNED so that glazings are securely engaged within their frames, be able to withstand vandalism without disengaging and be able to resist the prying out of panels by vandals. The assembly design shall provide for easy glazing replacement by the City when the need arises. The Contractor shall submit details for approval prior to installation.

19.09 ROOF

- A. THE ROOF SYSTEM SHALL CONSIST OF twelve (12) inch wide interlocking panels or approved equal. The panels shall be Dura/Lok panels which consist of a flat structural sandwich (integral unit) composed of a minimum eighteen-thousandths (0.018) of an inch thick outer aluminum skin and a minimum twelve-thousandths (0.012) of an inch thick steel inner skin enclosing a three-and-one-tenth (3.1) pound-per-cubic-foot-density polyurethane foam core or approved equal.

The core material of the roof shall be moisture, leak, fungus, and fire resistant. Adhesives used in roof system shall not deteriorate from moisture. Prior to installation, the Contractor shall submit material and construction details for City approval.

A white baked enamel coating shall be applied to the outer aluminum roof skin to protect it against the effects of weather. The steel skin shall be protected with a high-fidelity vinyl laminate that is durable and highly resistant to scratching or staining.

Panel facings shall not de-laminate. The roof edges shall be thoroughly sealed.

- B. THE CENTER OF THE ROOF SHALL withstand a load of forty (40) pounds per square foot with no more than two-tenths (0.2) inch permanent deformity.

The roof shall be constructed so that it can be securely fastened to the shelter in a concealed and tamper-proof manner. Once installed, the roof shall not interfere with the installation or removal of window panels.

A fascia member fastened in a concealed manner, of minimum one-eighth (1/8) inch thickness and at least a six (6) inch face shall be used around the perimeter of the roof. The top edge of fascia shall extend three (3) inches above the finished roof. The fascia shall be one-piece seamless extruded aluminum sections with an integral gutter system, with holes in each rear corner of gutter with double corner key slots for each

corner. Joints in the fascia section shall not be allowed except at the corners. Additional three-quarter (3/4) inch diameter weep holes shall be provided in line with the mullions and posts.

- C. THE ROOF SHALL BE GENTLY CONTOURED to provide for controlled drainage of water without creating obstructions, which may prevent leaves and other debris from being blown or washed easily from the top of the roof. Prior to installation, the Contractor shall submit details for City approval.
- D. THE ROOF SHALL HAVE A downward slope toward the back of the shelter to promote adequate drainage and prevent debris buildup. This slope shall be provided by adding shims into the base flanges for the front posts and/or adding a flat bar on top of the front roof beam.
- E. THE ROOF SHALL BE COMPLETELY LEAK-PROOF - Prior to installation, the Contractor shall provide evidence that the panel unit is designed to be watertight. All roof panel seams shall be sealed. Where caulking is used, it shall be a non-hardening compound, such as General Electric's 1200 construction sealant (Silicone), or approved equal, in white or transparent, and shall be neatly applied.

19.10 BENCH

- A. EACH BENCH UNIT SHALL CONSIST of a seat and backrest; each supported by the shelter frame. The seats and its supports shall be designed to accommodate a load of two hundred (200) pounds per linear foot without appreciable deflection. An appreciable deflection shall be considered to be any deflection over 1/360th of the span or distance subject to deflection in any direction. The unit (seat, backrest, brackets, fastenings and supports) shall be structured to resist deformity and stress from normal usage and vandalism.
- B. THE SUPPORTS SHALL BE ATTACHED TO the shelter frame at every vertical member crossed along the back wall of the unit. The supports and mounting brackets shall be anodized aluminum and of the same color as the shelter. They shall be of sufficient strength and size to support a full-seated bench load.

Prior to installation, details of mounting the bench unit shall be submitted to the City for approval.

- C. BENCH UNITS SHALL BE A MINIMUM OF six (6) feet in length. Each bench shall be located adjacent to the sidewall closest to the approaching bus. A minimum thirty-six (36) inch space shall be left open on the side away from the approaching bus, providing wheelchair access.
- D. THE BENCH BACK REST SHALL BE THE same length as the seat, of the same material and constructed and treated in the same manner as the seat and mounted to each vertical column behind bench with the same spacing of fasteners.
- E. TAMPER-PROOF FASTENERS SHALL be used to secure the seat and backrest to the mounting brackets. Mounting brackets shall be designed to allow water to run off toward the rear edge of the seat when the shelter is level.

- F. THE GEOMETRICAL PLACEMENT OF THE back rest with relation to the seat will be such that the place of the back rest front surface, when projected downward to the seat, will intersect the top rear corner of the seat.
- G. THE TOP OF THE BACK REST SHALL be placed eighteen (18) inches above the seat surface and the seating surface shall be set seventeen (17) inches above the floor. The shelter shall be mounted such that, after the shelter is installed and leveled, the bench will be level.
- H. THE BENCH SEAT AND BACK SHALL be constructed of reinforced aluminum planks (minimum twelve (12) inches wide for seat, minimum seven-and-a-half (7-1/2) inches wide for backrest) and shall have a dark bronze Alcoa Duranodic #313E finish of minimum seven-tenths (0.7) mil thickness (to match the remainder of the shelter.)
- I. THE BENCH SEAT AND BACKREST SHALL not have sharp edges or corners.
- J. EACH SLAT COMPRISING EITHER THE bench seat or backrest shall be one piece. Multiple pieces of bench material and joinery fasteners are not acceptable.

19.11 DISPLAY HOLDER

- A. ONE (1) DISPLAY HOLDER SHALL be furnished as part of each shelter in the upper window panel at the end farthest from an approaching bus.
- B. THE DISPLAY HOLDER SHALL HAVE a viewing space the length and the width of the upper window panel.
- C. THE BUS SHELTER WINDOW PANEL SHALL act as the exterior viewing window of the display holder. The interior-viewing panel shall be mounted between the vertical columns or dividers and shall provide a space of at least one-eighth (1/8) inch, but not more than three-sixteenths (3/16) inch depth for insertion of printed information. Glazing shall be firmly attached to or inserted in the frame.
- D. THE INTERIOR VIEWING WINDOW OF the display holder shall be framed on all four sides with aluminum extruded material of sufficient gauge to provide stability of the viewing window and protection of printed material contained therein.

Metal used in the frame of interior viewing panel shall be of the same type and color as that used in bus shelter columns or dividers.

- E. ONE EDGE (RIGHT OR LEFT) OF THE interior viewing panel shall be hinged with a matching finish continuous hinge. The display holder door shall be properly balanced with wedges, if necessary, at the continuous hinge side of the door so that the display holder door opens and closes with ease and does not bind.
- F. BUS SCHEDULE INFORMATION SHALL BE visible from both sides of display holder. Interior viewing window shall be one-quarter (1/4) inch in thickness and clear acrylic (plexiglass).
- G. THE SURFACES OF THE VERTICAL and horizontal members of dividers surrounding the display holder door shall not contain any exposed rivet, screw, or fastener heads, which could cause binding of the display holder door when opened and closed.
- H. THE DESIGN SHALL INCLUDE a tamper-proof locking or sealing mechanism, which

makes the schedule information inaccessible to tampering or the insertion of foreign materials but will provide easy access by employees for frequent changes in the schedule information. The use of rivets to secure schedule information within frame is not acceptable. No padlocks or key-type cabinet locks will be used. Spanner Head screws or other security fasteners are preferred. A maximum of two (2) fasteners shall be used to secure the door in its locked position.

- I. A TOTAL OF THREE (3) TOOLS used to open the locking or sealing mechanism of the interior-viewing panel shall be delivered to the City.

19.12 LEANING RAIL

- A. LEANING RAILS WILL BE INSTALLED on the shelters as shown in the Standard Details. A leaning rail shall be mounted on the back wall of the shelter extending across the area without the bench. Another leaning rail shall be mounted across the end wall farthest from the approaching bus.
- B. EACH LEANING RAIL SHALL BE CONSTRUCTED of 1 1/2" X 2 1/2" X 1/8" oval aluminum tubing of 6063-75 alloy. The color, materials, finishes and method of construction shall be as specified for the rest of the shelters. The ends of each leaning rail shall be closed.
- C. THE MOUNTING DETAILS OF THE LEANING rails shall be submitted to the City for approval.
- D. EACH LEANING RAIL SHALL BE MOUNTED on the horizontal member that is midway between the lower and upper spans.

19.13 CONCRETE SHELTER PAD COMPATIBILITY

- A. THE TYPICAL PORTLAND CEMENT concrete pad for the shelter shall extend one foot beyond each side of the bus shelter unit.
- B. EACH SHELTER ASSEMBLY SHALL BE capable of being securely anchored on such pads. The Contractor shall supply all necessary anchors and shelter mounting materials for all shelters. The anchors must be capable of resisting wind loads as described in Section 2311 of the UBC.
- C. EACH SHELTER SHALL BE DESIGNED to be installed on a concrete pad adjacent to the sidewalk so that it is accessible by the handicapped in wheelchairs and meets accessibility guidelines, as contained in Title 24 of the California Administrative Code.

19.14 MEASUREMENT AND PAYMENT

The bus shelter shall be measured, and payment made per each shelter and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for furnishing and installing complete and in place a bus shelter all in accordance with the plans, these Standard Construction Specifications, City Standard Details, and as directed by the City Engineer.