SECTION 133423.16 - FABRICATED CONTROL BOOTHS

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. Section Includes:

Fabricated steel control booths.

Fabricated aluminum control booths.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control booths.

Include rated capacities, operating characteristics, and electrical characteristics, for included systems.

* + - * 1. Shop Drawings: For control booths. Include plans, elevations, sections, details, accessories, and fastening and anchorage details, including mechanical fasteners.

Anchor-Bolt Plans: Submit anchor-bolt plans and templates. Include location, diameter, and projection of anchor bolts required to attach control booths to foundation. Indicate post reactions at each location.

Retain "Samples" Paragraph below for single-stage Samples, with a subordinate list if applicable. Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs below for two-stage Samples.

* + - * 1. Samples: For each exposed product and for each color and texture specified, Approximately 8-1/2 by 11 inches in size.
				2. Samples for Initial Selection: For each type of exposed finish.
				3. Samples for Verification: For each type of exposed finish in manufacturer's standard sizes.

Include Samples of wall panels and accessories to verify finish selection.

Retain "Delegated-Design Submittal" Paragraph below if design services have been delegated to Contractor.

* + - * 1. Delegated-Design Submittal: For fabricated control booths, including analysis data signed and sealed by the qualified professional engineer, licensed in the State of New York, responsible for their preparation.
				2. Sample Warranty: For special warranty.
			1. CLOSEOUT SUBMITTALS
				1. Maintenance Data: For control booths to include in maintenance manuals.
			2. WARRANTY

When warranties are required, verify with Owner's counsel that warranties stated in this article are not less than remedies available to Owner under prevailing local laws.

* + - * 1. Special Warranty: Manufacturer agrees to repair finish or replace control booths that fail in materials or workmanship within specified warranty period.

Verify available warranties and warranty periods for units and components.

Warranty Period: [**Five**] <**Insert number**> years from date of Substantial Completion.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. PERFORMANCE REQUIREMENTS

Retain "Delegated Design" Paragraph below if Contractor is required to assume responsibility for design. Authorities having jurisdiction may require fabricated control booths to be designed by a professional engineer.

* + - * 1. Delegated Design: Engage a qualified Professional Engineer, licensed in the State of New York, to design fabricated control booths.
				2. Structural Performance: Fabricated control booths shall withstand the following loads and stresses within limits and under conditions indicated in accordance with [**ASCE/SEI 7**] <**Insert requirement**>:

Loads: [**As indicated on Drawings**] <**Insert loads**>.

Retain "Seismic Performance" Paragraph below for projects requiring seismic design. Delete paragraph if performance requirements are indicated on Drawings. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Coordinate requirements with structural engineer.

* + - * 1. Seismic Performance: Fabricated control booths shall withstand the effects of earthquake motions determined in accordance with [**ASCE/SEI 7**] <**Insert requirement**>.

Loads: [**As indicated on Drawings**] <**Insert loads**>.

* + - * 1. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

Differential values in "Temperature Change (Range)" Subparagraph below (for aluminum in particular) are suitable for most of the United States.

Temperature Change (Range): [**120 deg F, ambient; 180 deg F, material surfaces**] <**Insert temperature range**>.

Confirm that each control booth component in "Ballistics Resistance" Paragraph below can meet the indicated ballistics resistance. Revise paragraph if only some components are required to be ballistic resistant.

* + - * 1. Ballistic Resistance: Provide components, including windows, walls, and doors, identical to those tested for compliance with requirements indicated, and as follows:

Retain "UL Rating" or "NIJ Classification" Subparagraph below. See the Evaluations for a description of ballistic-resistance levels. Confirm that each control booth component can meet the indicated ballistics resistance.

Retain first option in "UL Rating" Subparagraph below, in addition to a level option, to require that products be UL listed with ongoing performance verification by UL. Note that the numbering sequence does not indicate an increasing level of threat; consult with Owner for necessary requirements.

UL Rating: [**Listed and labeled as**] [**Level 1**] [**Level 2**] [**Level 3**] [**Level 4**] [**Level 5**] [**Level 6**] [**Level 7**] [**Level 8**] <**Insert Level**> when tested in accordance with UL 752.

NIJ Classification: [**Type I**] [**Type IIA**] [**Type II**] [**Type IIIA**] [**Type III**] [**Type IV**] when tested in accordance with NIJ STD-0108.01.

* + - * 1. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70 and marked for intended location and application.
				2. Safety Glazing: Comply with 16 CFR 1201, Category II.

Retain "Safety Glazing Labeling" Subparagraph below if applicable. Not all manufacturers participate in third-party testing programs.

Safety Glazing Labeling: Permanently mark glazing with certification label of [**the SGCC**] [**the SGCC or another certification agency acceptable to authorities having jurisdiction**] [**or**] [**manufacturer**], indicating manufacturer's name, glass type, thickness, and safety glazing standard with which glass complies.

Retain requirements in "Regulatory Requirements" Paragraph below for accessible control booths. See the Evaluations for discussion of accessibility requirements for control booths. Design Consultant to review code references and verify that referenced sections/tables are current. Note that code references shall be based on the current version of the Uniform Code.

* + - * 1. Regulatory Requirements: Comply with applicable provisions in [**The U.S. Department of Justice 2010 ADA Standards for Accessible Design**] [**and**] [**ICC A117.1**].
			1. FABRICATED STEEL CONTROL BOOTHS

Manufacturers' control booths and their components are available in a range of styles, shapes, configurations, and options, in both standard and custom designs. Revise this article, which includes the most common construction, to suit Project.

* + - * 1. Building Style: [**Standard square corners**] [**Radius corners**] [**Round corners**] [**Butt-glazed corners**] [**Wraparound type, with single rounded building end**] [**Wraparound type, with both building ends rounded**] [**As indicated on Drawings**].
				2. Structural Framework: Fabricated from 2-by-2-by-0.075-inch steel structural or mechanical tubing. Connect framework by welding.

Retain "Sliding Doors" or "Swinging Doors" Paragraph below. Manufacturers of steel control booths often use aluminum doors.

* + - * 1. Sliding Doors: Top suspended from aluminum track with ball-bearing rollers; 1-3/4 inches thick; tubular-frame design fabricated from [**clear-anodized aluminum**] [**galvanized steel**]; with [**top half**] [**full height**] of door glazed. Equip door with deadlock, lock support, guide hardware, and full weather stripping. Provide door on [**one side**] [**both sides**] of booth.

Glazing: [**Fixed**] [**Horizontal sliding**] unit with clear [**insulating**] <**Insert glazing**> glass.

Deadlock: Mortised, laminated-hook bolt type with removable cylinder capable of being master keyed.

Revise "Swinging Doors" Paragraph below if Dutch doors are used. Some manufacturers offer Dutch doors.

* + - * 1. Swinging Doors: 1-3/4 inches thick; tubular-frame design fabricated from [**clear-anodized aluminum**] [**galvanized steel**]; with [**top half**] [**full height**] of door glazed. Equip door with deadlock, three butt hinges, closer, and full weather stripping.[**Provide door on back of booth.**]

Glazing: [**Fixed**] [**Horizontal sliding**] unit with clear [**insulating**] <**Insert glazing**> glass.

Deadlock: Mortised, with lever handle and removable cylinder capable of being master keyed.

Revise "Windows" Paragraph below to suit Project. Manufacturers also offer tinted glass, clear and tinted polycarbonate, and acrylic glazing.

* + - * 1. Windows: Extruded-aluminum sash frames glazed with clear [**tempered**] [**insulating**] <**Insert glazing**> glass.

Frame Finish: Manufacturer's standard mill or clear anodic.

Operable Windows: Equip windows with cam locks, weather stripping, and [**stainless steel**] [**nylon**] ball-bearing rollers.

Screens: [**Insect**] [**Security**] screens for each window.

Corner Shape: [**Square**] [**Round**].

Revise "Wall Panel Assembly" Paragraph below to suit Project. Wall panel assemblies vary considerably among manufacturers; custom fiberglass exterior panels and hardboard interior finish panels are also available. First option below is most common.

* + - * 1. Wall Panel Assembly: Assembly consisting of exterior face panel fabricated from 0.079-inch nominal-thickness, galvanized-steel sheet; and interior face panel fabricated from [**0.064-inch**] [**0.052-inch**] nominal-thickness, galvanized-steel sheet; with [**2-inch-**] [**3-inch**] <**Insert dimension**> thick, [**rigid fiberglass**] [**or**] [**polystyrene board**] insulation in cavity between exterior and interior face panels.

Retain "Raised Base Assembly," "Flush Base Assembly," or "Open Base" Paragraph below.

Revise "Raised Base Assembly" Paragraph below to suit booth design, which varies among manufacturers. 4-inch- high base is typical for exterior applications; 3-inch- high base is often used for interior or sheltered applications.

* + - * 1. Raised Base Assembly: [**4-inch-**] [**3-inch-**] high assembly consisting of perimeter frame welded to structural framework of booth. Fabricate frame from 2-by-4-inch galvanized-steel structural tubing; 0.108-inch nominal-thickness, C-shaped, galvanized-steel sheet channels; or galvanized structural-steel angles. Include anchor clips fabricated from 1/4-inch- thick galvanized-steel plate, predrilled and welded to exterior of integral floor frame.

Retain "Tread Plate Floor Assembly," "Insulated Floor Assembly," or "Uninsulated Floor Assembly" Subparagraph below. Tread plate in first subparagraph below does not require a separate subfloor.

Tread Plate Floor Assembly: 0.108-inch nominal-thickness, galvanized, rolled steel tread plate.

Insulated Floor Assembly: Assembly consisting of 0.079-inch nominal-thickness, galvanized-steel sheet underside with rigid insulation core; covered by 0.125-inch- thick, aluminum rolled tread plate; with overall assembly thickness of 2 inches.

Uninsulated Floor Assembly: Assembly consisting of [**one**] [**two**] layer(s) of 3/4-inch- thick plywood or oriented strand board with [**0.125-inch- thick, aluminum rolled tread plate**] [**vinyl composition flooring**] [**carpeting**].

Retain "Flush Base Assembly" Paragraph below to eliminate raised step into control booth.

* + - * 1. Flush Base Assembly: No perimeter frame, with finished floor fabricated from 0.108-inch nominal-thickness, galvanized, rolled steel tread plate.

Retain "Open Base" Paragraph below if no base/floor assembly is required.

* + - * 1. Open Base: No perimeter frame, with surface of supporting concrete base as finished floor.

Revise "Flat Roof/Ceiling Assembly" Paragraph below to suit Project. Acoustical ceiling tile is also available. Canopies and downspouts are often omitted on interior and sheltered applications, and scuppers are often used instead of downspouts. If needed, insert requirements for gable, hip, mansard, vaulted, and dome roof/ceiling assemblies.

* + - * 1. Flat Roof/Ceiling Assembly: Assembly consisting of exterior roof panels, interior ceiling panels, and insulation between exterior and interior panels; sloped to drain at booth perimeter.

Exterior Roof Panel: Fabricated from [**0.079-inch**] [**0.064-inch**] nominal-thickness, galvanized-steel sheet; with [**painted finish**] [**EPDM membrane**], continuously welded seams[**, and full-perimeter gutter**].

Interior Ceiling Panel: Fabricated from 0.079-inch nominal-thickness, galvanized-steel sheet; with fiberglass insulation in cavity between ceiling and roof.

Retain "Exterior Roof Panel" and "Interior Ceiling Panel" subparagraphs above or "Insulated Composite Panel" Subparagraph below.

Insulated Composite Panel: Fabricated from 0.028-inch nominal-thickness, galvanized-steel sheet faces and expanded-foam insulation core.

Canopy Fascia: Fabricated from 0.079-inch nominal-thickness, galvanized-steel sheet, of [**manufacturer's standard design**] [**custom design indicated on Drawings**].

Height: [**6 inches**] [**8 inches**] <**Insert dimension**>.

Configuration:

Retain one of first two subparagraphs below. Flush canopies are often used for booths located within parking garages or under overhangs. Oversized overhangs, up to 6 feet (1.8 m), are also available. Verify availability with manufacturers.

Overhang [**3 inches**] <**Insert dimension**> beyond face of walls below.

Flush with face of walls below.

Retain "Downspouts" or "Roof scuppers" Subparagraph below, or delete both if not required.

Downspouts: Integral, extending 3 inches beyond booth walls.

Roof scuppers.

Rooftop finial.

Insert additional requirements for ticket windows in "Work Counters" Paragraph below if needed.

* + - * 1. Work Counters: Full width of control booth, reinforced; with 16-inch- wide [**storage**] [**cash**] drawer below each counter and an access opening for electrical cords at[**each**] rear corner of counter.

Material: [**0.078-inch- thick, stainless steel sheet**] [**0.079-inch nominal-thickness, galvanized-steel sheet**] [**1/2-inch- thick particleboard with plastic-laminate finish**].

Depth: [**18 inches**] [**20 inches**] [**22 inches**] <**Insert dimension**>.

* + - * 1. Electrical:

Single-Point Connection: Service-entrance-rated, fused safety switch located on exterior for connection of 125 A, [**120/240 V, single-phase, three-wire**] [**120/208 V, single-phase, three-wire**] [**208Y/120 V, three-phase, four-wire**] feeder with equipment ground conductor.

Grounding: Grounding electrode bonded to equipment ground conductor at single-point connection in accordance with NFPA 70 and Section 260526 "Grounding and Bonding for Electrical Systems."

Power Distribution: Readily accessible panelboard in accordance with Section 262416 "Panelboards" installed at [**interior**] [**exterior**] location[**coordinated with Director’s Representative**]. Include 25 percent provisions for installation of additional future devices.

Power Connections:

[**One**] <**Insert number**> duplex, weatherproof, ground-fault circuit interrupter (GFCI), NEMA 5-15R power outlet(s) for servicing exterior equipment.

[**One**] [**Two**] <**Insert number**> duplex, [**ground-fault circuit interrupter (GFCI),**] NEMA 5-15R power outlet(s) under counter(s) near access openings.

[**One**] [**Two**] <**Insert number**> Type USB-A power outlet(s) above counter(s) for charging portable devices.

Provide power connections and means of disconnect for interior and exterior HVAC equipment.

Provide power connections and means of disconnect for vehicle[**and pedestrian**] control equipment.

Lighting:

Booth Interior: LED. Provide 20-fc average horizontal illuminance, with uniformity not exceeding 2:1 average-to-minimum[**, dimmable from 100 percent to 10 percent,**] on counter work surfaces.

Booth Exterior: LED, located above door. Provide not less than 0.5-fc average horizontal illuminance, with uniformity not exceeding 3:1 maximum-to-minimum, when measured at finished grade over the distance of 15 ft from entrance door.

Retain "Vehicle( and Pedestrian) Circulation" Subparagraph below if exterior lighting is mounted on control booth or otherwise provided with control booth.

Vehicle[**and Pedestrian**] Circulation:

Retain subparagraph(s) below that apply to the Project location. Lighting Zone 1 (LZ1) applies to areas where lighting might adversely affect flora and fauna or disturb the character of the area. LZ2 applies to areas where vision is adapted to moderate ambient lighting that may not be continuous. LZ3 applies to areas where vision is adapted to moderately high ambient lighting that is uniform and continuous. LZ4 applies to areas where vision is adapted to high ambient lighting that is necessary for safety, security, and convenience. If retaining more than one subparagraph, indicate on Drawings the LZ applying to each booth location.

LZ1: LED. For drive aisles[**and pedestrian walkways**] in primary directions of travel for distance 10 ft from booth, provide not less than 2-fc average horizontal illuminance when measured 4 ft above finished grade and not less than 1.5-fc average vertical illuminance when measured 3 to 5 ft above finished grade, with horizontal and vertical uniformities not exceeding 2:1 average-to-minimum.

LZ2: LED. For drive aisles[**and pedestrian walkways**] in primary directions of travel for distance 10 ft from booth, provide not less than 1.5-fc average horizontal illuminance when measured 4 ft above finished grade and not less than 1-fc average vertical illuminance when measured 3 to 5 ft above finished grade, with horizontal and vertical uniformities not exceeding 2:1 average-to-minimum.

LZ3: LED. For drive aisles[**and pedestrian walkways**] in primary directions of travel for distance 10 ft from booth, provide not less than 1-fc average horizontal illuminance when measured 4 ft above finished grade and not less than 0.8-fc average vertical illuminance when measured 3 to 5 ft above finished grade, with horizontal and vertical uniformities not exceeding 2:1 average-to-minimum.

LZ4: LED. For drive aisles[**and pedestrian walkways**] in primary directions of travel for distance 10 ft from booth, provide not less than 0.8-fc average horizontal illuminance when measured 4 ft above finished grade and not less than 0.6-fc average vertical illuminance when measured 3 to 5 ft above finished grade, with horizontal and vertical uniformities not exceeding 2:1 average-to-minimum.

Controls: [**Provide manual switches for interior and exterior lighting on wall inside booth door**] [**Provide automatic photocontrol for interior and exterior lighting, with manual override located on wall inside booth door**].

* + - * 1. Communications:

[**One**] <**Insert number**> communications outlet(s) under counter(s) with [**two**] [**four**] <**Insert number**> TIA-1096-A miniature eight-position series jack(s) for connecting telephone and data equipment.

Revise "Heating Unit" Paragraph below if heat pump is required. Verify availability with manufacturers. Coordinate capacity with size of booth and climate conditions.

* + - * 1. Heating Unit: [**Wall**] [**Roof**]-mounted, thermostatically controlled, [**110-V**] [**230/208-V**], electric heater with fan-forced operation and with capacity of not less than [**5000 Btu/h**] [**7500 Btu/h**] <**Insert capacity**>. Enclose in enameled-steel cabinet[**and mount under work counter**].

Coordinate capacity in "Cooling Unit" Paragraph below with size of booth and climate conditions.

* + - * 1. Cooling Unit: [**Wall**] [**Roof**]-mounted, thermostatically controlled air conditioner with cooling capacity of not less than [**10,000 Btu/h**] [**12,000 Btu/h**] [**13,500 Btu/h**] <**Insert capacity**>. Enclose in enameled-steel cabinet.

In "Accessories" Paragraph below, insert requirements for preplumbed interior restrooms if needed.

* + - * 1. Accessories: Provide the following for each control booth:

Through-wall transaction drawers[**and speaking apertures**].

Antifatigue mats.

Exterior stainless steel counter.

[**Floor**] [**Wall-mounted**] safe.

Signage: <**Insert requirements**>.

Ventilation fan.

Insect screens on operable openings.

Rollup shutters on doors and windows.

Intercom.

Traffic control lights.

Bollards.

* + - * 1. Anchorage: [**Cast-in-place anchor bolts**] [**Postinstalled anchors**] fabricated from non-ferrous or corrosion-resistant materials, with allowable load or strength design greater than or equal to the design load, as determined by testing conducted by a qualified testing agency.
				2. Materials:

Zinc-Coated (Galvanized) Steel Sheet: ASTM A653, commercial quality, G90 coating designation; mill phosphatized.

Galvanized Rolled-Steel Floor Plate: ASTM A786, rolled from plate complying with ASTM A36 or ASTM A283, Grade C or D); hot-dip galvanized in accordance with ASTM A123.

Steel Structural Tubing: ASTM A500, Grade B.

Steel Plates, Shapes, and Bars: ASTM A36.

Steel Mechanical Tubing: ASTM A513, welded-steel mechanical tubing.

Zinc-Coated (Galvanized) Steel: Hot-dip galvanized in accordance with ASTM A123.

Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

Sheet: ASTM B209.

Extruded Shapes: ASTM B221.

Rolled Tread Plate: ASTM B632, Alloy 6061-T4 or Alloy 6061-T6.

Stainless Steel Sheet: ASTM A240 or ASTM A666, Type 304.

Plastic Laminate: NEMA LD 3, Grade HGS or HGL.

Plywood: DOC PS 1, Exterior grade.

Particleboard: ANSI A208.1, Grade M-2.

Retain "Clear Tempered Float Glass," "Clear Insulating Glass," or "Ballistic-Resistant Glazing" Subparagraph below. Revise to include other glazing types if required.

Clear Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Class 1, and Quality q3; [**6 mm thick**] <**Insert thickness**>.

Clear Insulating Glass: ASTM E2190. Factory-assembled units consisting of two lites of 2.5-mm-thick clear float glass, ASTM C1036, Type I, Class 1, Quality q3, and dehydrated air space, with a total overall unit thickness of [**1 inch**] [**3/4 inch**] [**5/8 inch**] <**Insert dimension**> and with manufacturer's standard dual seal. Provide tempered lites where indicated.

Ballistic-Resistant Glazing: Tested to comply with bullet-resistant testing level indicated.

* + - * 1. Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on finish, including thermosetting, electrostatically applied, and powder coatings. Comply with coating manufacturer's written instructions for applying and baking.

Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Director’s Representative's sample**] [**As selected by Director’s Representative from manufacturer's full range**] <**Insert color and gloss**>.

* + - 1. FABRICATED ALUMINUM CONTROL BOOTHS

Manufacturers' control booths and their components are available in a range of styles, shapes, configurations, and options, in both standard and custom designs. Revise this article, which includes the most common construction, to suit Project.

* + - * 1. Building Style: [**Standard square corners**] [**Radius corners**] [**Round corners**] [**Butt-glazed corners**] [**Wraparound type, with single rounded building end**] [**Wraparound type, with both building ends rounded**] [**As indicated on Drawings**].
				2. Structural Framework: Fabricated from 2-by-2-by-0.125-inch aluminum tubing, channel, angle, or tee extrusions; with [**clear**] [**color**] anodic finish. Connect framework with[**exposed**] mechanical fasteners.

Retain "Sliding Doors" or "Swinging Doors" Paragraph below.

* + - * 1. Sliding Doors: Top suspended from aluminum track with ball-bearing rollers; 1-3/4 inches thick; tubular-frame design fabricated from clear-anodized aluminum; with [**top half**] [**full height**] of door glazed. Equip door with deadlock, lock support, guide hardware, and full weather stripping. Provide door on [**one side**] [**both sides**] of booth.

Glazing: [**Fixed**] [**Horizontal sliding**] unit with clear [**insulating**] <**Insert glazing**> glass.

Deadlock: Mortised, laminated-hook bolt type with removable cylinder capable of being master keyed.

Some manufacturers offer Dutch doors; revise "Swinging Doors" Paragraph below if using Dutch doors.

* + - * 1. Swinging Doors: 1-3/4 inches thick; tubular-frame design fabricated from clear-anodized aluminum; with [**top half**] [**full height**] of door glazed. Equip door with deadlock, three butt hinges, closer, and full weather stripping.[**Provide door on back of booth.**]

Glazing: [**Fixed**] [**Horizontal sliding**] unit with clear [**insulating**] <**Insert glazing**> glass.

Deadlock: Mortised, with lever handle and removable cylinder capable of being master keyed.

Revise "Windows" Paragraph below to suit Project. Manufacturers also offer tinted glass, clear and tinted polycarbonate, and acrylic glazing.

* + - * 1. Windows: Extruded-aluminum sash frames glazed with clear [**tempered**] [**insulating**] <**Insert glazing**> glass.

Frame Finish: Manufacturer's standard mill or clear anodic.

Operable Windows: Equip windows with cam locks, weather stripping, and [**stainless steel**] [**nylon**] ball-bearing rollers.

Screens: [**Insect**] [**Security**] screens for each window.

Corner Shape: [**Square**] [**Round**].

Revise "Wall Panel Assembly" Paragraph below to suit Project. Wall panel assemblies vary considerably among manufacturers; custom fiberglass exterior panels and hardboard interior finish panels are also available.

* + - * 1. Wall Panel Assembly: Assembly consisting of exterior face panel fabricated from [**0.032-inch-** ] [**0.063-inch-** ] thick aluminum sheet, and interior face panel fabricated from [**0.032-inch-** ] [**0.050-inch-**] thick aluminum sheet; with 2-inch- thick [**polystyrene**] [**or**] [**polyisocyanurate board insulation**] in cavity between exterior and interior face panels.

Retain "Raised Base Assembly" or "Open Base" Paragraph below.

Retain "Raised Base Assembly" Paragraph below if base/floor assembly is required; revise to suit booth design, which varies among manufacturers. 4-inch- high base is typical for exterior applications.

* + - * 1. Raised Base Assembly: 4-inch- high assembly consisting of perimeter frame welded to structural framework of booth. Fabricate frame from 2-by-4-by-0.125-inch aluminum tubing or aluminum angles. Include anchor clips fabricated from 1/4-inch- thick aluminum, predrilled and welded to exterior of integral floor frame.

Retain "Insulated Floor Assembly" or "Uninsulated Floor Assembly" Subparagraph below.

Insulated Floor Assembly: Assembly consisting of 0.032-inch- thick, aluminum sheet underside with plywood and rigid insulation core; covered by 0.125-inch- thick, aluminum rolled tread plate; with overall assembly thickness of 2 inches.

Uninsulated Floor Assembly: Assembly consisting of [**one**] [**two**] layer(s) of 3/4-inch- thick plywood or oriented strand board with [**0.125-inch- thick, aluminum rolled tread plate**] [**vinyl composition flooring**] [**carpeting**].

Retain "Open Base" Paragraph below if no base/floor assembly is required.

* + - * 1. Open Base: No perimeter frame, with surface of supporting concrete base as finished floor.

Revise "Flat Roof/Ceiling Assembly" Paragraph below to suit Project. Acoustical ceiling tile is also available. Canopies and downspouts are often omitted on interior and sheltered applications, and scuppers are often used instead of downspouts.

* + - * 1. Flat Roof/Ceiling Assembly: Assembly consisting of exterior roof panels, interior ceiling panels, and insulation between exterior and interior panels; sloped to drain at booth perimeter.

Exterior Roof Panel: Fabricated from 0.032-inch- thick aluminum sheet; with protective plastic sheet finish and full-perimeter gutter.

Interior Ceiling Panel: Fabricated from 0.125-inch- thick hardboard; with polyisocyanurate board insulation in cavity between ceiling and roof.

Retain "Exterior Roof Panel" and "Interior Ceiling Panel" subparagraphs above or "Insulated Composite Panel" Subparagraph below.

Insulated Composite Panel: Fabricated from 0.032-inch- thick aluminum sheet faces and expanded-foam insulation core.

Canopy Fascia: Fabricated from 0.063-inch- thick aluminum sheet, of [**manufacturer's standard design**] [**custom design indicated on Drawings**].

Height: [**6 inches**] [**8 inches**] <**Insert dimension**>.

Configuration:

Retain one of first two subparagraphs below. Flush canopies are often used for booths located within parking garages or under overhangs. Oversized overhangs, up to 6 feet (1.8 m), are also available. Verify availability with manufacturers.

Overhang [**3 inches**] <**Insert dimension**> beyond face of walls below.

Flush with face of walls below.

Retain "Downspouts" or "Roof scuppers" Subparagraph below, or delete both if not required.

Downspouts: Integral, extending 3 inches beyond booth walls.

Roof scuppers.

Rooftop finial.

Insert additional requirements for ticket windows in "Work Counters" Paragraph below if needed.

* + - * 1. Work Counters: Full width of control booth, reinforced; with 16-inch- wide [**storage**] [**cash**] drawer below each counter and an access opening for electrical cords at[**each**] rear corner of counter.

Material: 1/2-inch- thick particleboard with plastic-laminate finish.

Depth: [**18 inches**] [**20 inches**] [**22 inches**] <**Insert dimension**>.

If required, revise "Electrical Power Service" Paragraph below for three-phase service.

* + - * 1. Electrical Power Service:

Single-Point Connection: Service-entrance-rated, fused safety switch located on exterior for connection of 125 A, [**120/240 V, single-phase, three-wire**] [**120/208 V, single-phase, three-wire**] [**208Y/120 V, three-phase, four-wire**] feeder with equipment ground conductor.

Grounding: Grounding electrode bonded to equipment ground conductor at single-point connection in accordance with NFPA 70 and Section 260526 "Grounding and Bonding for Electrical Systems."

Power Distribution: Readily accessible panelboard in accordance with Section 262416 "Panelboards" installed at [**interior**] [**exterior**] location[**coordinated with Director’s Representative**]. Include 25 percent provisions for installation of additional future devices.

Power Connections:

[**One**] <**Insert number**> duplex, weatherproof, ground-fault circuit interrupter (GFCI), NEMA 5-15R power outlet(s) for servicing exterior equipment.

[**One**] [**Two**] <**Insert number**> duplex, [**ground-fault circuit interrupter (GFCI),**] NEMA 5-15R power outlet(s) under counter(s) near access openings.

[**One**] [**Two**] <**Insert number**> type USB-A power outlet(s) above counter(s) for charging portable devices.

Provide power connections and means of disconnect for interior and exterior HVAC equipment.

Provide power connections and means of disconnect for vehicle[**and pedestrian**] control equipment.

Lighting

Booth Interior: LED. Provide 20-fc average horizontal illuminance, with uniformity not exceeding 2:1 average-to-minimum[**, dimmable from 100 percent to 10 percent,**] on counter work surfaces.

Booth Exterior: LED, located above door. Provide not less than 0.5-fc average horizontal illuminance, with uniformity not exceeding 3:1 maximum-to-minimum, when measured at finished grade over the distance of 15 ft from entrance door.

Retain "Vehicle( and Pedestrian) Circulation" Subparagraph below if exterior lighting is mounted on control booth or otherwise provided with control booth.

Retain subparagraph(s) below that apply to the Project location. Lighting Zone 1 (LZ1) applies to areas where lighting might adversely affect flora and fauna or disturb the character of the area. LZ2 applies to areas where vision is adapted to moderate ambient lighting that may not be continuous. LZ3 applies to areas where vision is adapted to moderately high ambient lighting that is uniform and continuous. LZ4 applies to areas where vision is adapted to high ambient lighting that is necessary for safety, security, and convenience. If retaining more than one subparagraph, indicate on Drawings the LZ applying to each booth location.

Vehicle[**and Pedestrian**] Circulation:

LZ1: LED. For drive aisles[**and pedestrian walkways**] in primary directions of travel for distance 10 ft from booth, provide not less than 2-fc average horizontal illuminance when measured 4 ft above finished grade and not less than 1.5-fc average vertical illuminance when measured 3 to 5 ft above finished grade, with horizontal and vertical uniformities not exceeding 2:1 average-to-minimum.

LZ2: LED. For drive aisles[**and pedestrian walkways**] in primary directions of travel for distance 10 ft from booth, provide not less than 1.5-fc average horizontal illuminance when measured 4 ft above finished grade and not less than 1-fc average vertical illuminance when measured 3 to 5 ft above finished grade, with horizontal and vertical uniformities not exceeding 2:1 average-to-minimum.

LZ3: LED. For drive aisles[**and pedestrian walkways**] in primary directions of travel for distance 10 ft from booth, provide not less than 1-fc average horizontal illuminance when measured 4 ft above finished grade and not less than 0.8-fc average vertical illuminance when measured 3 to 5 ft above finished grade, with horizontal and vertical uniformities not exceeding 2:1 average-to-minimum.

LZ4: LED. For drive aisles[**and pedestrian walkways**] in primary directions of travel for distance 10 ft from booth, provide not less than 0.8-fc average horizontal illuminance when measured 4 ft above finished grade and not less than 0.6-fc average vertical illuminance when measured 3 to 5 ft above finished grade, with horizontal and vertical uniformities not exceeding 2:1 average-to-minimum.

Controls: [**Provide manual switches for interior and exterior lighting on wall inside booth door**] [**Provide automatic photocontrol for interior and exterior lighting, with manual override located on wall inside booth door**].

* + - * 1. Communications:

[**One**] <**Insert number**> communications outlet(s) under counter(s) with [**two**] [**four**] <**Insert number**> TIA-1096-A miniature eight-position series jack(s) for connecting telephone and data equipment.

Revise "Heating Unit" Paragraph below if heat pump is required. Verify availability with manufacturers. Coordinate capacity with size of booth and climate conditions.

* + - * 1. Heating Unit: [**Wall**] [**Roof**]-mounted, thermostatically controlled, [**110-V**] [**230/208-V**] electric heater with fan-forced operation and with capacity of not less than [**5000 Btu/h** ] [**7500 Btu/h**] <**Insert capacity**>. Enclose in enameled-steel cabinet[**and mount under work counter**].

Coordinate capacity in "Cooling Unit" Paragraph below with size of booth and climate conditions.

* + - * 1. Cooling Unit: [**Wall**] [**Roof**]-mounted, thermostatically controlled air conditioner with cooling capacity of not less than [**10,000 Btu/h** ] [**12,000 Btu/h** ] [**13,500 Btu/h** ] <**Insert capacity**>. Enclose in enameled-steel cabinet.

In "Accessories" Paragraph below, insert requirements for preplumbed interior restrooms if needed.

* + - * 1. Accessories: Provide the following for each control booth:

Through-wall transaction drawers[**and speaking apertures**].

Antifatigue mats.

Exterior stainless steel counter.

[**Floor**] [**Wall-mounted**] safe.

Signage: <**Insert requirements**>.

Ventilation fan.

Insect screens on operable openings.

Rollup shutters on doors and windows.

Intercom.

Traffic control lights.

Bollards.

* + - * 1. Anchorage: [**Cast-in-place anchor bolts**] [**Postinstalled anchors**] fabricated from stainless steel, with allowable load or strength design greater than or equal to the design load, as determined by testing conducted by a qualified testing agency.
				2. Materials:

Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

Sheet: ASTM B209.

Extruded Shapes: ASTM B221.

Rolled Tread Plate: ASTM B632, Alloy 6061-T4 or Alloy 6061-T6.

Stainless Steel Sheet: ASTM A240 or ASTM A666, Type 304.

Plastic Laminate: NEMA LD 3, Grade HGS or HGL.

Plywood: DOC PS 1, Exterior grade.

Particleboard: ANSI A208.1, Grade M-2.

Retain "Clear Tempered Float Glass," "Clear Insulating Glass," or "Ballistic-Resistant Glazing" Subparagraph below. Revise to include other glazing types if required.

Clear Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Class 1, and Quality q3; [**6 mm thick**] <**Insert thickness**>.

Clear Insulating Glass: ASTM E2190. Factory-assembled units consisting of two lites of 2.5-mm-thick clear float glass, ASTM C1036, Type I, Class 1, Quality q3, and dehydrated air space, with a total overall unit thickness of [**1 inch** ] [**3/4 inch** ] [**5/8 inch** ] <**Insert dimension**> and with manufacturer's standard dual seal. Provide tempered lites where indicated.

Ballistic-Resistant Glazing: Tested to comply with bullet-resistant testing level indicated.

Retain finishes in remaining paragraphs to suit Project. If retaining more than one, indicate location of each on Drawings or by inserts.

Retain one of two options in "Clear Anodic Finish" Paragraph below. Class II finish is standard with many manufacturers; Class I finish is heavy anodized. Verify availability with manufacturers.

* + - * 1. Clear Anodic Finish: AAMA 611, [**AA-M12C22A41, Class I, 0.018 mm**] [**AA-M12C22A31, Class II, 0.010 mm**] or thicker.

Retain one of two options in "Color Anodic Finish" Paragraph below. Verify availability with manufacturers.

* + - * 1. Color Anodic Finish: AAMA 611, [**AA-M12C22A42/A44, Class I, 0.018 mm**] [**AA-M12C22A32/A34, Class II, 0.010 mm**] or thicker.

Options in "Color" Subparagraph below are examples only and may vary in color range and availability among manufacturers.

Color: [**Light bronze**] [**Medium bronze**] [**Dark bronze**] [**Black**] [**Match Director’s Representative's sample**] [**As selected by Director’s Representative from full range of industry colors and color densities**] <**Insert color**>.

"Baked-Enamel or Powder-Coat Finish" Paragraph below references AAMA standard for pigmented organic coating on extrusions and panels.

* + - * 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603, except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Director’s Representative's sample**] [**As selected by Director’s Representative from manufacturer's full range**] <**Insert color and gloss**>.

* + - 1. FABRICATION
				1. Factory fabricate complete control booths, with accessories and options installed at factory.
				2. Factory preglaze windows and doors.
				3. Factory prewire control booths, ready for connection to service at Project site.
				4. Fabricate control booths with [**forklift pockets in base of booth**] [**removable lifting eye centered in roof**].

Retain "Accessible Control Booths" Paragraph below for accessible control booths. Requirements may vary; verify with authorities having jurisdiction. See the Evaluations.

* + - * 1. Accessible Control Booths: Where indicated to be accessible, fabricate control booths as follows:

Provide service windows located no higher than 34 inches above exterior grade.

Provide door opening with minimum 32-inch clear width.

Provide minimum 60-inch clear turning spacing within the booth.

Provide minimum 27-inch clearance beneath interior work surfaces. Locate work surfaces 28 inches minimum and 34 inches maximum above the floor.

Locate controls and operable parts no lower than 15 inches and no higher than 48 inches above the floor where reach is unobstructed. Where side reach is obstructed, locate controls and operable parts no lower than 15 inches and no higher than 46 inches above the floor.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including concrete bases; accurate placement, pattern, and orientation of anchor bolts; critical dimensions; and other conditions affecting performance of the Work.
				2. Examine roughing-in for electrical and communication systems to verify actual locations of connections before control booth installation.
				3. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
				4. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. INSTALLATION

Revise this article if installing control booths on raised structures.

* + - * 1. Install control booths in accordance with manufacturer's written instructions.

Retain "Accessible Control Booths" Paragraph below for accessible control booths.

* + - * 1. Accessible Control Booths: Install with interior floor surface at same elevation as adjacent paved surfaces.
				2. Set control booths plumb and aligned. Level baseplates true to plane, with full bearing on concrete bases.
				3. Fasten control booths securely to concrete base with anchorage indicated.
				4. Connect to electrical power service and communication systems.
				5. Perform startup checks of [**heating**] [**and**] [**cooling**] units in accordance with manufacturer's written instructions.
			1. ADJUSTING
				1. Adjust doors, operable windows, and hardware to operate smoothly, easily, properly, and without binding. Confirm that locks engage accurately and securely without forcing or binding.
				2. Adjust interior and exterior lighting controls.
				3. Lubricate hardware and other moving parts.
				4. After completing installation, inspect exposed finishes and repair damaged finishes.

END OF SECTION 133423.16