SECTION 116143 - STAGE CURTAINS

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. SUMMARY
				1. Section Includes:

Stage curtains, scrims, and drops.

Draw-curtain tracks.

Draw-curtain machines for motorized operation.

Curtain rigging.

* + - * 1. Related Requirements:

Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 055000 "Metal Fabrications" for steel framing and supports for stage-curtain systems.

* + - 1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

If needed, insert list of conference participants.

* + - 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. Submittals Package: Provide all submittals, except samples, coordination drawings, and closeout submittals, as a single submittal package.
				5. Product Data: For each type of product and the following:

Retain "Draw-Curtain Machines" and "Tracks" subparagraphs below if required; insert other subparagraphs to suit Project.

Draw-Curtain Machines: Include rated capacities, operating characteristics, and electrical characteristics.

Tracks: Capability of each track to support the weight and operation of curtains that it supports.

* + - * 1. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

Include plans, elevations, sections, and attachment details of curtains.

Include fabric assembly and hanging details.

Dimension operating clearances.

Include documentation of capacity of each batten, track, attachment, and rigging component to support loads.

Consider retaining first subparagraph below if significant point loads may be required such as for an unusually heavy proscenium curtain.

Points of attachment for proscenium curtain and the corresponding static and dynamic loads imposed on structure.

Locations of equipment components, switches, and controls. Differentiate between manufacturer-installed and field-installed wiring.

Retain "Wiring Diagrams" subparagraph below if equipment includes wiring.

Wiring Diagrams: For power, signal, and control wiring.

Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs for two-stage Samples.

* + - * 1. Samples for Initial Selection: For each type of stage curtain indicated. Include color charts showing full range of colors, textures, and patterns available, together with 12-inch- square Sample (any color) of each fabric type and seam.
				2. Samples for Verification: Minimum 12-inch by 12-inch- section of each fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.

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

* + - * 1. Delegated-Design Submittal: For stage-curtain systems and attachments to structure, including analysis data signed and sealed by the qualified professional engineer, licensed in the State of New York, responsible for their preparation.

Retain "Coordination Drawings" Paragraph below for situations where limited space necessitates maximum utilization for efficient installation of stage overhead components or if coordination is required for installation of products and materials by separate installers. Coordinate paragraph with other Sections specifying products listed below. Preparation of coordination drawings requires the participation of each trade involved in installations within the limited space.

* + - * 1. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

Structural members to which tracks, battens, and other stage-curtain equipment will be attached.

Locations of lighting fixtures and cabling, ductwork, piping, and sprinklers.

Rigging equipment for stage equipment.

Access panels.

Retain "Product Certificates" paragraph below to require submittal of product certificates from manufacturers.

* + - * 1. Product Certificates: For the following, from manufacturer:

Retain "Fabric" Paragraph below if attached product labels alone are insufficient.

Fabric: Provide name of flame-retardant chemical used, identification of applicator, treatment method, application date, allowable life span for treatment, and details of any restrictions and limitations.

* + - * 1. Sample Warranty: For manufacturer's special warranty.
			1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For stage curtains and rigging to include in operation and maintenance manuals.
			2. QUALITY ASSURANCE
				1. Installer Qualifications: Manufacturer of stage curtains.
			3. FIELD CONDITIONS
				1. Environmental Limitations: Do not install stage curtains until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
				2. Field Measurements: Verify locations of supporting structural elements and construction contiguous with stage curtains and rigging by field measurements before fabrication and indicate measurements on Shop Drawings.
			4. WARRANTY
				1. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of stage-curtain systems that fail in materials or workmanship within specified warranty period.

Failures include, but are not limited to, faulty operation of rigging.

Verify available warranties and warranty periods.

Warranty Period: Two years from date of Substantial Completion.

1. PRODUCTS

See Editing Instruction No. 1 in the Evaluations for cautions about named manufacturers and products.

* + - 1. STAGE-CURTAIN SYSTEMS

Generally, retain this article if an entire stage-curtain system, including curtains, track, rigging, and operators, is required. Revise "Description" paragraph below if only sewn curtains for existing battens and tracks are required or if specifying stage-curtain systems and components developed by a stage-design consultant.

* + - * 1. Description: Complete stage-curtain systems, including stage curtains, tracks, draw-curtain machines, and rigging; with necessary accessories for support and operation.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

LimeLight Productions, Inc.

NorthEast Stage.

Rose Brand.

Syracuse Scenery & Stage Lighting Co., Inc.

Approved equivalent.

* + - * 1. Source Limitations: Obtain stage-curtain systems from single manufacturer. Obtain each color, grade, finish, type, and variety of fabric from single source with resources to provide materials of consistent quality in appearance and physical properties.
			1. PERFORMANCE REQUIREMENTS

Retain "Delegated Design" paragraph below if Contractor is required to assume responsibility for design of stage-curtain systems.

* + - * 1. Delegated Design: Engage a qualified Professional Engineer, licensed in the State of New York, to design stage-curtain systems, including comprehensive engineering analysis and attachments to building structure, using performance requirements.
				2. Structural Performance: Stage-curtain systems and attachments to structure shall withstand the effects of gravity and operational loads and the following loads and stresses:

Consult a structural engineer experienced in engineering stage-curtain systems of type indicated in the Project location to quantify design loads applicable to Project. Verify compliance with codes.

Design Loads: Weight of curtains and **<Insert loads>**.

* + - * 1. Fire-Test-Response Characteristics: Provide stage curtains meeting the following requirements as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

Retain "Flame-Propagation Resistance" Subparagraph below if required by authorities having jurisdiction. Revise to suit Project.

Flame-Propagation Resistance: Passes NFPA 701.

Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant or is treated with flame-retardant chemicals and whether it requires retreatment after cleaning or after a designated time period of use.

Permanently attach 12-inch- square swatch of same fabric and dye lot for each fabric of a curtain assembly to the back of assembly for use as fire-resistance test strip.

Retain "Electrical Components, Devices, and Accessories" Paragraph below if draw-curtain machine is required.

* + - * 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
			1. CURTAIN FABRICS
				1. General: Provide fabrics inherently and permanently flame resistant or chemically flame resistant by immersion treatment according to performance requirements indicated. Provide fabrics of each type and color from same dye lot.

Retain required fabrics in paragraphs below; revise to suit Project or insert other fabrics.

Fabric in "Heavyweight Woven Cotton Velour" paragraph below is an example of fabric suitable for front-setting curtains; revise to suit Project.

* + - * 1. Heavyweight Woven Cotton Velour: Napped fabric of 100 percent cotton weighing not less than 25 oz./linear yd., with pile height not less than 79 mils; 54-inch minimum width.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Dazian LLC.

Frankel/Fabric One.

JB Martin Company.

Approved equivalent.

Color/Texture/Pattern: **[As indicated by manufacturer's designations] [Match Director’s Representative's samples] [As selected by Director’s Representative from manufacturer's full range]**.

Fabric in "Medium-Weight Woven Cotton Velour" paragraph below is an example of fabric suitable for front-setting, intermediate-setting, or cyclorama curtains, borders, and side legs; revise to suit Project. Intermediate-setting curtain fabric is usually at least one step down in weight from front-setting fabric. Fabrics for cyclorama-setting curtains are often used for intermediate-setting curtains.

* + - * 1. Medium-Weight Woven Cotton Velour: Napped fabric of 100 percent cotton weighing not less than 20 oz./linear yd., with pile height not less than 75 mils; 54-inch minimum width.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Dazian LLC.

Frankel/Fabric One.

JB Martin Company.

Approved equivalent.

Color/Texture/Pattern: **[As indicated by manufacturer's designations] [Match Director’s Representative's samples] [As selected by Director’s Representative from manufacturer's full range]**.

Fabric in "Lightweight Woven Cotton Velour" paragraph below is an example of fabric suitable for intermediate-setting or cyclorama curtains; revise to suit Project.

* + - * 1. Lightweight Woven Cotton Velour: Napped fabric of 100 percent cotton weighing not less than 15 oz./linear yd., with pile height not less than 59 mils; 54-inch minimum width.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

JB Martin Company.

KM Fabrics, Inc.

Valley Forge Fabrics, Inc.

Approved equivalent.

Color/Texture/Pattern: **[As indicated by manufacturer's designations] [Match Director’s Representative's samples] [As selected by Director’s Representative from manufacturer's full range]**.

Fabric in "Polyester Velour" paragraph below is an example of polyester velour fabric suitable for front-setting, intermediate-setting, or cyclorama curtains; revise to suit Project. Consider retaining polyester velour also for curtains in locations outdoors or with humid ambient conditions.

* + - * 1. Polyester Velour: Napped fabric of 100 percent polyester weighing not less than 22 oz./linear yd., with pile height approximately 75 mils; inherently and permanently flame resistant; 54-inch minimum width.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Dazian LLC.

JB Martin Company.

KM Fabrics, Inc.

Approved equivalent.

Color/Texture/Pattern: **[As indicated by manufacturer's designations] [Match Director’s Representative's samples] [As selected by Director’s Representative from manufacturer's full range]**.

Fabric in "Muslin" paragraph below is an example of a drop fabric; revise to suit Project. Muslin is also the traditional fabric for cyclorama curtains.

* + - * 1. Muslin: Sheer, plain-woven fabric.

Retain one of two "Fabric" subparagraphs below or insert another. Revise second subparagraph for heavier weight such as 17 oz./linear yd. if required. Muslin in these two subparagraphs below is available in 12-, 16-, 19-, 25-, 33-, and 40-foot widths for seamless sky drops but is progressively more expensive.

Fabric: 100 percent cotton weighing not less than 16 oz./linear yd.; 100-inch minimum width.

Fabric: 100 percent polyester weighing not less than 11.75 oz./linear yd.; inherently and permanently flame resistant; 106-inch minimum width.

Some colors in "Color" subparagraph below are unavailable for some fabric types.

Color: **[White] [Black] [Gray] [Blue]**.

Retain one or more of remaining paragraphs below, which are examples of fabrics that are suitable for intermediate-setting or cyclorama curtains; revise to suit Project.

Duvetyn in "Duvetyn" paragraph below may weigh 8 or 12 oz./linear yd. Verify weight with manufacturer.

* + - * 1. Duvetyn: 100 percent cotton, short-napped fabric weighing not less than **[8 oz./linear yd.] [12 oz./linear yd.]**; twill weave with soft uniform texture; 54-inch minimum width; **[black]**.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Dazian LLC.

Frankel/Fabric One.

Rose Brand.

Approved equivalent.

Fabric in "Duvetyn, Heavy Weight" paragraph below is frequently called "commando."

* + - * 1. Duvetyn, Heavy Weight: 100 percent cotton, short-napped fabric weighing not less than 16 oz./linear yd.; twill weave with soft uniform texture; 54-inch minimum width; **[black]**.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Dazian LLC.

Fred Krieger & Co., Inc.

Rose Brand.

Approved equivalent.

* + - * 1. Repp, Atlas Oxford: 100 percent heavyweight cotton woven fabric; herringbone weave; 54-inch minimum width.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Fred Krieger & Co., Inc.

Rose Brand.

Approved equivalent.

Color/Texture/Pattern: **[As indicated by manufacturer's designations] [Match Director’s Representative's samples] [As selected by Director’s Representative from manufacturer's full range]**.

* + - * 1. Repp, Nassau Chevron: 100 percent **[heavyweight cotton] [polyester]** woven fabric; chevron weave; 54-inch minimum width.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Frankel/Fabric One.

Fred Krieger & Co., Inc.

Rose Brand.

Approved equivalent.

Color/Texture/Pattern: **[As indicated by manufacturer's designations] [Match Director’s Representative's samples] [As selected by Director’s Representative from manufacturer's full range]**.

* + - * 1. Synthetic Boucle: 100 percent synthetic blend with opaque vinyl backing; diagonal weave; inherently and permanently flame resistant; 48-inch minimum width.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Fred Krieger & Co., Inc.

Approved equivalent.

Color/Texture/Pattern: **[As indicated by manufacturer's designations] [Match Director’s Representative's samples] [As selected by Director’s Representative from manufacturer's full range]**.

* + - * 1. Polyester: 100 percent polyester yarn woven fabric weighing not less than 13 oz./linear yd.; inherently and permanently or durably flame resistant; 72-inch minimum width.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Dazian LLC.

Frankel/Fabric One.

Rose Brand.

Approved equivalent.

Color/Texture/Pattern: **[As indicated by manufacturer's designations] [Match Director’s Representative's samples] [As selected by Director’s Representative from manufacturer's full range]**.

Fabric in "Sharkstooth Scrim" paragraph below is an example of a general-purpose scrim fabric; revise to suit Project.

* + - * 1. Sharkstooth Scrim: Open-weave, seamless, lightweight gauze fabric.

Retain one of four "Fabric" subparagraphs below or insert another.

Fabric: 100 percent cotton or 95 percent cotton/5 percent polyester weighing not less than 29 oz./linear yd.; [30-foot] [35-foot] minimum width.

Fabric: 100 percent cotton weighing not less than 32 oz./linear yd.; three-thread construction; [30-foot] [35-foot] minimum width.

Fabric: 100 percent polyester weighing not less than 37 oz./linear yd.; inherently and permanently flame resistant; [35-foot] minimum width.

Material in "Fabric" subparagraph below is for indoor or outdoor use and can be painted.

Fabric: 100 percent polyester/modacrylic blend weighing not less than 40 oz./linear yd.; inherently and permanently flame resistant; three-thread construction; suitable for all weather applications; **[36-foot]** minimum width.

Some colors in "Color" subparagraph below are unavailable for some fabric types.

Color: **[White] [Black] [Gray] [Blue]**.

* + - 1. LINING

Retain "Cotton Lining" or "Ranger Lining" paragraph below for lining cotton velour if lining is required; revise to suit Project.

* + - * 1. Cotton Lining: Yarn-dyed denim cloth of 100 percent cotton; woven in a warp-faced twill; 54-inch minimum width; **[black]**.
				2. Ranger Lining: 100 percent cotton fabric weighing not less than 13 oz./linear yd.; 54-inch minimum width; **[beige] [black]**.
				3. Polyester Lining: 100 percent polyester fabric; inherently and permanently flame resistant; 54-inch minimum width; **[beige] [black]**.
				4. Individual Weights: Curtain manufacturer's standard segmented weights to suit each curtain type and location.
				5. Proof Coil Chain: Grade 30, No. 8, zinc plated, 3/16 inch, ASTM A413.
				6. Weight Tape: Curtain manufacturer's standard, continuous weight tape to suit each curtain type and location.
				7. Pipe or Conduit Weight and Stiffener: Curtain manufacturer's standard or recommended stiffening pipe or conduit that slides into bottom hem, suitable for curtain type and location indicated.

Retain "Polyester Lining" paragraph below for lining polyester velour if lining is required; revise to suit Project.

* + - 1. CURTAIN-BOTTOM WEIGHTS

Retain one or more of four paragraphs below if required; revise to suit Project.

* + - 1. CURTAIN FABRICATION

Delete this article if only scrim or drops are required.

Retain option in "General" paragraph below if applicable.

* + - * 1. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on fabric not visible to audience. Provide vertical seams unless otherwise indicated. Arrange vertical seams so they do not fall on faces of pleats. Do not use fabric cuts less than one-half width. Orient velour fabric with the fabric nap down.
				2. Vertical and Top Hems: Machine sew hems as follows unless otherwise indicated:

Retain option in "Vertical Hems" subparagraph below if required for professional theater installations.

Vertical Hems: Minimum 2 inches wide, and not less than 4 inches wide at borders, valance, teasers, and tormentors, with not less than a 1-inch tuck and with no selvage material visible from front of curtain. Sew open ends of hems closed.

Generally, retain "Turnbacks" subparagraph below for leading-side hems of traveler curtains; consider retaining second option to allow reversing of curtain sections as leading side wears. Retain last option in subparagraph below for turnbacks formed by one-half width of face fabric if required for professional theater installations.

Turnbacks: Provide leading- and trailing-edge turnbacks for traveler curtains, formed by folding back not less than 12 inches of face fabric, with not less than a 1-inch tuck, and vertically secured by sewing.

Top Hems: Reinforced by double-stitching 3-1/2-inch- wide, heavy, jute or laminated synthetic webbing to top edge on back side of curtain with not less than 2 inches of face fabric turned under.

* + - * 1. Fullness:

Retain one or more of "Flat," "50 Percent Fullness," or "100 Percent Fullness" subparagraphs below. First option in "percent fullness" subparagraphs is for traditional box pleats; second option is for round pleats. Revise if another style of pleating, such as lap pleats, or another method of achieving fullness is required. "Flat" subparagraph below is for batten-hung curtains only. 100 percent fullness with round pleats on 6-inch centers requires twice as many carriers as 100 percent fullness box pleats on 12-inch centers.

Flat: Provide zero percent fullness in curtains.

50 Percent Fullness: Provide fullness, exclusive of turnbacks and hems, by **[sewing additional material into 3-inch double-stitched, flat, box pleats] [tying or hooking together adjacent grommets into round pleats]** spaced at 12 inches o.c. along top hem reinforcement.

100 Percent Fullness: Provide fullness, exclusive of turnbacks and hems, by **[sewing additional material into 6-inch double-stitched, flat, box pleats spaced at 12 inches o.c.] [tying or hooking together adjacent grommets 6 inches apart into round pleats spaced at 6 inches o.c.]** along top hem reinforcement.

* + - * 1. Grommets: Brass, No. 3, or No. 4.

Black Curtains: Provide brass or aluminum grommets with black finish.

Retain one of two "Flat Curtains" subparagraphs or "Pleated Curtains" subparagraph below; coordinate with curtain fullness and type of attachment.

Flat Curtains: Place 12 inches o.c. and 1 inch from corner of curtain; for ties, snap hooks, or S-hooks.

Flat Curtains: Provide blind grommet top finish to mask battens using hidden pairs of grommets; place 12 inches o.c. and 1 inch from corner of curtain; for ties.

Pleated Curtains: **[Center grommets on each box pleat] [Double grommets for each round pleat]** and place 1 inch from corner of curtain; for snap hooks or S-hooks.

* + - * 1. Bottom Hems: Machine sew hems as follows unless otherwise indicated:

Retain option in "For Flat Curtains Without Fullness" subparagraph below to give curtains the ability to seal to the uneven stage floor and eliminate light leaks from upstage. Revise option if a 1-inch flap or skirt is required; revise to suit Project.

For Flat Curtains Without Fullness: 4-inch lined hem with pocket for sliding pipe or conduit weight and stiffener into bottom of curtain**[, and with a concealing flap of same fabric in front of pocket made 2 inches longer than bottom edge of pocket]**.

For Curtains With Fullness:

Retain option in "Curtains That Do Not Hang to Floor" subparagraph below if required; revise to suit Project. Bottom hems of valances and borders are sometimes made without weights because the hem weight itself can be sufficient.

Curtains That Do Not Hang to Floor: Hems not less than 3 inches deep,**[ with 3/4-inch weight tape,]** and with open ends of hems sewn closed.

Retain one or more of three "Floor-Length Curtains" subparagraphs below; revise to suit Project. If retaining more than one subparagraph, indicate location of each on Drawings or by inserts. Weight tape is quieter than chain and does not bunch up. A few manufacturers prefer individual weights in pockets. Consider retaining third subparagraph for professional theater installations.

Floor-Length Curtains: Hems not less than 6 inches deep, with 1-inch weight tape sewn to top seam of the bottom hem, clear of the finished bottom edge, and with open ends of hems sewn closed.

Floor-Length Curtains: Hems not less than 6 inches deep, with individual weights in individual closed pockets sewn above finished bottom edge of curtain, and with open ends of hems sewn closed.

Floor-Length Curtains: Hems not less than 6 inches deep; with separate, interior, 100 percent cotton, heavy canvas chain pockets equipped with proof coil chain; with chain pockets sewn so that chain rides 2 inches above finished bottom edge of curtain; and with open ends of hems sewn closed.

Retain one option in "Lining" subparagraph below. Linings are typical for the best quality proscenium curtains.

Lining: Where indicated, provide lining for curtain in same fullness as face fabric and finished 2 inches shorter than face fabric. Sew or otherwise securely attach lining to top hem of face fabric. Attach lining to face fabric along **[bottom and ]side seams with 4-inch- long strips of heavy woven cotton tape.[ Sew lining to bottom edge of curtain allowing sufficient lining fabric for tucking to prevent shrinkage.]**

* + - 1. SCRIMS AND DROPS
				1. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on fabric not visible to audience. Provide vertical seams unless otherwise indicated. Do not use fabric cuts less than one-half width.

Retain "Scrims" or "Drops" paragraph below or both to suit Project; coordinate with required fabrics.

* + - * 1. Scrims: Scrim curtain fabric sewn flat. Provide with continuous 6-inch pipe pocket at bottom with 6-inch flap of same fabric in front of pocket. Double-stitch 3-1/2-inch jute or laminated synthetic webbing at top with not less than No. 2 brass grommets spaced at 12 inches o.c. and 1 inch from corner of curtain. Provide not less than 2-inch double-folded side hem and 4-inch bottom hem.
				2. Drops: Muslin fabric, sewn flat, with either horizontal or vertical seams and with selvage to the rear. Provide 6-inch pipe pocket at bottom with 6-inch flap of same fabric in front of pocket. Double-stitch 3-1/2-inch jute or laminated synthetic webbing at top with not less than No. 2 brass grommets spaced at 12 inches o.c. and 1 inch from corner of curtain. Provide not less than 2-inch double-folded side hem and 4-inch bottom hem.
			1. CURTAIN ACCESSORIES

If using more than one method to hang curtains, indicate location of each on Drawings or by inserts.

Retain option in "S-Hooks" paragraph below if curtains are hung from tracks. Delete paragraph if all curtains are hung directly from battens with ties or if track-hung curtains are hung with snap hooks exclusively.

* + - * 1. S-Hooks: Manufacturer's standard heavy-duty plated-wire hooks, not less than 2 inches long.

Retain "Tie Lines" paragraph below for curtains, scrims and drops hung from battens; delete if all curtains are hung from tracks. Second option in paragraph below conceals the batten and is for tape ties only.

* + - * 1. Tie Lines: No. 4 or No. 4-1/2 cord or braided soft cotton tape, black or white to best match curtain; not less than 5/8 inch wide by 36 inches long, **[threaded through grommets] [sewn to top hem of curtain]**.

Retain "Snap Hooks" paragraph below for track-mounted curtains if snap hooks are used in lieu of S-hooks to hang curtains. First two options in paragraph below may be suitable for lightweight curtains; third option may be suitable for heavy or lined curtains. Consult curtain manufacturer for recommendations.

* + - * 1. Snap Hooks: Manufacturer's standard heavy-duty hooks**[, sewn to top edge of curtain] [, blind sewn to top hem of curtain] [, attached to top hem with nylon strap secured by rivets]**.
			1. ALUMINUM CURTAIN TRACK

Retain this article if aluminum track is required.

Verify manufacturer's published working load for curtain weight per unit of length. Some track is available with black painted finish. Consult curtain-system or track manufacturers for recommendations for specific installations. Different tracks may be required for different curtain types and operation. If using more than one, indicate location of each on Drawings or by inserts.

* + - * 1. Aluminum Track: Extruded aluminum, ASTM B221; alloy and temper as recommended by manufacturer for strength and corrosion resistance; **[mill] [black paint]** finish; complete with necessary accessories for support and operation.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Automatic Devices Company.

Tru-Roll, Inc.

Approved equivalent.

Retain "Curved Track" and "Cable Guides for Curved Track" subparagraphs below for curved tracks. Shop fabrication offers better control over working conditions. Aluminum track is usually bent in the field.

Curved Track: Fabricate curved portions of track in shop.

Cable Guides for Curved Track: Outside idlers, mule pulleys, spindles, and guides; quantity sufficient for configuration of curve(s) and length of track.

Aluminum Thickness: **[0.080 inch] [0.125 inch] [As recommended by manufacturer for loads and operation]**.

* + - * 1. Curtain Rails: Single or double curtain capacity as indicated. Provide end stops for track rails.
				2. Curtain Carriers: Standard carriers with a pair of nylon or neoprene-tired ball-bearing wheels riveted parallel to plated-steel body. Equip carriers with rubber or neoprene bumpers and nylon glide strips to reduce noise, and heavy-duty, plated-steel swivel eye for attaching curtain snap or S-hook. Provide quantity of curtain carriers sufficient for track length, to suit curtain fabrication.

Master Curtain Carriers: One master carrier, for each leading curtain edge, with two pairs of nylon or neoprene-tired ball-bearing wheels riveted parallel to plated-steel body.

Retain "Curved-Suspended-Track Stiffener" paragraph below for curved track if required to support load; revise to suit Project. Delete paragraph if track is mounted directly to ceiling.

* + - * 1. Curved-Suspended-Track Stiffener: NPS 1-1/2 steel pipe for supporting both sections of suspended curved tracks; curved to match track.
				2. Clamp and Bracket Hangers: Steel clamps and brackets of sufficient strength required to support loads for attaching track to overhead support.

Retain "Track-Lap Clamp" paragraph below if draw-curtain track is rigged for biparting, overlapping curtain closure; delete if only one-way draw curtains are required.

* + - * 1. Track-Lap Clamp: Metal to match track channel for attaching two tracks at center overlap.

Retain "Folding Guide" paragraph below if required. See Evaluations.

* + - * 1. Folding Guide: Where indicated, equip carriers with rear-fold or backpack guide and rubber spacers to fold curtain from the offstage end of the track; sized for use with operating line if any.

Retain one or more of "Manual Walk-Along Operation," "Manual Cord Operation," and "Motorized Operation" paragraphs below.

* + - * 1. Manual Walk-Along Operation: Fabricate curtain track without cord, cable, pulleys, or floor pulley.
				2. Manual Cord Operation: Fabricate curtain track with cord, pulleys, and floor pulley.

Operating Line: 3/8-inch- diameter, stretch-resistant operating cord consisting of braided synthetic-fiber jacket over solid, synthetic-fiber, linear filaments.

End Pulleys: One single dead-end and one double live-end pulley. Provide sheave(s) with shielded ball bearing(s) housed in plated-steel body finished to match track. Provide with bracket for securing off-stage curtain end.

Adjustable-type pulleys in "Floor Pulley" subparagraph below are considered better quality than the spring-tensioned type.

Floor Pulley: Sheave with shielded ball bearing housed in plated-steel body**[, painted black].[ Spring-tensioned type.] [ Adjustable type, with 3-inch wheel.] [ Adjustable type, with 5-inch wheel.]**

* + - * 1. Motorized Operation: Fabricate curtain track with cord and pulleys.

Operating Line: 1/4-inch- diameter, stretch-resistant operating cable consisting of braided synthetic-fiber jacket over galvanized wire cable.

End Pulleys: One single dead-end and one double live-end pulley. Provide sheave(s) with shielded ball bearing(s), housed in plated-steel body finished to match track. Provide with bracket for securing off-stage curtain end.

* + - 1. STEEL CURTAIN TRACK

Retain this article if steel track is required.

Verify manufacturer's published working load for curtain weight per unit of length. Some track is available with black painted finish. Consult curtain-system or track manufacturers for recommendations for specific installations. Different tracks may be required for different curtain types and operation. If using more than one, indicate location of each on Drawings or by inserts.

* + - * 1. Steel Track: Roll-formed, galvanized, commercial-quality, zinc-coated steel sheet, ASTM A653; G60 coating designation; with continuous bottom slot and with each half of track in one continuous piece**[; black paint finish]**; complete with necessary accessories for support and operation.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Automatic Devices Company.

Tru-Roll, Inc.

Approved equivalent.

Retain "Curved Track" and "Cable Guides for Curved Track" subparagraphs below for curved tracks. Factory prefabrication is typical for curved steel track. If retaining curved steel track, verify availability with manufacturer.

Curved Track: Factory-fabricated sections.

Cable Guides for Curved Track: Outside idlers, mule pulleys, spindles, and guides; quantity sufficient for configuration of curve(s) and length of track.

Steel Thickness: As recommended by manufacturer for loads and operation.

Retain "Heavy Duty" or "Medium Duty" subparagraph below or both to set a minimum thickness; revise to suit Project.

Heavy Duty: Minimum 0.079 inch (14 ga) .

Medium Duty: Minimum 0.064 inch (16 ga) .

Retain "Curved-Suspended-Track Stiffener" paragraph below for curved track if required to support load; revise to suit Project. Delete paragraph if track is mounted directly to ceiling. If retaining curved steel track, verify availability with manufacturer.

* + - * 1. Curved-Suspended-Track Stiffener: NPS 1-1/2 steel pipe for supporting both sections of suspended curved tracks; curved to match track.
				2. Clamp and Bracket Hangers: Steel clamps and brackets of sufficient strength required to support loads for attaching track to overhead support.

Retain "Track-Lap Clamp" paragraph below if draw-curtain track is rigged for biparting, overlapping curtain closure; delete if only one-way draw curtains are required.

* + - * 1. Track-Lap Clamp: Metal to match track channel for attaching two tracks at center overlap.

Retain "Folding Guide" paragraph below if required. See Evaluations.

* + - * 1. Folding Guide: Where indicated, equip carriers with rear-fold or backpack guide and rubber spacers to fold curtain from the offstage end of the track; sized for use with operating line if any.

Retain "Heavy-Duty Track System" or "Medium-Duty Track System" paragraph below for track duty or insert another system. Generally, use heavy duty for track 30 feet long and longer and medium duty for track less than 30 feet long. Verify that track can support weight of curtain retained. For heavy curtains, retain nylon option for carrier wheel material.

* + - * 1. Heavy-Duty Track System: Equip track with heavy-duty components as recommended by manufacturer for loads and operation. Provide end stops for track.

Curtain Carriers: Standard carriers of plated steel with a pair of nylon or neoprene-tired ball-bearing wheels riveted parallel to body. Equip carriers with rubber or neoprene bumpers to reduce noise, and heavy-duty, plated-steel swivel eye and trim chain for attaching curtain snap or S-hook. Provide quantity of curtain carriers sufficient for track length, to suit curtain fabrication.

Master Curtain Carriers: One master carrier, for each leading curtain edge, of plated steel with two pairs of nylon or neoprene-tired ball-bearing wheels and with two line guides per carrier.

Pulleys: One dead-end, single-wheel pulley; one live-end, double-wheel pulley; and one adjustable pulley to maintain proper tension on operating line; each with not less than 5-inch molded-nylon- or glass-filled-nylon-tired ball-bearing sheaves enclosed in steel housings. Provide pulleys with steel housing finished to match track and with bracket for securing off-stage curtain end.

* + - * 1. Medium-Duty Track System: Equip track with components as recommended by manufacturer for loads and operation. Provide end stops for track.

Curtain Carriers: Standard carriers of plated steel with a pair of nylon or neoprene wheels riveted parallel to body. Equip carriers with plated-steel swivel eye for attaching curtain snap or S-hook. Provide quantity of curtain carriers sufficient for track length, to suit curtain fabrication.

Master Curtain Carriers: One master carrier, for each leading curtain edge, of plated steel with two pairs of nylon or neoprene wheels and with two line clamps per carrier.

Pulleys: One dead-end, single-wheel pulley; one live-end, double-wheel pulley; and one adjustable pulley to maintain proper tension on operating line; each containing guarded ball-bearing sheaves enclosed in steel housings. Provide pulleys with steel housing finished to match track and with bracket for securing off-stage curtain end.

Retain "Manual Cord Operation" or "Motorized Operation" paragraph below. Revise for walk-along operation for lightweight steel-track installations, if required.

* + - * 1. Manual Cord Operation: Provide with cord operating line, 3/8-inch- diameter, stretch-resistant operating cord of braided synthetic-fiber jacket over solid, synthetic-fiber, linear filaments.
				2. Motorized Operation: Provide with cable operating line, 1/4-inch- diameter, stretch-resistant operating cable of braided synthetic-fiber jacket over galvanized wire cable.
			1. DRAW-CURTAIN MACHINES

Retain this article for draw-type operation; revise for lift or roll-up operation.

Insert requirements in "General" paragraph below for wall- or track-mounting machines and sheet metal machine enclosures available from manufacturers. Motors, controls, rigging, and operator locations are safety issues when children will be backstage. Consult curtain-system or machine manufacturers for recommendations for specific installations. Different-sized machines may be required for different curtain types and operation. If using more than one model, indicate location of each on Drawings or by inserts.

* + - * 1. General: Operating machine of size and capacity recommended and provided by track manufacturer for each motorized curtain specified; complete with electric motor and factory-prewired motor controls, starter, gear-reduction unit, brake, and control station.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Automatic Devices Company.

Tru-Roll, Inc.

Approved equivalent.

Retain one of or both "Operator Type" paragraphs below; revise to suit Project. If using more than one model, indicate location of each on Drawings or by inserts. First paragraph is suitable for large curtains but requires floor space for installation. Second paragraph is suitable for medium and long curtains and can be located off the floor. Consult curtain-system or machine manufacturers for recommendations for specific installations.

* + - * 1. Operator Type: Cable drum with grooved drum and cable tension device to automatically take up cable slack and retain cable in grooves.
				2. Operator Type: Traction drive.
				3. Motor Characteristics: Size sufficient to start, accelerate, and operate curtain in either direction from any position at indicated speeds without exceeding nameplate rating or service factor; complying with NEMA MG 1 and the following:

Verify motor performance and availability with track manufacturer and coordinate electrical characteristics with Project's electrical engineer.

Electrical Characteristics:

Verify motor performance and availability with track manufacturer and coordinate electrical characteristics with Project's electrical engineer. See Evaluations.

Phase: **[Single phase] [Polyphase]**.

Volts: **[115 V] [208 V] [NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected]**.

Hertz: 60.

Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.

Revise "Controllers, Disconnect Switches, Wiring Devices, and Wiring" Paragraph below if required; coordinate requirements with Project's electrical engineer. Verify which electrical devices, connections, and wiring, if any, are furnished or installed by other than the stage-curtain manufacturer; these devices must comply with requirements for electrical devices and connections specified elsewhere.

* + - * 1. Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
				2. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

Revise "Control Station" Paragraph below if machine retained has toggle-type switch. Insert requirements for multiple control stations if any.

* + - * 1. Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

Revise "Switches" and "Control-Station Enclosures" subparagraphs below to suit Project, or delete both and insert another. Key operation or other safety precaution is typical for school installations.

Switches: Key-operated, keyed alike, with one key per switch plus one extra key.

Control-Station Enclosures: Key-accessed, keyed alike, with one key per enclosure plus one extra key.

* + - * 1. Limit Switches: Fully closed and fully opened preset stops.

Insert requirements for accessories such as pivot arms to rotate curtain position and switching devices for switching curtains to another track.

* + - 1. CURTAIN RIGGING

Retain "Battens" paragraph below for battens used as stiffeners for suspended track and as supports for fixed valances and ceiling borders. Insert galvanizing requirements if applicable.

* + - * 1. Battens: Fabricated from steel pipe with a minimum number of joints. Connect pipe at joints with a drive-fit pipe sleeve not less than 18 inches long, and secure with four flush rivets, plug welds, threaded couplings, or another equally strong method.

Consider changing pipe to NPS 1-1/4 for small or lightweight installations.

Steel Pipe: ASTM A53, Grade A, standard weight (Schedule 40), black, NPS 1-1/2 nominal diameter unless otherwise indicated.

Finish: Shop painted black, with a 1-inch- wide yellow stripe at center of each batten.

* + - * 1. Supports, Clamps, and Anchors: ASTM A153, Class B, galvanized sheet steel in manufacturer's standard thicknesses, galvanized after fabrication.

Retain "Trim and Support Cable" or "Trim and Support Chain" paragraph below or both for suspending and leveling pipe battens and curtain tracks.

* + - * 1. Trim and Support Cable: 1/4-inch- diameter, 7x19 galvanized-steel cable with a breaking strength of 7000 lb. Provide fittings according to cable manufacturer's written instructions for size, number, and method of installation, including a drop-forged galvanized turnbuckle to allow for leveling.
				2. Trim and Support Chain: ASTM A391, Grade 80, hardened alloy steel chain rated for overhead lifting.
				3. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard corrosion-resistant units.
1. EXECUTION
	* + 1. EXAMINATION
				1. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage-curtain work.
				2. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens.
				3. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. INSTALLATION, GENERAL
				1. Install stage-curtain system according to curtain and track manufacturer's written instructions.
			3. BATTEN INSTALLATION

Revise spacing in paragraph below for batten pipe smaller than NPS 1-1/2.

* + - * 1. Install battens by suspending at heights indicated with trim and supports spaced to support load, except do not exceed 10 feet between supports.

Retain "Cable Trim and Support" or "Chain Trim and Support" subparagraph below for cable or chain suspension; retain both if chain is used with cable.

Cable Trim and Support: Secure cables either directly to structures or to inserts, eye screws, or other devices that are secure and appropriate to substrate and that are not subject to deterioration or failure with age or elevated temperatures. Attach other cable end to pipe clamps with turnbuckles, housed or fixed with nuts after adjustment, to prevent loosening.

Chain Trim and Support: Secure chain with load-rated terminations.

* + - 1. TRACK INSTALLATION

Retain one or more of first four paragraphs below; revise to suit Project.

* + - * 1. Ceiling-Mounted Track: Drill track at intervals not greater than manufacturer's written instructions for spacing, and fasten directly to structure.
				2. Beam-Mounted Track: Install track by suspending from beam clamps securely mounted to I-beam structure at track-support spacing, according to manufacturer's written instructions.
				3. Wall-Mounted Track: Install track by suspending from brackets securely mounted to wall construction at track-support spacing, according to manufacturer's written instructions.
				4. Batten-Hung Track: Install track by suspending from pipe batten with manufacturer's track clamp hangers attached to batten pipe clamps at track-support spacing, according to manufacturer's written instructions.
				5. Track-Support Spacing: According to manufacturer's recommendations for applied loads, but not exceeding the following dimensions between supports:

Heavy-Duty Track: 72 inches.

Medium-Duty Track: 48 inches.

Curved Walk-Along Track: 48 inches, with additional supports at curves and splices.

Retain paragraph below if required; revise to suit Project.

* + - * 1. Install track for center-parting curtains with not less than 24-inch overlap of track sections at center, supported by track lap clamps.
			1. CURTAIN INSTALLATION
				1. Track Hung: Secure curtains to track carriers with **[S-hooks] [snap hooks]**.
				2. Batten Hung: Secure curtains to pipe battens with **[S-hooks] [ties]**.
			2. DRAW-CURTAIN-MACHINE INSTALLATION
				1. Install each draw-curtain machine by securely mounting to the supporting construction, according to manufacturer's written instructions.
				2. Adjust each installation to function smoothly and lubricate as recommended by manufacturer.
			3. DEMONSTRATION

Retain this article for complex installations or for systems with complicated controls. Revise to suit Project.

* + - * 1. Engage a Company Field Advisor to train Facility’s maintenance personnel to adjust, operate, and maintain stage curtains, draw-curtain machines, and tracks.
			1. CURTAIN SCHEDULE

This article demonstrates a method of indicating requirements for stage curtains. This schedule is an example only; revise to suit Project.

Assign a drawing designation for each required stage curtain, and retain required components and other requirements that apply to it. Use these designations on Drawings to identify locations. Coordinate this curtain schedule with the related requirements in Part 2 articles.

First paragraph below is for a variety of stage curtains; revise to suit Project. Copy this paragraph and re-edit for different stage-curtain types. See Evaluations for definitions.

* + - * 1. Stage Curtain **<Insert drawing designation>**: As indicated on Drawings and as follows:

Type: **[Proscenium] [Grand drape] [Tormentors] [Intermediate] [Traveler panels] [Legs] [Sides] [Border] [Valance] [Scrim] [Drop] [Cyclorama]**.

Generally, retain "Horizontal Accessory Curtain" subparagraph below if a horizontal component of the curtain type, not reaching the floor, is required; revise to suit Project.

Horizontal Accessory Curtain: [Teaser] [Valance].

Size and Arrangement: As indicated on Drawings.

Fabric: **[Heavyweight woven cotton velour] [Medium-weight woven cotton velour] [Lightweight woven cotton velour] [Polyester velour] [Duvetyn] [Duvetyn, heavy weight] [Repp, atlas oxford] [Repp, Nassau chevron] [Synthetic boucle] [Polyester] [Sharkstooth scrim] [Muslin]**.

Lining: **[Cotton] [Ranger] [Polyester]**.

Fullness: **[Flat] [50 percent] [100 percent]**.

Revise "Bottom Weights" subparagraph below if a horizontal accessory curtain for the main curtain type is not to have weights. A border-type curtain may also function adequately without weights.

Bottom Weights: **[None] [Individual weights] [Proof coil chain] [Weight tape] [Pipe or conduit weight and stiffener]**.

Hanging Accessories: **[S-hooks] [Tie lines] [Snap hooks]**.

If retaining first option in "Battens" subparagraph below, verify that required curtains can be supported by existing battens.

Battens: **[Use existing] [As indicated on Drawings] [As recommended by manufacturer]**.

Retain subparagraphs below for traveling curtains only. If retaining first option in "Track" subparagraph, verify that required curtains can be supported by existing track and operating system. Insert splicing clamps in "Track" subparagraph below if required. 24- to 26-foot track length is available without splices, depending on manufacturer.

Track: **[Use existing] [Aluminum] [Medium-duty steel] [Heavy-duty steel] with [single-] [double-]** curtain capacity.

Track Shape: **[Straight] [Curved as indicated on Drawings]**.

Operation: **[Manual walk-along] [Manual cord (pulley rope)] [Motorized] [Motorized with fold guide]**.

If retaining "Draw-Curtain Machine Location" subparagraph below, consult manufacturers for recommendations.

Draw-Curtain Machine Location: **[Floor mounted] [Track mounted] [Overhead mounted] [Wall mounted] [As indicated on Drawings]**.

Special Requirements: **<Insert requirement>**.

END OF SECTION 116143